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ESTABLISHMENT OF A PILOT PLANT FOR PESTICIDE FORMULATION

DP/BUR/80/011

UNION OF MYANMAR

Technical report: Findings and Recommendations*

Prepared for the Government of the Union of Myanmar
by the United Nations Industrial Development Organization,
acting as Executing Agency for the United Nations Development Programme

Based on the work of I. Bendefy,
consultant in formulation and marketing of pesticides

Backstopping officer: B. Sugavanam, Chemical Industries Branch

United Nations Industrial Development Organization
Vienna

* This document has not been edited.

EXPLANATORY NOTES

FBP	=	Final boiling point
IBP	=	Initial boiling point
MAS	=	Myanma Agriculture Service
m/h	=	miles/hour
MOA	=	Ministry of Agriculture
MPE	=	Myanma Petrochemical Enterprise
MPI	=	Myanmar Pharmaceutical Industries
PPPF	=	Pilot Plant for Pesticide Formulation
SK	=	Superior Kerosene
s/s	=	Stainless steel
UNDP	=	United Nations Development Programme
UNIDO	=	United Nations Industrial Development Organization
yt	=	yearton = ton/year

* * * * *

I. SUMMARY

Project Title: Establishment of a Pilot Plant for
Pesticides Formulation

Number: DP/BUR/80/011/11-01

Purpose of the project: To provide facilities for the formulation
of liquid pesticides using locally avail-
able solvents as far as possible

Objectives of the mission were to evaluate the progress of the project and to assist/advise on various aspects related to the implementation of the project according to the work plan agreed upon between UNIDO and the project authorities.

The expert was expected to ensure effective cooperation between international and national staff and

- to make sure the local staff (skilled and semi-skilled) are provided according to the requirements;
- assist in contacting raw material suppliers, when necessary
- to, in consultation with the National Project Manager, modify the Work Plan to facilitate better implementation;
- to organize and give continuous attention to in-service training of the national personnel assigned to the project.

During the mission it became clear that a new Pesticide Law is to be issued by the Government, which deeply influences the activities within the project. Accordingly coordination work was extended to this area as well.

The present report gives an analysis of the status of the project based on the revised (July 1989) work plan with suggested modifications and a review of activities aimed at promoting and coordinating the implementation of the project.

A C K N O W L E D G E M E N T

The consultant wishes to acknowledge the whole-hearted cooperation extended by the management and the staff of Myanma Pharmaceutical Industries, as well as by all the Government officials and organizations in Myanmar who collaborated in various activities and assisted the consultant in his work.

Particular mention is made of the efficient help of the six member team of senior staff for the project headed by U Win Kyi, National Project Director and U Myint Swe, Project Manager. U Ban Yi, Director of Planning, Myanma Pharmaceutical Industries, (MPI) showed great interest in the work and was always ready for consultation and assistance.

Mr. K. Kitatani, Resident Representative and U Htin Aung, Programme Officer, UNDP, followed the activities with continuous attention, provided necessary guidance and help, together with the whole UNDP staff.

Dr. Gaston Pierrard and Dr. Arpad Ambrus of FAO provided quick and efficient assistance in information and consultation during the whole project.

Thanks are due to Dr. M.G. Srivastava who covered the important area of safety by a very careful and detailed inspection.

Cynthia Daw Mya Mya assisted the project with excellent secretarial service.

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* * *

II. HISTORY AND BACKGROUND OF THE PROJECT

The Project is an integral part of the Government's Integrated Pest Control Management Programme aiming at keeping the country at the prevailing relatively pest-free conditions while increasing and intensifying commodity crops cultivation and substantially increase the yield per acre of cotton to meet the needs of the existing cotton textile mills.

The Project is expected to supply sufficient quantity of liquid pesticides for paddy crop and cotton crop pest control and beside that to supply pesticides in minimal but sufficient quantity to the Plant Protection Division to carry out field testing of new pesticide formulas and/or on new pest strains.

The history of the project is traced back to 1974 when a proposal for Pyrethrum Extraction and Pesticides Formulation Pilot Plant was included in the UNDP Second Country Programme (1974-78). In July 1978, UNDP authorized the approval of a UNIDO prepared version, which included only a liquid pesticide formulation line. The Pyrethrum proposal was not accepted by the Government. A Project Document was finally approved by all parties in April 1983. It called for the establishment of three production lines: for liquid formulation, for dust formulation and granular formulation with UNDP contributions budgeted at US\$ 958,000. It became very soon apparent that UNDP inputs were grossly underestimated and a new estimate was set at about US\$ 1,850,000. A proposal was made to establish a first phase (laboratory, liquid formulation line and supporting services). At this point UNDP suspended the project implementation. An evaluation mission clarified the doubts why only insecticides and why only liquid formulations should be produced. Meanwhile a few training elements of the project were implemented and some laboratory equipment items were procured. The Government constructed 3 buildings (laboratory, workshop and store); a team of 5 most senior personnel of the project was nominated and stand by ready for the project to restart.

A new revised Project Document was prepared calling for only liquid formulation, production and ancillary equipment estimated at US\$ 680,000 and was approved in October 1987. SICPLANT (Italy) had been selected as contractor and the equipment was delivered during 1989.

III. ACTIVITIES DURING THE MISSION

According to the provisions of the Project Document UNIDO hired Mr. I. Bendefy as Chief Technical Adviser to carry out a survey on the project.

I. Bendefy served in Myanmar from 16 December 1989 to 4 February 1990. MPI assigned six of the selected senior staff as counterparts headed by U Win Kyi, National Project Director. Headquarters were in Yangon, office, transport and secretarial service was provided by MPI.

A. REVIEWING THE PROGRESS

Activities started by reviewing the progress made in the project and the findings were recorded in a Status Report attached as Annex II. The review was based on the revised Work Plan, dated 13 July, 1989. Documents used while preparing the report were the Terminal Report DP/10/SER.B/468, 18 July 1984, the revised Project Document BUR/80/011/1/01/37 dated 2 October 1987 and the Contract No.87/138 between UNIDO and SICPLANT INTERNATIONAL SRL.

According to the structure of the Work Plan the revision covered areas of Planning and Design, Laboratory, Civil Engineering and Energy Supply, Plant Erection and Start Up, Monitoring and Evaluation, Fielding of Experts and Consultants as well as Training

In agreement with the Project Management and due to several on-going activities with uncertain termination included the delay of the visit of the contractors team no revised Work Plan was prepared.

During the revision an Organization Table has been prepared and is attached under Annex III. In the table both recommended and filled in posts are shown. The table on the next page shows that the recruitment advances properly. Unfilled posts of qualified personnel is only 3. The greatest gap is at skilled personnel for the Production, which should be completed by the time the performance tests start, to provide proper training by the contractors team for them.

	<u>Personnel Planned</u>	<u>Recruited</u>	<u>Missing</u>
Administration Department	32	16	16
Laboratory	8	4	4
Production	18	4	14
Finance Dept.	5	2	3
Planning Dept.	20	10	10
<hr/>			
Total	- 83	36	47

1. Planning and Design

Already at the time of the revision all the original design work had been completed. Design of minor items will be necessary, such as:

- foundations for the incinerator
- foundation for the Diesel Generator
- Water Reservoir Basin for firefighting
- settling (on charcoal) & evaporation basin
- oil trap in the canal
- glass chips storage box

2. Laboratory

The construction works of the laboratory building had been finished, furniture for the rooms provided. UNIDO purchased the basic instruments however, in this respect the Quality Control Consultant revealed some deficiencies. The Safety Verification Inspection also revealed a number of deficiencies to be corrected. Both areas are covered by the relevant reports of the experts. Activities in this area are dealt with separately under G.

3. Civil Engineering and Energy Supply

Civil Engineering work made progress as far as to enable start of the performance tests in February/March. A major deficiency is the lack of the incinerator. Potential designer has been contacted to offer design, construction or assistance in construction.

The firefighting water reservoir basin has not been built; the Safety Verification Inspection declared this as essential. The

safety inspection did also point out the importance of a firefighting engine. There is no provision at the moment for either the engine or its housing. The housing may be solved by placing it in the garage, the reservoir could be replaced by the water tank at the tube well.

4. Plant Erection and Start Up

All the items of the Work Plan have been investigated and commented in the Status Report (Annex II). Recommendations for changes/completions in the liquid formulation plant were prepared and are shown in Annex IV. The following bottlenecks need special attention:

- The order of the mould for 0.5 lit glass bottles was delayed due to additional request from the glass bottle factory for accessories for the moulds as well. The safety inspection also suggested some modification on the moulds. The possibility of performance of these modifications is being cleared.
- The order of the 1 lit glass bottles' mould was pending for a certain period, as MPI wanted to check the possibility whether tin containers could be produced being less breakable. After that this approach did not prove to be successful mould and accessories were also ordered for the 1 lit. bottles. Due to the above delays glass bottles will not be available earlier than March or April.
- However, the machinery has been placed and pipe connection lines laid down, the chemical resistant floor cover might be laid down, only after the contractors final inspection and all the welding works finished in the area.
- Drop and rolling tests of the collective cardboard boxes cannot be made earlier than glass bottles will be available.
- Production of even large-scale trial quantities need the consent of MOA, MAS based on tests performed with experimental lots.

5. Monitoring and Evaluation

An evaluation of the present status and the next necessary actions was foreseen together with the contractor. This could not be performed because of the delay of the contractor team's visit. The next (second) tripartite review is suggested for January 1991.

6. Fielding of experts and consultants

The fielding of experts should be continuously adjusted to the progress in the project. Urgently needed is the visit of an expert in packaging.

7. Training

Since the project implementation started the six senior staff members selected by MPI underwent a very extensive training programme performed at pesticides manufacturing companies of wide experience which enables them to realize a proper management of the Pilot Plant for Pesticides Formulation. The companies providing training included:

- Sumitomo Co. Japan
- Hoechst AG, FRG
- Ciba-Geigy AG., Switzerland
- Chemie Linz AG., Austria

Before start-up the contractor provides/provided training to the same staff.

B. COORDINATION WITH THE MINISTRY OF AGRICULTURE

The future activity of the PPPF is connected with the responsibility area of the MOA in more lines:

- financial provision was made for the purchase of technical active substances and other primary materials by the MOA from their funds;
- the receiver of the goods produced by the PPPF will be the Agriculture;
- within a short time the Pesticide Law will be issued which regulates all activities concerning the sales and distribution of pesticides and therefore the PPPF must organize its

own activities in such a way that they should be in accord with the provisions of the law.

Considering all the above a discussion was organized, see Annex V; where representatives of the Ministry of Agriculture, the PPPF and UNDP/UNIDO were present. The main issues of discussion were:

- information about the progress made in the project,
- clarification of which products should be considered as standard formulated products, established in Myanmar,
- clarification of technical questions affecting product quality,
- clarification of the time schedule of agricultural spray programmes to be coordinated with the production programme,
- clarification of standpoint concerning rumours on dimethoate accidents,
- clarification of the requirements of the MOA concerning biological testing
- clarification of the procedure to be followed concerning the registration of products,
- clarification of the main requirements concerning packaging and transport of products,
- agreement on the quality control of imported technical active substances.

Based on the time schedule of the sprayings, a model Production programme was prepared which is attached in Annex VI.

C. SAFETY VERIFICATION INSPECTION

According to the Work Plan, UNIDO provided the services of Mr. Madho G. Srivastava, Safety Verification Expert, who arrived in Yangon on the 27th of December 1989 and completed his work by 9th January, 1990. Two visits were organized to inspect the Plant. The potential hazards to be considered were viewed from the following angles:

- 1). Operational safety (relates to work in the plant and with the equipment, storage of raw materials and finished products, services, handling equipment etc.)

- 2). Occupational Safety (covers health and safety of workers, avoid undesirable exposure, accidents and other emergencies).
- 3). Environmental Safety (concerns pollution of soil, water, air and neighbouring community in case of any serious leakage, fire and explosion, disposal of waste etc).

All the available basic information was provided for the expert, the inspections were performed together and the findings, recommendations discussed. Findings and Recommendations are available in the relevant report, therefore in the present report, reference is made to the most important issues only.

During the mission it was not possible to clear the problem of potential flooding at the Production building. A meeting was organized later which cleared that no fears should be in this matter. For details see Annex VI.

D. ASSISTANCE IN CONTACTING RAW MATERIAL SUPPLIERS

Pesticides have been imported until now in the form of ready to use formulated products, each product from only one standard supplier. These products are listed in the Annex VII. The use of these products proved to be safe and efficient in the Myanma Agriculture as the MAS stated.

Concerning the start of a new industry branch, Pesticide Formulation, reasons were given why it is important for the factory not to depend only on one single supplier for each product. Beside the necessity of having alternative suppliers the importance of the control of the proper quality which can be characterized mainly by its impurity profile has been stressed. Reliable suppliers have been suggested and the first contacts have been initiated in order to have quick responses. Altogether 14 companies were contacted/ requested to send data sheets, methods of analysis, analytical standard, sample of technical a.i. Assistance was also provided to contact the companies requesting the registration of their standard formulation.

E. CONTACTS WITH EMULSIFIER SUPPLIERS

The activity of the laboratory in the Plant is twofold:

- quality control
- formulation development

The program of this latter includes development of new formulae containing:

- active ingredients from new sources
- new active ingredients
- new emulsifiers

The aim of this latter is to find the formula which is the most economic, provides perfect emulsion properties matching the set specifications at minimum cost. Some emulsifier samples from Japan were already available. Three types of Geronazzo emulsifiers were being shipped in commercial quantity but with uncertain arrival date.

The manufacturers of emulsifiers contacted for providing samples are listed in Annex VIII. Most of them responded positively on our request to send samples for testing.

There are two special additives also needed:

1) Epichlorohydrine (1-chloro-2,3-epoxypropane)

melting point: - 25,6°C

boiling point: 117,9°C

2) Epoxidized Soybean oil

flash point over 310°C

sources: Edenol D 81, Henkel, FRG

Reoplast 39, Ciba Geigy

Steps were made to acquire the needed quantities.

F. DISCUSSION CONCERNING SUPPLY OF SUPERIOR KEROSENE

Discussion was organized with the management of the MPE in order to investigate not fully clarified issues concerning the potential of supply the PPPF with Superior Kerosene. It could be cleared in the discussion

- the specification of the SK available,
- that the PPPF will be supplied from the closest refinery,

- that there is no objection to supply in more than one lot,
- that SK does not contain water when produced
- that the supply can be realized by road tankers and
- that other fractions with potentially higher aromatic content might be checked on suitability

This way the supply of the plant seems to be ensured. Details of the discussions are attached in Annex IX.

G. ACTIVITIES CONCERNING THE LABORATORY

The role of the laboratory rooms has undergone some changes as compared to the original plan. e.g. no biological laboratory will be established, the general laboratory was placed on the 1st floor instead of ground floor etc. During the safety inspection it was agreed the No.2 room will be used as Medical Treatment Room. Agreement was met concerning the final use of the rooms, they were numbered, their use recorded as shown in Annex XI.

The report of the Consultant in Quality Control states that the water pressure in the laboratory is not sufficient; supposedly this is due to having moved it to the 1st floor and thus decreasing the level difference in reference to the trestle. This affects mainly the water distilling apparatus. It was decided that this apparatus will be moved to the ground floor into room No.5. Should the water supply in the laboratory not improve a small (500 - 1000 lit) trestle should be erected aside the laboratory preferably insulated, to provide cooling water for the apparatus.

Steps were made to change the unusable Karl Fischer apparatus and to acquire a standard distillation apparatus to control Kerosene quality.

The representative of Perkin Elmer Co. was contacted and requested to submit offer for indispensable spares for the gas chromatograph. The spares were ordered as Field Purchase including G.C. columns as main items. Without these columns it was not possible to elaborate the proper analytical methods.

A SAMPLING CERTIFICATE form has been drafted to be used for imported technical active substances and a CERTIFICATE OF ANALYSIS for formulated products. Annex XII.

UNIDO/Vienna gave information about the purchase of a Diesel Generator of 70 KVA (56 KW), AC 400/230 V, 50 Hz, three phase, which will serve as Uninterruptible Power Supply for the laboratory, to eliminate fluctuations in voltage and thus eliminating damage of the expensive laboratory apparatus (GC). It has been decided that it will be placed in the room of the aircompressor/boiler in the Liquid Formulation building and provision was made of the preparation of the foundations.

The recommendations of the Safety Verification Expert were evaluated and the necessary activities initiated with main stress on change of electrical switches/fittings etc. for explosions proof quality. However it was stated that the built in fittings of the two fume chambers are not ex-proof as well and change seems to be very difficult.

By the beginning of 1990 MPI assigned two assistant chemists for the laboratory.

H. CONTACTS AND ACTIONS CONCERNING GLASS BOTTLES

UNIDO Vienna ordered one set of moulds with accessories for the production of 0.5 lit bottle (double gob) in December 1989. Supplier OSC S.p.A., Milan, Italy; delivery term: 60 days after order receipt. The discussion with MOA, MAS on 2nd January Annex V, concluded that it is necessary to make the capping pilferproof to avoid opening until final destination, and it is advisable to apply ring shape elevations at the bottom and the shoulder of the bottles to ensure secure grip when using.

The above aspects were forwarded to OSC for consideration on 5th January. When the order of the 1 lit bottles was initiated at UNIDO Vienna, the same aspects were requested for consideration as well as the addition of accessories.

Information was obtained from OSC that there is no objection to make changes on the bottles' design according to request, only they need confirmation of certain dimensions. It's confirmation was delayed, as the machinery of the Syriam Glass factory is a different type one.

J. CONTACTS AND NEGOTIATIONS CONCERNING COLLECTIVE PACKING AND THE USE OF PALLETS.

The collective packing should comply with the following requirements:

- provide maximum safety by eliminating, or at least keeping at minimum rate the breakage of the bottles;
- to be economic by providing the maximum rate of re-use

Two alternatives may be introduced and therefore both were investigated:

- use of corrugated cardboard boxes,
- use of wooden crates

In order to collect as much information as possible discussions and visits were organized with the following institutions:

- Packaging Material Factory No.2, for details see Annex XIII.
- Myanma Pharmaceutical Industries' factory, for details see Annex XIV.
- Dagon Pure Drinks & Ice Factory, for details see Annex XV.
- Myanma General Industries factory, (not performed).

Based on the information collected the following main consequences can be drawn:

Double sheet corrugated cardboard box collective packing containing not more than 12 bottles with internal partitions provided and sealed with broad self-adhesive strips seams to be safe enough provided it is packed, transported and stored under dry conditions. The risk involved at using this type of collective packing is that the boxes will be wet during transport and storage in the rainy season. This would mean considerable decrease of the strength of the boxes and consequently increase of damages when handling or when

stored, stacked up at height of five - six, for the bottom layers.

Wooden crates seem to be same or even more safe if provided with a bottom sheet, top sheet and partitions of double-sheet corrugated paper also sealed with self-adhesive strips. This collective packing offers higher rate of re-use and better possibility to serve as return container for the empty glasses.

To estimate the economic aspects of both alternatives, the following calculation was made using estimated re-use rates for both packing:

Production in 1990:	475000 lit.	
Equivalent No. of $\frac{1}{2}$ lit. bottles:	950000 bottles	
	<u>paper boxes 12 pcs.</u>	<u>wooden crates 15 pcs.</u>
Collective packing, No:	79,167	63,333
" " unit value:	16.70*	24.00
" " total value:	1,322,083 Ks	1,520,000 Ks
Estimated recirculation rate	70%	95%
Recirculated value:	925,458 Ks	1,444,000 Ks
Non-returning expenses:	396,625 Ks	76,000 Ks

*Price not yet confirmed.

It is stressed that the above considerations are only estimated, therefore it is recommended to collect experience of both alternatives, i.e. to make use of both collective packing in commercial quantity to collect reliable experience of advantages and disadvantages.

It is also recommended for the future that the possibility of producing plastic crates at the Plastic Factory in Hmawhi should be investigated as a third alternative offering maybe the most advantages. It would be not only the PPPF project the single user of such locally made crates.

All the above problems and alternatives were discussed with the representatives of MAS (see Annex XVII), and they expressed their wish to check the possibility for a change in the future in favour of aluminium or suitable plastic bottles.

According to the original plan, boxes/crates should have been loaded on trucks on and together with pallets. Considering the fact that at the countryside there are no facilities available to unload shipments packed on pallets, it has been decided that no pallets will be used for the national transport. They will be used for internal transport within the plant only. As different size boxes/crates will be used in the plant but it is important to achieve a good coverage on the pallet what is not possible with uniform size pallets it is recommended to use two different pallet sizes with colour marking. This will also help to find proper size pallet for the various size active substance drums.

Another discussion with wooden boxes producing factory was not possible because of time shortage.

IV. RECOMMENDATIONS

As it is mentioned in the Report it did not seem to be practical to prepare again a new Work Plan, instead it is recommended that it be used as a check list together with the present Report. However, detailed information on the present status and guidance for the follow-up is included in the Report covering all areas of the Project, it is especially recommended:

a) Construction/Design

- that additional objects missing as compared to original suggestion or revealed later should be designed and constructed (see Annex XVI). Financing of the above needs should be cleared; it is suggested, to be Government contribution;
- that the implementation of the Safety Verification Recommendations should receive special attention and continuous follow-up. Special stress is put on the recommended Accident Alarm System, which first needs to be designed properly;
- that the construction of the incinerator should receive continuous follow-up. In case of substantial delay a burning pit at an appropriate place - observing safety distances and wind direction - might be provisional solution;
- that each building/object built in the future should be marked on the layout plan;
- that recommendations for changes/completions in the formulation workshop given in Annex IV should be observed.

b) Primary and packing material

- that the stores should be cleared, cleaned and safety prescriptions observed before material arrives;
- that when orders are placed, the delivery schedule for the arriving material should be planned in accordance with the available storage capacity;
- that in case of each order for technical active substances analytical standard samples should also be requested;

- that the technical active substances arriving at the post should be sampled without delay and the drawn samples forwarded to MAS for analysis with sampling certificate;
- that after successful testing of laboratory samples provision of Superior Kerosene should take place before the rainy season;
- that both wooden and double-sheet corrugated cardboard boxes should be tried as collective packing for suitability;
- that cardboard boxes should not contain more than 12 bottles;
- that as soon as sample bottles are available, the drop tests should be performed with the cardboard boxes (see Annex XIII).
- that only adhesive tapes, and no paper ones, should be used to seal the cardboard boxes;
- that as soon as the final design of the bottles or the sample bottles are available, steps should be made to change design of the screw caps for pilferproof design;
- that an expert in packaging should review the whole situation and more recommendations.

c) Organization

- that the staff of the production department should be completed by the time the non-load and performance tests will be started;
- that the four missing label text should be drafted without delay and submitted to MOA for approval;
- that as soon as all components for one formulation are available, 500 ml sample should be prepared and submitted to MAS for testing physical/chemical characteristics. Together with the sample an application for registration should be submitted;

- that upon approval of the above sample a pilot scale sample should be prepared (50 lit or less) and provided for biological testing. Large scale production may start only after registration or provisional licence had been granted;
- that as soon as components are available, the work for new formulations' development should start;
- that information on "Symptoms of poisoning" and "Recommendations for first aid and medical treatment" should be collected from suppliers;
- that the contractor should be requested to offer filling device for 2 - 10 lit. containers.

INSTITUTIONS AND PERSONS CONTACTED

United Nations Personnel

Mr. Katsuhide Kitatani	Resident Representative
U Htin Aung	Programme Officer
Dr. Gaston Pierrard	Chief Technical Adviser Biological Control of Agricultural Pests FAO
Dr. Arpad Ambrus	Pesticides Analyst, FAO
Dr. Madho G. Srivastava	Safety Verification Expert, UNIDO

Myanma Pharmaceutical Industries

Col. Soe Lwin (Retd)	Managing Director
U Ban Yi	Planning Director
U Thein	Deputy General Manager (Planning)
U Thein Hlaing	Deputy General Manager (Production)
U Pe Than	Deputy Manager (Filling)

Project Personnel

U Win Kyi	National Project Director
U Myint Swe	Project Manager
U Saw Moolar	Head, Laboratory
U Mon Tin Win	Assistant Head, Laboratory
U Saw Win	Head, Production
U Nyo Lay	Head, Maintenance
U Nan Tun Kyaw	Planning Manager

Ministry of Agriculture

U Maung Maung Tin	Project Director Plant Protection Project
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Packaging Material Factory No.2

U Nyan Tun	General Manager
------------	-----------------

Myanma General Industries

Daw Khin Khin Deputy Director (Planning)

Myanma Petrochemical Enterprise

U Aye Kyaw Director (Production)

Perkin Elmer Co.

Daw Chit Chit Myint Technical Representative

Public Works Services

U Thein Myint Assistant Engineer

U Maung Maung Assistant Engineer

U Hla Min Township Engineer

U Ye Min Township Engineer

U Aung Ba Township Engineer

U Tin Myat Deputy Group Leader
Architecture Group II

Engineering Industry No.4

U Zaw Aye Electrical Engineer

Dagon Pure Drinks and Ice Factory

U Soe Tint General Manager

Myanma Agriculture Service

U Soe Myint General Manager

U Tun Lwin Deputy General Manager

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UNIDO - VIENNA PROJECT NO.DP/BUR/80/011
MYANMA PHARMACEUTICAL INDUSTRIES
PESTICIDES PILOT PLANT - HMAWBI - MYANMAR

STATUS REPORT

Based on the revised Work Planning, dated 13 July, 1989, reflecting status at 1st January 1990.

The Work Plan is organized according to the following main fields of activities:

- 1). Planning and Design
- 2). Laboratory
- 3). Civil Engineering and Energy Supply
- 4). Plant Erection and Start Up
- 5). Monitoring and Evaluation
- 6). Fielding of Experts and Consultants
- 7). Training

1. PLANNING AND DESIGN

Already at the time of the revision all the design work had been completed. Additional objects mentioned under 3 need additional design work.

2. LABORATORY

2.1 Finishing work on building

Building construction has been completed in time.

2.2 Procurement of Gas Chromatograph

The apparatus had been procured, installed and tested. Consultant in Quality Control made recommendations to change the glass column and procure proper packing for the column. Except those aspects the apparatus is well functioning but without the proper column the development of methods is not yet possible. Provision is expected in March.

2.3 Electrical connection/installation of equipment

Electrical connection/installation of equipment has been completed, however, the electrical wiring system of the laboratory needs some completion/rearrangement according to the recommendations of the Consultant in Quality Control, and the Safety Verification Expert. It is a constant problem the shortage of minor expendable items, such as plugs, safety breakers, fuses etc. It is urgent need to cope with this problem.

The following main apparatuses are in service in the laboratory:

- Water distilling apparatus
- pH meter
- Karl-Fischer apparatus (needs replacement)
- Dean and Stark distillation unit
- Refrigerator
- Analytical balance (2)
- Glassware is enough to perform emulsion stability tests. One refrigerator seems to be not enough to store sensitive chemicals. Acquisition of a second one is necessary and urgent.

2.4 Adaptive research in pesticide formulation

A Formulation Research Chemist has been nominated and partially trained, a three-month training is due in Jan/March 1990. True work may start only when all components of the future pesticides will be available in a number of variety including active substances, solvents and emulsifiers. Another need is assistant personnel.

MPI promised to appoint three chemists for the laboratory. Efforts are being made to acquire various samples of emulsifiers and technical active substances from various firms. Accordingly the start of the work is delayed since October 1989.

2.5 The aim of the biological testing for both efficacy and phytotoxicity is to avoid eventual loss in the agriculture and at the same time to cope with the requirements of the new Pesticide law to be issued soon but already known to the Project. Laboratory samples will be tested for chemical/physical properties, pilot scale samples will be tested for biological properties by the Ministry of Agriculture. Due to the preceding

paragraph the testing may start only after samples will be available, accordingly it is delayed since November 1989.

2.6 Purchase of Laboratory Chemicals

As a first provision some solvents arrived, the order of chemicals is just being processed and is expected to arrive in January. Together with the order of technical active substances provision of analytical standards is necessary,

2.7 Quality control on imported chemicals

According to an agreement with Ministry of Agriculture, MAS (see Annex IV.) the control of the imported technical active substances will be performed in MAS laboratory, only the sampling is the duty of the Formulation Plant. This solution provides at the same time firm base for eventual complaints as the test results will be originated from an independent laboratory.

2.8 On line quality control

It is suggested not to perform "on line" quality control in the production area. It is not justified, neither by the frequency of the tests (two batches/day) nor by the distance from the laboratory to start testing at a place where it cannot be properly done and would only mean another possibility of contamination to the environment.

3. CIVIL ENGINEERING AND ENERGY SUPPLY

According to the Work Plan a deadline of January 31, 1990 was set to finish all the construction works. The following buildings and other establishments are existing, being constructed or planned to be constructed:

1. Fencing and gate house
2. Office building
- 2a Temporary office building for the time of the construction
3. Laboratory (two stories)
4. Car garage
5. Workshop/maintenance building

6. Raw material store
7. Electrical substation
8. Liquid formulation building
9. Raw material and finished product store
10. Water supply together with tube well, pump house, trestle
11. Solvent store tank battery
12. Lockers
13. Incinerator
14. Internal roads
15. Electrical supply for the buildings
16. Residential buildings (outside) housing 15 families and 2 buildings for 6 persons each.

From the above: Nos. 1, 2, 2a, 3, 4, 5, 6, 7, 8, 10, 11, 15 and 16 are constructed, ready for use except for 8, where the glassing of the windows should be accomplished.

No. 9 is being constructed, readiness is about 70%

No.12 will be constructed in the 1st quarter, 1990

No.13: There is no drawing plan or offer available. It is urgently needed to acquire the above that the construction may start.

- At this point should be mentioned that the connecting road from Hmawbi to the site is as bad that it is nearly impassable, the maximum speed of lorries or cars is not more than 10 - 15 m/h and it is most probable, that in the rainy season the plant will be fully locked from supplies or lorries arriving to dispatch the ready products. Therefore, it is strongly recommended that the management of MPI should urgently ask for government assistance for proper road construction. (The same road serves the neighbouring cement products plant as well).

- The electrical substation should as early as possible be connected with the plant network to improve the quality and reliability of the supply mainly from the viewpoint of the laboratory work/equipment safety.

No. 14: the roads will receive an asphalt layer that the forklift truck may pass undisturbed.

In the passage between the buildings No.8 and 9, a shower room and a smoking/rest room will be built.

There is no provision (no drawing even) for the fire-fighting water reservoir foreseen in the Terminal Report.

There is also no provision of an oil trap built in into the canal at the point where it leaves the plant, suggested in the Terminal Report as well.

An additional settling/evaporation pit is needed to treat the effluents of the laboratory.

4. PLANT ERECTION AND START UP

4.1 Process Design

The process design has been completed in time.

4.2 Delivery of equipment to the site with inspection

All equipment has been delivered to the site. SIC was present at the opening of the containers.

4.3 Installation of production equipment

The personnel of MPI started the installation of the production equipment based on the drawings provided by SIC. The installation works are near completion, therefore the assistance, control and supervision of SIC personnel is due.

4.4 Installation of safety and emergency devices

The installation of safety and emergency devices needs completion according to recommendations of safety inspection.

4.5 Laying of supply lines

(Piping for solvents and compressed air network). Laying of the above lines is in progress. It may be finished in January.

4.6 Safety clearance

The first safety inspection is just being performed. The plant is not yet ready for safety clearance. Readiness is estimated by about end of March.

4.7 Recruitment of personnel

The present and needed personnel is given in the attached table, as Annex III.

4.8 Personnel training in Myanmar during the start up

Estimated period instead of original May/November 1989, would be July 1990 - January 1991.

4.9 Establishing of safety and emergency procedures

Set for 2nd half of May 1989 in the Work Plan. Performance depends on SIC plant, recommended for March 1990.

4.10 Selection of glass bottle design (bottle and screw top)

The selection was performed. Some modifications were suggested to increase safety.

4.11 Ordering of moulds for glass bottles

Effected in December, 1989 for 0.5 lit bottles. Delivery term 60 days. The order of 1 lit glass bottle's moulds was initiated in January including modifications as above.

4.12 Delivery of moulds for glass bottles

As above: expected delivery end of February/March

4.13 Production of glass bottles

In optimum case may start in March 1990.

4.14 Purchase of raw materials

Delayed due to shortage of foreign currency allocated. Allocation is now available. Estimated procedure: Issuing limited tender: January 1990.

Offers received:	February 1990
Tender awarded:	End of February 1990
Orders issued:	The week after tenders awarded
Delivery of 1st items:	April through June
Transportation to the site:	May through July

4.15 Performance tests

Earliest estimated date: March/April 1990

4.16 Product test period

Estimated start: April/May
Duration set for 7 months

4.17 Commissioning of the plant

Suggested start: July 1990

4.18 Guarantee period

Suggested start in accordance with the above: Jan. 1991

Additional Activities needed

4.19 Selection of suitable collective packing

Alternatives should be elaborated for

- a. Cardboard box
- b. Wooden box with partition

Alternatives should be evaluated for both safety & economy.

4.20 Proper sizing of pallets

Pallets will be used for internal transport within the plant; they need to be sized to carry either drums either boxes. Decision is needed based on previous paragraph's results whether to use pallets for national transport or not.

4.21 Calculation of needs and ordering pallets

January 1990

4.22 Coverage of floor with chemical resistant resin

March 1990

4.23 Preparation of label text

Text for two labels is ready, four more should be prepared and approved by Agriculture Service. Expected to be ready by February 1990.

4.24 Printing of labels

Printing of labels should take place in February/March

4.25 Provision of the screw caps

Screw caps for both size bottles should be ordered.

4.26 Protective wear prescriptions

Establishment of prescriptions of individual protective wear and tools for posts should take place. (Available in the report on Safety Verification).

4.27 Protective wear

Ordering of protective wear and tools should take place.

5. MONITORING AND EVALUATION

5.1 First tripartite review

Performed in July 1989

5.2 Second tripartite review

Foreseen for October 1990

Suggested for January 1991

5.3 Terminal tripartite review and internal evaluation

Foreseen for March 1991

Suggested for May 1991

5.4 First internal evaluation

Performed October 1988

5.5 Final internal evaluation

Foreseen November 1990

Suggested for May 1991

5.6 Briefing in Milan of the first group of training

Performed

5.7 Briefing in Milan of the second group of training

Due in January/February 1991

5.8 Inspection of main equipment in Italy before shipment

Performed

5.9 Opening containers report in Myanmar

Performed

6. FIELDING OF EXPERTS AND CONSULTANTS

6.1 Chief Technical Adviser (CTA)

Two months foreseen October/November 1989 being performed December 1989/January 1990.

Two months foreseen February/March, suggested instead July/August 1990.

Two months foreseen August/September, suggested Oct/Nov.

Further three months suggested early 1991.

6.2 Safety Verifying Consultant

Foreseen at early October 1989, early February 1990 and December 1990. The first inspection just being performed, the second is suggested for May, the last one for August/October.

6.3 Quality Control Consultant

Two months performed in 1988

Two months performed in October/November 1989

Further assistance should start as soon as possible, suggested end of March

6.4 Plant erection and start up experts

The foreseen date of March 1989 is delayed.

Suggested date: March through June 1990

6.5 Operation experts

Start of the foreseen period seems to be too early, in March 1990. It should join the previous one July 1990 through January 1991.

6.6 Unspecified consultant

Suggested: Consultation in packaging as soon as possible.

7. TRAINING

The following persons' training was foreseen:

- | | | |
|-----|------------------------------|-----------------|
| 7.1 | Formulation Research Chemist | - U Saw Mooler |
| 7.2 | Quality Control Chemist | - U Mon Tin Win |
| 7.3 | Plant Management | - U Win Kyi |
| 7.4 | Production Management | - U Myint Swe |
| 7.5 | Formulation Operator | - U Saw Win |
| 7.6 | Maintenance Engineer | - U Nyo Lay |

The training of persons under 7.2, 7.4 and 7.5 just terminated, the training of the persons under 7.1, 7.3 and 7.6 is due starting in January 1990.

Yangon, January 1990.

ORGANIZATION TABLE

Position	Quali- fied	P E R S O N N E L			Post Filled
		Skilled	Unskilled	Sub- Total	
Plant Director	1	-	-	2	1
Manager	1	-	-	-	1
<u>LABORATORY</u>					
Head	1	-	-	8	1
Assistant Head	1	-	-	-	1
Chemists	2	-	-	-	2
Lab Technician	2	-	-	-	-
Helper	-	2	-	-	-
<u>PRODUCTION</u>					
Manager	1	-	-	18	1
Supervisor	1	-	-	-	1
Mixer Operator	-	1	-	-	-
" Helper	-	2	-	-	-
Filling M/c Operator	-	1	-	-	-
Bottle charger	-	1	-	-	-
Capping M/c operator	-	1	-	-	-
Bottle cleaning	-	2	-	-	-
Labelling M/c operator	-	1	-	-	1
Carton box preparation	-	1	-	-	-
Bottle packer	-	2	-	-	-
Packing of carton box/piling	-	1	-	-	-
Transporting (Raw/Finished)	-	3	-	-	-

Position	Quali- fied	P E R S O N N E L			Post Filled	
		Skilled	Unskilled	Sub- Total		
<u>PLANNING</u>						
Manager	1	-	-	20	1	
Head of office	-	1	-	-	1	
Assistant	-	-	1	-	1	
Purchase: in charge	-	1	-	-	1	
: Assistant	-	3	-	-	1	
Maintenance: Head	1	-	-	-	1	
Assistant	-	1	-	-	-	
Electrician	-	1	-	-	1	
Mechanic	-	1	-	-	-	
Helper	-	-	3	-	2	
Stores : in charge	-	1	-	-	-	
Assistant	-	4	-	-	-	
Forklift	-	1	-	-	1	
<u>FINANCE</u>						
Manager	1	-	-	5	1	
Assistant	-	1	-	-	1	
Treasurer	-	1	-	-	-	
Book-keeping	-	1	-	-	-	
Payroll	-	1	-	-	-	
<u>ADMIN</u>						
Head	1	-	-	30	1	
Assistant	-	1	-	-	1	
Clerks	-	-	2	-	2	
Typist	-	3	-	-	1	
Driver	-	4	-	-	3	
Laundry	-	-	1	-	-	
Gardener	-	-	1	-	-	
Nurse	-	1	-	-	-	
Security Guard	-	-	16	-	7	
Total		14	45	24	83	34

Recommendations for changes/completions in the
Liquid Formulation Workshop

Production vessel (3000 L)

- Glass (acrylic) window or cylinder should be inserted into the connecting pipe to the overflow vessel to make overflow visible.
- Sampling device is not yet established. This should also work when the content is at minimum.

Overflow tank

- Pipe connection is needed to the pump returning products to the production vessel as well as to allow discharge by gravity into barrels.
- Sampling possibility should be provided even for minimal overflows.

Pumps for charging the a.i. and solvent

- Solvent suction pipe should be moved to direction of the wall to be closer to the scale.
- Valves in the suction branch should be placed into the horizontal section, end of the pipe bent at 45° only instead of vertical

Measuring Vessel

- It is necessary to attach additional pipe outlet by gravity to enable discharge solvents or to transfer SK from the storage tank battery into drums.

Filling tanks

- Direct inlet through filter is needed to transfer product from barrels into the filling tanks.
- Inlet pipes of the filling tanks should be separated close to the pump.
- Usefulness of the pipe branch after the transfer pump should be rechecked. Recommend elimination.
- The tanks need level indication

Pilot Mixing vessel

- Position of the vessel should be changed by turning by 120° anticlockwise to allow better arrangement for the cooler/heater piping.
- The mixer needs a platform
- The mixer need not be connected into the ventilation/suction system, use of individual protection is supposed/suggested.
- A funnel/chute should be provided, fixable on the window opening, to enable charging solids (material S/S)
- A platform scale of 50 Kg capacity is needed. It should be provided with hood connected to the suction system.
- A hand operated barrel discharging pump is needed to draw off small amounts of liquids.
- A measuring vessel with handles is needed for solids measuring up to 40 Kg with shovel (material S/S)
- Sampling device is needed.
- A flexible rubber hose direct connection is suggested to the bottling machine with filter.
- A hand operated drum-discharging pump should be provided.

Bottling Machine

- A control scale is needed measuring \pm deviations only at cca bttto 0.8 kg and 1.5 kg.

Pipework

- It is recommended to paint the different purpose pipes with different colours.

Minutes of the Discussion held on 2nd January 1990 at the
Plant Protection Project Director's Office, Yangon

Subject: Issues concerning the commissioning and operation of
the Pilot Plant for Pesticides Formulation, Hmawbi

Participants:

U Maung Maung Tin	-	Director Plant Protection Project Ministry of Agriculture
Dr. Gaston Pierrard	-	Chief Technical Adviser Biological Control of Agricultural Pests
Dr. Arpad Ambrus	-	Pesticide Analyst UNDP, FAO
Istvan Bendefy	-	Chief Technical Adviser Pesticide Formulation Plant
Dr. Madho G. Srivastava	-	Safety Verifying Expert Pesticide Formulation Plant UNDP, UNIDO
U Win Kyi	-	National Project Director
U Myint Swe	-	National Project Manager
U Mon Tin Win	-	Quality Control Chemist Myanmar Pharmaceutical Industries

* * *

1). Mr. Bendefy gave information about the progress made in construction of the Formulation Plant stating, that in his estimation:

- quality control activity in the laboratory may start within January-February, provided the electric network will be joined to the main power line and the column of the GC will be changed
- formulation development activity may start as soon as samples of the components will be available.
- the foreseen four months period for performance tests might be March through June;
- the foreseen seven months period for test run might continue in July through January 1991.

2) Information was given by representatives of the Myanma Agriculture Service of the Ministry of Agriculture/FAO concerning origin and use of the Insecticides already established for Pest Control in the agriculture of Myanmar, as shown in the attached table.

The representatives of the Formulation Plant offered to adjust the production programme as far as possible to the schedule of the use of the products however, it was stated that the work should start with the less dangerous active substances such as diazinon and cypermethryn.

According to estimation the present volume represents about 50 to 60% of today's total demand. Next products, which might be included into the local formulation program, are FENVALERATE and DELTAMETHRYN.

ESTABLISHED PRODUCTS IN THE AGRICULTURAL PESTS' CONTROL IN MYANMAR

<u>Product</u>	<u>Supplier</u>	<u>Qty '000 L</u>	<u>Requested Delivery</u>	<u>Period of Use</u>	<u>Crop/pest</u>
Fenitrothion	Sumitomo Chem. Corp. Japan	100	June	June - Sept	Rice & cereals, groundnuts, sesame, vegetables, pulses.
Dimethoate	Sumitomo Chem. Corp. Japan	25	June	Aug - Sept	Post-monsoon cotton
		25	Dec.	Feb - April	Pre-monsoon cotton
Endosulfan	Hoechst AG. FRG	50	Feb.	March- April	Pre-monsoon cotton (ballworm)
		50	July	Aug - Sept	Post-monsoon cotton (ballworm)
Cypermethryn	ICI Ltd., UK	35	Feb.	March- April	Pre-monsoon cotton (ballworm)
		40	July	Aug - Sept	Post-monsoon cotton (ballworm)
Diazinon	Nippon Kayaku Co. Japan	50	June	July - Oct	Rice (stem borer)
Phenthoate	Nissan Chem. Ind. Japan	100	Aug	Sept - Oct	Rice (foliar pests)

3). Recent oral information concerning accidents while storing/ formulating dimethoate was discussed. The information on nature and circumstances of these accidents is not available. The parties came to the conclusion that considering the long world-wide practice of dimethoate formulation without any higher than normal risk involved and any major accident reported, the activities may proceed as planned with the maximum care taken, especially keeping in mind the high demand of the agriculture against sucking pests.

4). Technical questions cleared:

The composition of the local formulations will be based on weights/volume content of a.i. determined at 24°C. Emulsion stability tests are to be performed both in CIPAC MT 18.1.1. and 18.1.4 Standard Water.

5). Representatives of the Formulation Plant took notice of the standpoint of the Myanma Agriculture Service of the Ministry of Agriculture that no new formulation will be released for distribution without prior biological testing. This standpoint is in accord with the new Pesticides Law to be issued in March 1990. The biological testing should cover both phytotoxicity and efficacy. Laboratory samples are not acceptable, pilot scale formulations should be provided for testing to the Myanma Agriculture Service of the Ministry of Agriculture.

Suggested procedure:

- (a) lab scale formulation tested on physical/chemical properties
- (b) based on approval of the above, pilot scale sample prepared and given for biological testing. The formulation plant has to pay for the expenses of the tests according to the Pesticide Law.

6). It has been discussed that a Registration Procedure will need to register each product of the Formulation Plant. Reasons were given concerning the importance of having alternative suppliers for the active substances. It has been cleared that a product containing different origin active substance than the standard products will also need to be registered. Considering the above, the following procedure is suggested to be followed:

- a). Request to the standard producer for analytical data including impurities and sample to enable initiate registration of the local formulation.
- b). Advice to the same producer to seek registration of his own standard formulation
- c). Request to the alternative supplier for data and sample to enable initiating registration of the local formulation.
- d). Advice to the alternative supplier to seek registration of his own standard formulation.

7). Problems of packaging and transport were discussed. Information was given that the products will be bottled in 0.5 lit and 1 lit glass bottles with screw cap, put in collective cardboard boxes and on framed pallets loaded on trucks. The following aspects were raised:

- the bottles should be thick enough to be sufficiently durable while transported on the rough roads;
- it is necessary to make the capping pilferproof to avoid opening until final destination;
- it is advisable to apply ring-shape elevations at the bottom and the shoulder of the bottles to ensure secure grip when using;

- concerning bigger than 1 lit. containers, Ministry of Agriculture gave his opinion that only 5 lit containers might be useful in a limited quantity;
 - the packing has to allow the maximum possible utilization of the trucks' capacity in order to minimize transport costs;
 - it must be considered that at the destination there will be no mechanical device to unload the trucks, accordingly the collective packing must be sized so as to be handled easily;
 - the crates should be provided with absorbent material (sawdust) to handle eventual leakages up to about 5%.
 - it was stated that there is no provision at the plant for transportation of the finished products assuming that the buyer/distributor will collect it at the plant.
- 8). Concerning the label text it was agreed that the Project Director will send the labels to Myanmar Agriculture Service of the Ministry of Agriculture for approval.
- 9). It was agreed that U Mon Tin Win is welcomed to practice at the laboratory of FAO in periods, while laboratory work is not (yet) possible at Hmawbi
- 10). It was a mutual agreement that the quality control of the imported active materials should take place at an independent laboratory. The Ministry of Agriculture/FAO is willing to undertake the performance of these tests. Sampling of the consignments is the duty of the Formulation Plant. The Formulation Plant has to pay for the expenses of the testing.
- 11). Finally it was agreed that a similar meeting should be organized at the Formulation Plant site in Hmawbi including

also representatives of the Procurement Division of the Myanma Agriculture Service, distributor of the future products, to enable them to comment on the problems.

Note: Addition to Item 4, Page 3

Due to extreme low temperatures in the northern states cold point of the products also must be determined and stated.

The minutes were prepared by

Bendeig
Chief Technical Adviser

Dated 2 January, 1990, Yangon

The content of the minutes reflects only the content of the discussion

U Maung Maung Tin
Project Director

U Win Kyi
National Project Director

MODEL PRODUCTION PROGRAM

PRODUCT		NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT
Dimethoate	production req. delivery use	XXX				XXX							
			25 t						25 t				
Endosulfan	production req. delivery use		XXXX				XXXX						
					50 t				50 t				
Cypermethryn	production req. delivery use		XXXXX				XXX						
					35 t				40 t				
Fenitrothion	production req. delivery use			XXXXX					100 t				
Diazinon	production req. delivery use				XXXXX								
									50 t				
Phenthoate	production req. delivery use							XXXXXXXXXX					
										100 t			

Minutes of the meeting held on 18th January 1990, at the office of the
National Project Director, Pilot Plant for Pesticide Formulation,
Yangon

Subject: Civil engineering works at Hmawbi plant site.

Participants:

Mr. I Bendefy	-	Chief Technical Adviser UNIDO
U Myint Swe	-	Project Manager, Pesticide Formulation Plant
U Nan Tun Kyaw	-	Project Engineer Pesticide Formulation Plant
U Thein Myint	-	Assistant Engineer Public Works Service
U Maung Maung	-	Assistant Engineer Public Works Service
U Hla Min	-	Township Engineer Public Works Service
U Ye Min	-	Township Engineer Public Works Service
U Aung Ba	-	Township Engineer Public Works Service

* * *

Mr. Pendify informed the representatives of the Public Works Service that during the Safety Verification Inspection, it was stated that the level of the Production Building as well as the joining stores were well below the level of the surrounding roads. This fact raises the fear that in the monsoon season during heavy rains, the mentioned buildings may be flooded. U Nan Tun Kyaw explained that by the time the construction works will be finished 1) the road level will be cut by about ½ m lower, 2) beside the narrow canal around the building both sides of the roads around will be provided by a 1 m deep rainwater canal. The representatives of the PPPF found the foreseen solution satisfactory.

Answering a question U Nan Tun Kyaw stated that the roof will be waterproof as it proved to be at the buildings existing already in the previous monsoon. Mention was made on additional necessary objects, such as a sedimentation/evaporation basin at the laboratory and a water reservoir basin for firefighting. Further Mr. Bendefy stressed the importance of an oil trap built at the point where the canal leaves the plant. The Public Works Service is ready to construct these items provided design is available and financing of the object is covered.

Answering a question it was explained that the water reservoir basin is needed because the water supply of the tube well is less than the need of a fire fighting engine. The capacity of the basin should be sized so that to supply the engine with water through one hour min.

Stated as above

The minutes were prepared by

BENDEFY
Chief Technical Adviser

PESTICIDES ESTABLISHED IN MYANMAR

<u>Trade Name</u>	<u>Formulation</u>	<u>Active Ingredient</u>	<u>Producer Co.</u>
CYDUSH	10 EC	Cypermethryn	ICI
DIAZINON	40 EC	Diazinon	Nippon Kayaku Co.
DIMETHOATE	40 EC	Dimethoate	Sumitomo Chem. Co. Ltd.
ELSAN	50 EC	Phenthoate	Nissan Chem. Industries Ltd.
SUMITHION	50 EC	Fenitrothion	Sumitomo Chem. Co. Ltd.
THIODAN	35 EC	Endosulfan	Hoechst AG.

EMULSIFIER MANUFACTURERS CONTACTED

RHONE-POULENC GERONAZZO S.P.A.

Via Milano, 78
20021 Ospiate di Bollate (Milan)
Italy
Tlx: 331 547

Requested types: FF/4, MS, SC/167, SC/224,
RE/70, V/497, Soprofor PA/19

OMNICHEM S.A.

Division Tensiofix
Rue du Fonds J.Paques, 8
1348 Louvain la Neuve
Belgium
Tlx: 59249 OMCHIM B
Telephone: 10 45 00 31
Fax: 10 45 06 93

Requested types: Tensiofix B 7438, B 7453

EGYESULT VEGYIMUVEK (EVM)

Represented by:
Chemolimpex
H-1805 BUDAPEST POB 121
Tlx: 224351
Telephone: 36-1-1183-970
Fax: 36-1-1179-444

HOECHST AG.

P.O.Box. 800320
6320 Frankfurt (Main) - 80
FRG
Tlx; 41234

BEROL KEMI AB

Sweden
Tlx: 20997 BEROL S

Requested types: Berol 09, 822, 106, 928, 931,
943, 944, 947, 948

ICI LTD.

Singapore
Tlx: IMP KEM RS 21111

Requested types; Atlox 3400 B, 4851 B, 4855 B
4857 B, 4868 B

Minutes of the Discussion held on 15th January 1990, at the Myanma
Petrochemical Enterprise, Production Director's Office

Subject: Supply of Superior Kerosene for Pesticides Formulation

Participants:

U Aye Kyaw	Director (Production) Myanma Petrochemical Enterprise
U Maung Maung	Assistant, MPE
Mr. I. Bendefy	Chief Technical Adviser UNIDO/UNDP
U Nan Tun Kyaw	Planning Manager Pesticide Formulation Project

Mr. Bendefy gave information that one main target at the establishment of the Pilot Plant for Pesticides Formulation - which is now near to be completed - was to utilize as much as possible of locally available materials and thus increase domestic input instead of importing ready formulated material. Therefore it is a very important contribution from the Myanma Petrochemical Enterprise if they are ready to supply the project with Superior Kerosene of the requested quality.

Specification

Comparing the data of the product available with those provided in 1983, U Aye Kyaw stated that:

- density is between 820 - 827 Kg/m³
- IBP is between 120 - 140°C
- FBP is not higher than 300°C
- Flashpoint is about 30 - 45°C
- Aromatic content is not known
- Acidity is almost nil

For the moisture it was cleared that at the production the SK does not contain any moisture. Any water content can originate only from rain water due to improper storage of the material. Therefore it is highly recommended to acquire SK during the dry season. Detailed data of the distillation curve were provided later and shown attached.

Supply

SK can be transported in road tankers, which belong to another company, Myanma Petroleum Products Supply Enterprise. Considering the present demand estimated at about 60 yt combined with the available storage capacity of 30000 lit U Aye Kyaw stated that there will be no problem to supply the plant in two lots. The importance of the supply, by which Xylene imports might be decreased, was stressed again and mentioned that empty Xylene drums will be available at the plant after Xylene being consumed. It was agreed that the supply should preferably originate from the refinery which is the closest to Hmawbi.

Alternative distillates

MPE agreed that they will check whether any other fraction of petroleum distillates would be available with higher (may be 18%) aromatic content. However, the flashpoint should not be lower than 27 - 30°C by any means.

Laboratory control

MPE agreed to train laboratory personnel of PPPF in standard distillation, which will be included in the methods practiced at the laboratory of the PPPF.

The minutes were drafted by

I. Bendefy
Chief Technical Adviser

Dated 15 January 1990

ပြည်ထောင်စု မြန်မာနိုင်ငံတော် အစိုးရ

စွမ်းအင်ဝန်ကြီးဌာန

မြန်မာ့ ရေနံ ဝါးတု ဝေ ဝ လုပ်ငန်း

အမှတ် (၁၁) ဗြဲစဉ်အင်း (ရေနံ ရေဒီယို ဝေ ဝ လုပ်ငန်း ဝေ ဝ) ရန်ကင်းမြို့။

စာအမှတ် ၁၁၀၄၆၅ / ရေနံ - ၄၄ / ၀၉ - ၉၀ (၂၅၅)

ရက်စွဲ၊ ၁၉ ၉၀၃၊ အ.န.န.ထိရီ.လ ၂၂ ရက်။

အကြောင်း အရ ၁။ ။ ရေနံအိမ် TYPICAL TEST RESULT မှား ဝေ ဝ ပြုခြင်း။

ဤလုပ်ငန်း လက် အောက်ရှိ အမှတ် (၁) ရေနံ ချက်စက်ရုံ (ဝန်လှစ်) မှ ထုတ်လုပ် ဖြန့်ဖြူး ဝေ ဝ လွှတ်ရှိ ဝေ ဝ ရေနံအိမ် TYPICAL TEST RESULT မှား မှာ အောက်ပါအတိုင်း ဖြစ် ကြောင်း အကြောင်း ကြား အပ် ပါသည်။

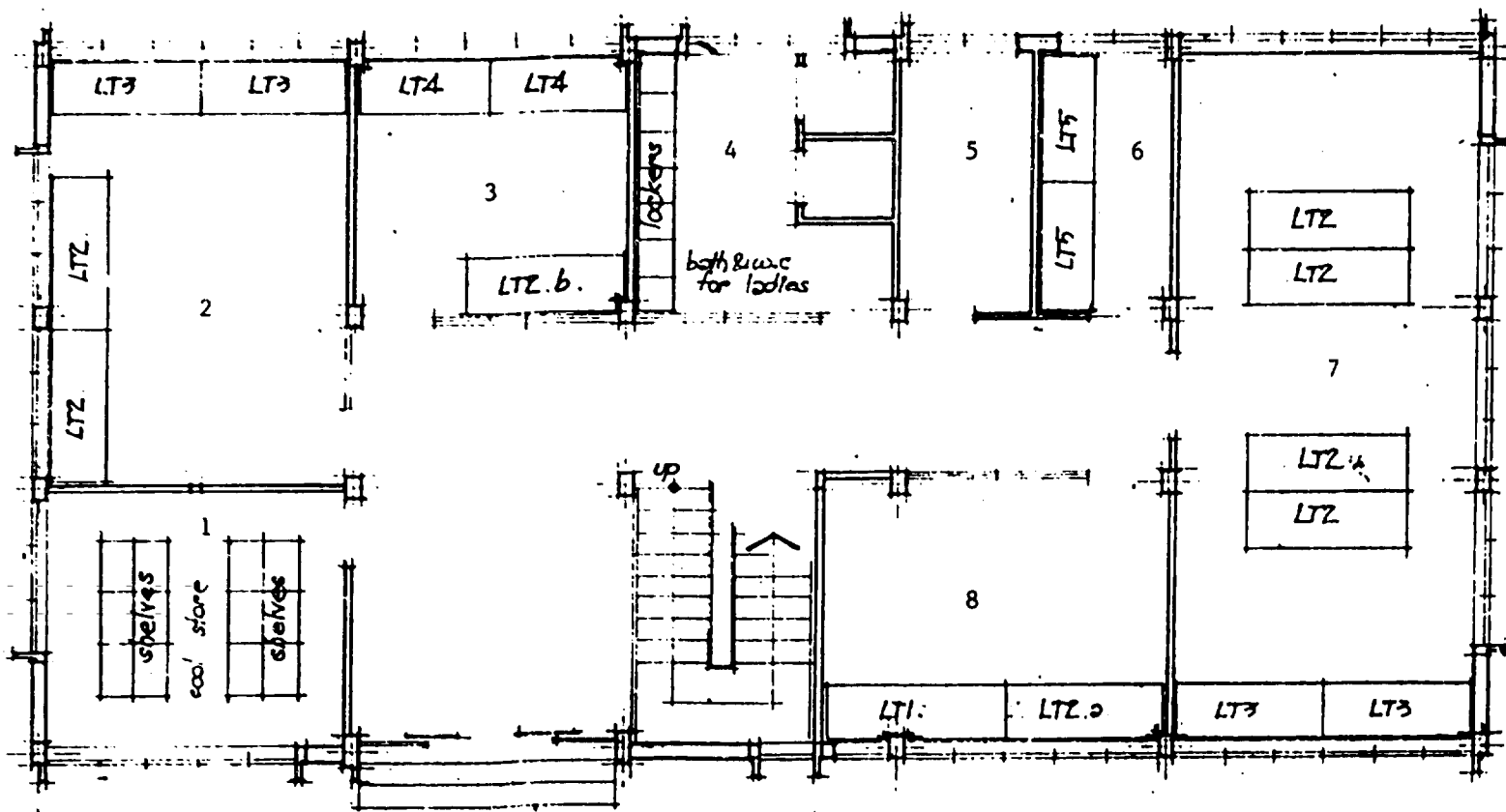
Slr:	PARAMETER	RESULT
1.	SF:GR:@60/60°F	0.829
2.	FLASH POINT C°	42
3.	DISTILLATION	
	IBP C°	157
	10% VOL RECOVERY @ C°	181
	50% VOL RECOVERY @ C°	204
	90% VOL RECOVERY @ C°	230
4.	SMOKE POINT mm	18
5.	SULPHUR CONTENT % wt	.005
6.	AROMATIC % VOL	21

(အေး ကျော်)

(ဗြဲစဉ်အင်း ဝေ ဝ မှား - ကုန်ထုတ်)

စက်ရုံ မှား ၊
ပိုင်း သတ် အေး စက်ရုံ စီမံကိန်း ။

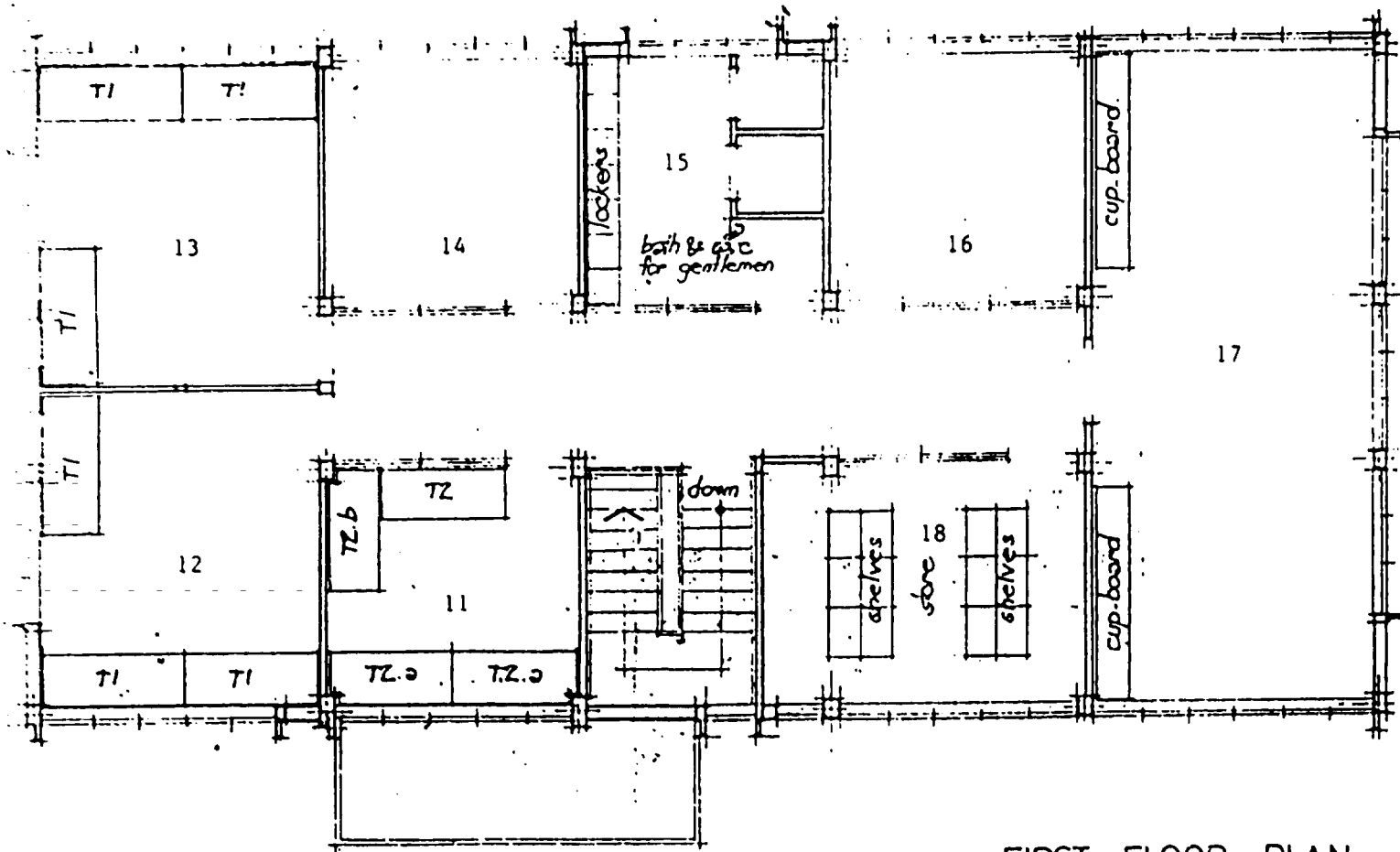
LABORATORY LAYOUT



1. Cool Store
2. Medical Room
3. Office
4. Toilet & Shower
5. Water distillation
6. Photocopy
- 7.
- 8.

GROUND FLOOR PLAN.

LABORATORY LAYOUT



- 11. Ovens
- 12. Glassware store
- 13. Library
- 14. GC Room
- 15. Toilet and Shower
- 16. Balance Room
- 17. General Laboratory
- 18. Chemicals Store

FIRST FLOOR PLAN

MYANMA PHARMACEUTICAL INDUSTRIES
PESTICIDE FORMULATION PLANT

SAMPLING CERTIFICATE
for technical active substances

No:

Date:

Name:

Identification:

Producer/Supplier:

Date of arrival:

Batch No:

Quantity stored:

Size of the packages/containers:

Site of sampling:

Quality/condition of the containers:

.....

Marking:

No. of containers opened:

No. & amount of samples taken:

Remarks:

.....
Sampling Officer

Test results:

Active: content:

Melting/setting point:

Density:

Impurities: water

other:

.....
Analyst

.....
Certifying Officer

MYANMA PHARMACEUTICAL INDUSTRIES
PESTICIDE FORMULATION PLANT

CERTIFICATE OF ANALYSIS

No.....

Date.....

Name of Pesticide.....

Date/batch No.....

Quantity..... filled in.....

Test results:

Appearance:.....

Colour:.....

Active content:

Water:.....

pH:.....

Density:.....

Flash point:.....

Cold stability:.....

Acidity/alkalinity:.....

Stability at elevated temp:.....

.....

Emulsion stability in..... water:

after..... hour(s).....

after..... hours

in..... water:

after..... hour(s).....

after..... hours

Remark:

.....

Analyst

.....

Certifying Officer

Minutes of the discussion held on 2nd February 1990, at the Office
of the National Project Director, PPF, Yangon

Subject: Questions concerning the collective packing of of
pesticides made of corrugated paper.

Participants:

Daw Khin Khin	Deputy Director Myanma General Industries
U Nyan Tun	General Manager Packaging Material Factory ..
Mr. I. Bendefy	Chief Technical Adviser UNIDO/UNDP
Dr. M.G. Srivastava	Safety Verification Expert UNIDO/UNDP
U Win Kyi	Project Director Pesticide Formulation Project
U Myint Swe	Project Manager Pesticide Formulation Project

The representative of the Packaging Material Factory No.2 explained that on the basis of the dimensions of the bottles as well as the gross weight of the filled bottles provided by MPI., they undertook structural calculations of the carton sizes for packing 12 x 1 lit and 20 x 0,5 lit bottles using single and double ply corrugated paper boards. Samples of these cartons with partitions + top + boards together with dimensions and price have been provided. These samples have been demonstrated. The Packaging Factory believes that the double ply brand carton which conforms to British specifications as shown in the bulletin of FEFCO (European Federation of Manufacturers of Corrugated Board) will be safer for packing bottles containing toxic liquids; pesticides. Hence this carton is recommended and claimed to be better than wooden cases.

In regard to safety and durability of the carton they rely mostly on the experience of packing nonfragile items like textiles and handicraft for export. The nearest comparison that they could offer was carton for jam jars (of course different size and construction). It was claimed that there were no complaints of jar breakages

in the export consignments. Considering all aspects it was decided that not more than 12 bottles will be collected in one box. Internally the beer bottles and soft drinks are transported in wooden crates and therefore beverage industry cannot provide any data on transport damage in cartons.

It was agreed that the collective boxes should be sealed by strong, abt. 60 mm wide self-adhesive tapes, which are water/weather resistant and keep the boxes even in eventual wet/moisturous conditions firmly closed. Paper bands and water-based adhesives are not acceptable.

Trials

At the moment there are no bottles of the type to be used for the bottling of pesticides available. Due to this lack no drop tests have been carried out until now. Sample bottles might be provided only after the mould will have been produced. Therefore, the drop test can be carried out only at a later date.

Following discussions on the details, agreement was met as below:

- a). MPI has to arrange about 100 sample bottles of each type for the trials.
- b). The Packaging Material Factory No.2 suggests the following packings to undergo drop/destructive testing:

Single ply corrugated paperboard cartons

- for 1 lit bottles with 1 ply partition only
- as above + corrugated 1 ply sleeving on the bottles
- for 0,5 lit bottles with 1 ply partitions only
- as above + corrugated 1 ply sleeving on the bottles

Double ply corrugated paperboard cartons

- for 1 lit bottles with 2-ply partitions only
- as above + single ply sleeves on the bottles
- for 0,5 lit bottles with 2-ply partitions only
- as above + single ply sleeves on the bottles

c). Drop and Rolling testing in the presence of representatives of MPI following British norms for drop-testing on No.-s of drops and using heights of 1, 2 and 3 meters for drop tests. The tests should be carried out with filled bottles using sodium salt dilution of density 1.1 g/cm³ initiating the formulated products.

Each carton has to be checked for nature and extent damage and documented.

Results of the testing should be recorded in a protocol authenticated by representatives of MPI and submitted to the CTA for approval/advice.

Order for the cartons should be placed only after approval of the cartons. If the cartons fail to be satisfactory, the use of wooden crates should be examined.

Data concerning packaging material:

Capacity of the factory

in single face cardboard: 4.41 mill. m²/year

in double face " " : 3.89 " "

in double wall " " : 2.85 " "

Double wall box for 12 x 1 lit bottles:

dimensions (internal): 377 x 252 x 257 mm

price:

Double wall box for 12 x 0,5 lit bottles:

dimensions (internal): 321 x 240 x 197 mm

price: 16,70 Kyats

The minutes were prepared by

I. Bendefy

Chief Technical Adviser

Dated 2 January 1990

Minutes of discussions and visit on 17th January 1990 at the Factory
of the Myanma Pharmaceutical Industry in Yangon

Subject: Information about bottling and transport of bottles

Participants:

U Thein	Deputy General Manager (Planning) Myanma Pharmaceutical Industry
U Thein Hlaing	Deputy General Manager (Production) Myanma Pharmaceutical Industry
U Pe Than	Deputy Manager (Filling) Myanma Pharmaceutical Industry
Mr. I. Bendefy	Chief Technical Adviser UNIDO/UNDP
U Myint Swe	Project Manager, PPPF
U Mon Tin Win	Quality Control Chemist, PPPF

The production unit fills liquid medicines in 150 ml, and in 500 ml bottles with screw cap. The filling is semi-automatic, the output is about 1500 lit/day for the 0.5 lit bottles, The small bottles are packed in collective corrugated paper boxes by 24 pcs each, then put on pallets. The 0.5 lit bottles are put into cages of abt. 1 x 1 x 06 m dimension suitable for moving by forklift. 3 layers of bottles are put above each other with partition corrugated paper sheets between.

Breakage rate of the empty bottles was claimed not to be higher than 1 - 2% when transported in carton boxes. The filled bottles are not transported, the customers lorry takes them from the factory godown. No essential breakage has been reported. "This side up" warning labels can be ordered from the factory.

The minutes were drafted by

I. Bendefy
Chief Technical Adviser

Dated 17 January 1990.

Minutes of the discussion held on the 30th of January 1990 at the Dagon Pure Drinks and Ice Factory, General Manager's Office.

Subject: Use of wooden boxes for collective packing of bottles.

Participants;

U Soe Tint	General Manager Dagon Pure Drinks & Ice Factory
Mr. I. Bendefy	Chief Technical Adviser UNIDO
U Myint Swe	Project Manager Pilot Plant for Pesticides Formulation
U Nan Tun Kyaw	Planning Manager Pilot Plant for Pesticides Formulation

Dagon Factory uses wooden and plastic crates for the packing of bottles. Plastic ones are imported, wooden crates are produced locally by Myanma General Industries. Breakage rate depends mainly on the strength of the bottles. In worst case goes as high as 11%, at stronger bottles is below 10%. The standard size crates carry 15 x 0,75 lit or 24 x 0,25 lit bottles. No partitions are used. 320 boxes can be conveniently loaded on a lorry. One box costs 24 Kyats.

Labels are printed on the bottles in the glass factory, quality is waterproof. There is no information, whether is also resistant to solvents. The bottles are transported from the glass factory bulk, breakage rate is over 10%. The drinks are transported only within Yangon area; the factory has 3000 crates for internal use, yearly repair is 500. Customers carry their bottles in own crates, there is no information about the rate of replacement/repair.

The minutes were drafted by

I. Bendefy
Chief Technical Adviser

Dated 30 January 1990

Minutes of the discussion held on the 30th January 1990, at the PPPF
National Project Director's Office, Yangon

Subject: Design works to be carried out concerning additional objects
at the Hmawbi Plant.

Participants

U Tin Myat	Deputy Group Leader Public Works Service
Mr. I. Bendefy	Chief Technical Adviser UNIDO
U Kyint Swe	Project Manager Pilot Plant for Pesticides Formulation

An explanation was provided to U Tin Myat that some objects, which were recommended as part of the project, have not been constructed and some other objects' need has been revealed recently but both kinds of objects need first to be designed and their cost calculated.

1). Firefighting water reservoir

It has been decided that the best solution will be to place a concrete wall (and bottom) basin of 8 x 4 x 1,5 m LxWxD with sides elevated to + 0,2 m between the pumphouse and the garage with a foundation joining to it for the firefighting engine. This latter should not be mobile but an underground hydrant pipeline should join to it with stems elevated above ground with fittings for hoses placed close to inflammables. (Formulation building, stores, laboratory).

2). Incinerator

No details are yet available of this equipment, foundations will need to be designed as soon as dimensions and load will be available. For placement the South-East corner of the plant was decided.

3). Diesel Generator

The generator will arrive in Yangon only on 4.3.90, only its dimensions are known. (L 2,22 x W 1,24 x H 1,63 m) but no load.

When weight will be known, can be decided whether it can be placed and fixed on the floor or stronger foundation will be needed. For placement the air-compressor room in the Production Building is recommended.

4). Settling/evaporation basin for laboratory effluents

It was decided that the basin will not be devided but it will be constructed in one part with about 10 m^2 open surface, depth 0,5 m, sides elevated above the ground by 0,2 m. Placement: behind the laboratory building, close to the fence.

5). Oil trap

An oil trap (concrete basin with upper-half partition wall) should be placed within the run-line of the surface-water canal at the point it leaves the plant.

6). Glass chips storage box

A concrete platform is needed with 3 side walls of about 5 m^2 surface not far from the bottles handling area.

The minutes were drafted by

I. Bendefy
Chief Technical Adviser

Dated 30 January 1990

Minutes of the discussion held on 31st January 1990 at the Office
of the PPPF National Project Director, Yangon

Subject: Transportation and Distribution of Pesticides

Participants:

U Soe Myint	General Manager Myanma Agriculture Service
U Tun Lwin	Deputy General Manager Myanma Agriculture Service
U Maung Maung Tin	Project Director Plant Protection Project
Mr. I. Bendefy	Chief Technical Adviser UNIDO
U Myint Swe	Project Manager PPPF
U Saw Win	Production Manager PPPF

Mr. Bendefy gave information about production programme, and the foreseen bottling as well as collective packing practices, in which form the Formulation Plant will provide the goods for the MAS trucks arriving. MAS representatives informed that at present they import pesticides in aluminium or plastic bottles. They asked to take every measure to eliminate the likelihood of breakage and put sawdust at the bottom of the boxes to absorb eventual spillage from broken glass. They also asked to check the possibility to change to plastic or aluminium bottles in the future.

The necessity of recollection of the bottles/boxes was discussed but it was stated that it will not be easy to solve the problem. The plant management should not count on bottles/boxes returned. The importance of the farmers' education, by extension service was stressed. Rail transport is not used due to likelihood of damages.

The minutes were drafted by

I. Bendefy
Chief Technical Adviser

Dated 31 January 1990