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K Särkimäki/JRa

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## FORMULATION PLANT / BURMA

Mission Report 31st March - 3rd April 1987

## 1 MEETING AT UNIDO OFFICES IN RANGOON

Date 31st March 1987, 09.00 - 12.00 hrs

Participants Mr Song Leong, UNDP, N.Y., Industrial adviser  
Mr Stanislav Morozov, UNIDO, Vienna,  
Chief Contract Unit Division of Industrial Operations  
Mr Jerzy B Gorski, Senior Industrial Development Field  
Adviser, UNDP, Rangoon  
Mr Pontus Harju-Jeanty, Kemira Oy  
Mr Kari Särkimäki, Kemira Oy

Mr Gorski explained the Burmese administrative system and the background of the project.

This project is run by the Pharmaceutical Industries Corporation (PIC) which acts under Ministry 1. The raw materials for the pesticide plant are purchased by PIC who then sells the products to the Agricultural Industrial Corporation (AIC).

The AIC informs the PIC about which products are needed.

The AIC laboratory in Rangoon is in charge of analysing the raw materials and the products.

At present the project employes 8 persons. Since 1984 some of the staff have received 8 months training in Europe, and all of them have participated in the planning of the plant. However, the training has been of very general character, and been largely forgotten. Additional training would be given by Kemira Oy, and it would be based on individual training providing the command of the subject in question, i.e. formulation and quality control, process knowledge, knowledge on equipment, basic technical knowledge, work safety and hygiene.

The discussion with Mr Leong about the scope of supply resulted in extending the scope:

- An equipment list according to the indicative offer by Kemira Oy was distributed to the participants.
  - The present areal lay-out plan (produced by Hungarian consultant Mr Bendefi) is not suitable; e.g. the production of products in powder form is not included in the scope.
  - For waste incineration a destruction furnace will be required. Kemira Oy shall design the furnace, and give a price estimate.
  - The product shall be supplied in 0.5 - 1 litre glass bottles; Kemira Oy shall design the bottle as well as provide instructions for the packing and storage of the product. The PET bottle is abandoned.
  - Kemira Oy shall provide a pilot reactor with a capacity of 200 litres.
  - Kemira Oy shall provide the necessary safety equipment.
  - Kemira Oy shall provide the necessary fire fighting equipment.
  - An effort shall be made to provide as complete set of spare parts as possible.
  - The flow meter for the solvent shall be as reliable as possible, and it shall need a minimum of servicing.
- Kemira Oy shall provide special tools and testing equipment (the Burmese cannot weld high alloy steel). The equipment shall be delivered well prefabricated.

## 2 VISIT TO PLANT CONSTRUCTION SITE IN HWAMBI

Date 31st March 1987, 13.30 - 17.30 hrs

Participants Mr Leong  
Mr Morozov  
Mr B Sugavanam, UNIDO, Vienna, Industrial Development Officer  
Mr U Win Kyi, PIC, Head of the Project  
Mr U Myint Swe, PIC, Project Manager  
Mr U Nyo Lay, PIC, Maintenance Engineer  
Mr U Mon Tin Win, PIC, biologist  
Mr U Saw Win, PIC, Production Engineer  
Mr Pontus Harju-Jeanty, Kemira Oy  
Mr Kari Särkimäki, Kemira Oy

The construction site in Hwambi is located 65 kilometers to the north of Rangoon (1.5 hour drive). Approximately 40 kilometers of the road is asphalted (in poor shape) and the rest of it is an unpaved road made in a clay soil. This road has two bridges which can probably take a 10-ton-load.

The nearest railway is at a distance of some 5 kilometers.

There is an operating asbestos factory at a distance of one kilometer approximately.

Dwelling houses for the plant management group and for Kemira personnel are under construction at a distance of some 400 meters from the site. The house for the Finnish would have three bedrooms, living room, kitchen, washroom and toilet.

The areal lay-out is in conformity with the copy enclosed with the inquiry by UNIDO. A copy of the soil exploration was requested by Kemira Oy.

The following buildings have been constructed on the site:

- a laboratory, completed in October 1984, and
- storage and maintenance buildings, completed in April 1986.

The buildings are made of concrete and wood (teak). They are sturdy built and extremely suitable for planned use. For the storage building, a ventilation system, based on natural circulation of air, has been designed: air comes at the top of the wall and goes out at the bottom (illustrated in photographs).

PIC handed drawings of the buildings to Kemira Oy.

Time schedule for construction in Burma is as follows:

- planning 2 to 3 months
- procurement of materials 6 months
- construction work 6 months

It was agreed upon that Kemira Oy will make a new lay-out in such a way that:

- the present buildings remain in their original use,
- the production facilities, storages and solvent tanks are located close to each other in their own section so that internal transport distances are kept short (aggressive chemicals), and the production section is distinguished from the rest of plant activities.
- the incoming goods traffic is facilitated,
- the offices, recreation room and infirmary are placed in one single building.

In the area there is a well, from which water is pumped into a trestle at a rate of 22.7 m<sup>3</sup>/h (see photograph).

Power will be supplied via a 33 kV copper cable line from the asbestos factory at a distance of one kilometer using poles. The power consumption of the asbestos factory is manifold compared to the plant in question, and the power supply has been steady (no failures), confirmed the Burmese. The construction of the cable line will take about one month.

It was agreed upon that Kemira Oy will provide a transformer, electrical centrals, cables, process electrification and building electrification. The Burmese shall provide the necessary amount of skilled and unskilled labour. Kemira Oy must ensure that all materials and tools are included in the delivery.

The original plan of the laboratory building included insect breeding and activity determination rooms. Mr Harju-Jeanty wondered if they were necessary. The determination of phyto-toxicity would be more important.

There should be a shower in the washroom, and a hand shower in the laboratory room.

We were given the price list for laboratory equipment, into which were added 1 UV spectrophotometer, 1 analysis mill, 1 formulation mill, 2 thermomixers, 1 turbomixer, 1 mechanical mixer and 1 vacuum pump. Magnetic mixers and glassware had already been taken into account.

Proposals concerning the equipment as well as the Finnish prices for liquid and gas chromatographs and spectrophotometer will be sent to Mr Leang.

In the installation phase it will be possible to use a 30 ton car elevator (may be necessary for lifting containers over the bridges with the 10-ton-limit).

Solvents will be delivered in 1.6 gallon containers, which will be unloaded into tanks using the truck's pump or the plant's diaphragm pump. The supplier is Burmese Petroleum Supplier.

Other raw materials will be brought by truck from the port under the responsibility of the PIC (a 2 ton truck, new).

### 3 VISIT TO FAO'S PESTICIDE LABORATORY

Date 1st April 1987, 09.00 - 12.00 hrs

We met with Dr Grove, an Englishman who has spent seven years in Burma organizing FAO's activities, but who is most probably handing the job over to Mr Pierrad, a Belgian national.

The analysis laboratory is situated at half-an-hour's drive from the centre of Rangoon. A Hungarian chemist, Mr Ambrus will start working in the laboratory.

The laboratory has suffered from power cuts, and due to the lack of fuel oil, it is not possible to have power using an aggregate. The laboratory is divided in two sections: analytical section and formulation section.

It has the following equipment:

2 pcs	Perkin Elmer Sigma 300 gas chromatograph,
1 pce	Perkin Elmer Series 10 + LC-75 HPLC with reverse phase column,
	Nitrogen and hydrogen,
	Hobart mill
	Mixers,
	Distillation equipment,
	Ventilation chamber
	Aging oven
	Centrifuge
	Evaporator.

FAO's Plant Protection Headquarter operates under the supervision of the AIC.

There are no regulations concerning plant protecting chemicals or their use; everything is up to the director of the AIC. In the laboratory scale no biological activity or phytotoxicity tests can be carried out, only determinations through field tests.

Plant protecting chemicals are used only for rice (20,000 acres out of 12 million are being sprayed; there would be a need to spray 50 to 60,000 acres) and cotton (under 10 % of the area sprayed, while the need would be almost 100 %).

The rice is planted in July, the spraying takes place in August and the cotton tests could be carried out in October.

A biological plant protection project has been under way for nine years already. The project has tried to find nature's own means, i.e. use of predators. One of such projects is the NIM project (run by a German scientist), which tries to isolate an insect repelling substance from a certain Burmese tree species.

For spraying, a Japanese knapsack sprayer with 10 litre capacity is used. In addition, there are over 10,000 ULV sprayers (Micron ULVA) in the country.

Dr Grove also emphasized the need to get proper labels on the packings; today the products are delivered in large containers carrying only the product name. From these containers the farmers fill their beer bottles. Labels can be printed in Burma and the suitable bottle size would be between 0.5 and 1 litre.

#### 4 MEETING WITH FIC DIRECTORS

Date	1st April 1987, 15.00 - 17.00 hrs
Participants	Leang, Gorski, Morozov, Sugavanam, U Win Kyi, U Myint Swe, U Mon Tin Win, Harju-Jeanty and Särkimäki
Hosts	U Ba Nyunt, Managing director, PIC (part of the time) U Ban Yi, Planning director, PIC

Leang and Harju-Jeanty gave a brief summary of the background of the project.

Mr Leang said that he'll try to get the financing confirmed by mid-May. Both hosts stressed the importance of the project; they promised all possible support to the project. When arranging the training of the Burmese, it has to be taken into account that it takes about 2 months to get the permit to leave Burma.

## 5 MEETING BETWEEN UNIDO, PIC AND KEMIRA

Date 1st April 1987, 13.00 - 15.00 hrs

Place Inya Lake hotel

Participants U Win Kyi, U Myint Swe,  
U Saw Mooler, U Mon Tin Win, PIC  
Leang, Morozov, Sugavanam, UNIDO  
Harju-Jeanty, Särkimäki, Kemira

In the meeting an agenda prepared by Kemira was discussed; precisions to the scope of supply and to the obligations of each party.

- 5.1 Kemira shall study the inclinations, sewers and coatings of the floors in the raw material and product storage rooms.  
Note: The coating of the production building floor!
- 5.2 Kemira shall examine the need for a fire alarm system.
- 5.3 Kemira shall design the areal lay-out, the lay-out of the production section, and carry out the detail engineering for the construction.
- 5.4 The equipment - scope of Kemira's supply
- equipment list
    - 1 pce compressed air driven pump (stand-by), hose and connection parts,
    - 2 pcs electricity driven fork-lifts plus a loading station
  - adsorption filter for exhaust gases
  - pilot reactor, capacity 200 litres
    - agitator
    - cooling/heating jacket
  - bottling station, revised construction (0.5 or 1 litre glass bottle)
  - 1 pce scale as per equipment list
  - safety material
  - fire extinguishers
  - design and price estimate of waste chemical incineration furnace
  - spare parts in excess of normal needs.

Kemira gave a rough estimate, without obligations, of the effect of the modifications on the price of the indicative offer, see appendix 1.



**5.5 Electrification**

Complete electrification starting from the transformer:

- process electrification
- electrification of the buildings.

**5.6** Kemira shall bear the cost of its personnel's stay in Burma. UNIDO shall provide the Kemira personnel with a car.

**5.7 Training**

The training shall be organized as follows:

In the 1st phase training will be given in Finland (Vaasa).

Director of the plant	3 months
Plant manager	3 months
Quality control manager	3 months
Formulation expert	3 months
Operator	2 months

Total 14 months

The director of the plant will be given particularly training related to safety. Kemira shall choose the time period, preferably in the Finnish summer season, however, in such a way that the quality control manager and the formulation expert will get their training at the same time.

There will be as little general training as possible, the emphasis will be on individual practical training. Kemira did not accept that the maintenance manager receives training in Finland, nor that a Finnish analyst is sent to Burma.

In the 2nd phase the training shall continue in connection with the installation and commissioning periods (maintenance, servicing, etc.).

It is necessary to include in the training of the quality control manager also some training related to installation and servicing of equipment.

**5.8 Laboratory and analysis equipment**

In addition to the gas chromatograph and UV spectrophotometer to be provided for the analysis laboratory, also an HPLC will be provided as recommended by Kemira.

Due to its reliability Perkin Elmer is the only possible make to be selected. In Burma it is not possible to get spare parts nor servicing for Japanese equipment. Equipment list attached (appendix 2).

## 5.9

**Miscellaneous**

Kemira asked for detailed information on the variations of water content level of the supior-kerosene (when emulgator is added into the solvent, the water appears).

Kemira emphasized the importance of humidity in disintegrating the active ingredients.

The Burmese will communicate to Kemira as soon as possible the potential active ingredient suppliers from whom Kemira shall directly order samples.

In the further studies and probably also in the production the emulgators used by Kemira in the laboratory research shall be used. Kemira shall give their price as well as the prices of other raw materials (including active ingredients).

The Burmese will be informed of the prices (in Finland) of GC, HPCL and UV spectrophotometer with accessories as well as of the suppliers.

A sample of a 0.5 litre glass bottle with screw cap was received from Glass Factory Syriam. Kemira will send samples of its own glass bottles, intermediate stoppers and caps to Burma.

The Burmese shall define the bottle size: 0.5 or 1 litre.

**Product order**

According to Mr Leang  
1. Diazinon

According to the Burmese  
1. Cypermethrin  
2. Thiomethon  
3. Phenthoate ULV

The Burmese will inform more precisely which 2 or 3 products will be initially included in the experiment and production.

Xylene production will reportedly start in two years' time in Burma.

Estimated quantities of plant protection chemicals given by Mr Leang are as follows:

1	Fenitrothion	50 EC	200,000	1/a
2	Fenitrothion	ULV	30,000	1/a
3	Phenthoate	50 EC	200,000	1/a
4	Phenthoate	ULV	30,000	1/a
5	Thiometon	25 EC	85,000	1/a
6	Endosulphan	35 EC	150,000	1/a
7	Cypermethrin	10 EC or	75,000	1/a
	Fenvalerate	20 EC or		
	Decamethrin	2.5 EC		
			770,000	1/a

Additionally the AIC is interested in getting the following formulations:

Diazinon	40 EC
Eluvalinate	10 EC
Topsin M	50 SC

#### 5.10 Project management

From the Burmese side, the Director of the project and the person responsible for the technical matters should participate in the Project meeting. This meeting should preferably take place in Burma and its duration should be from 1 to 2 weeks.

The principle of performance guarantee tests must be defined in the offer, e.g. during one month in periods of three consecutive days. The production shall advance progressively from laboratory scale to 200 - 500 litre scale and finally to production scale (3 m<sup>3</sup>).

The contact person in Burma, UNDP Rangoon Office, is:

United Nations Development Programme  
Mr Jerzy Gorski  
24 Mahawhari Rd  
P.O. Box 650  
Rangoon, BURMA  
Code BUR/80/011

## 6 VISIT TO GLASS FACTORY SYRIAM

Date 3rd April 1987, 10.00 - 12.00 hrs

Participants U Win Kyint, U Myint Swe, PIC  
P Harju-Jeanty, K Särkimäki, Kemira

Persons met U May Win, Managing director, CIC  
Other factory responsables, CIC

The Syriam Glass Factory is located at a 45 minute-ferry-trip down the river from Rangoon, and a 30-minute-drive (approx. 15 km) from the river.

The factory uses German technology (Emmag), and is part of the Ceramic Industrial Corporation. Capacity 70 t/d with two ovens each having two moulds.

The factory has operated very well for 20 years, without the exception of shut-downs caused by power cuts. Part of raw material comes from the adjoining plot, part of it is bought.

An extension to the factory will be completed in 1988 raising the capacity by 60 t/d, and adding an automatic packing and palletizing line.

There are several warehouse buildings. All products cannot be stored indoors.

Medicine bottles are packed in cartons with compartment separating the bottles. They are stored in a separate building. In two years time they will be able to protect the packing with plastic. Fluffing of the packings is a problem.

The bottle for plant protecting chemicals must be brown. Among the models presented to us, the 0.5 litre Winchester Plain medicine bottle would be the most suitable (bottle mouth o.d.  $25 \pm 0.3$  mm, i.d.  $19 \pm 0.5$  mm).

Kemira received a sample of the medicine bottle.

However, for plant protecting chemicals a model of its own is required with a volume scale on the side.

The bottle mould will be ordered from Singapore; delivery time approx. 3 months. The life of the mould is about 2 million bottles.

In the handling of bottles the development of condensate (humidity) will be a problem. Deliveries from the factory would take place once a month.

One solution to the condensate problem would be to blow (hot) air into the bottle before filling it.

At the factory bottle deliveries are agreed upon at monthly and weekly meetings.

Kemira is to give the design data for the bottle. This must be done in good time before the start-up of the formulation plant, so that bottle manufacturing would then already be going on.

K Särkimäki/JRa

PRICE ESTIMATE OF ADDITIONS  
MADE TO THE SCOPE OF SUPPLY

Mr Leang/UNDP, New York, requested a price estimate resulting from the increased scope of supply for the opening of a fund. The following specification was given without obligations.

1	Equipment	( FIM )
	Design of the furnace	38,000
	Stand-by pump and hoses	40,000
	Electrical forklift, 2 pcs	180,000
	Loading station for forklifts	30,000
	Bottling station, precision	50,000
	Pilot reactor, 200 l	69,000
	Scale	18,000
	Gas filter	20,000
	Spare parts	20,000
2	Floor coating, epoxide paint	80,000
3	Fire alarm, transformer	120,000
4	Safety equipment, extinguishers	50,000
5	Engineering	150,000
6	Subsistence of Kemira personnel in Burma	450,000
7	Training, total 14 months	34,000
8	Freight	30,000
	<b>TOTAL</b>	<b>FIM 1,379,000</b>

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