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ASSISTANCE TO PESTICIDES PACKAGING

DG/CPR/91/121/11-07

PEOPLE'S REPUBLIC OF CHINA

Technical report: Findings and recommendations*

Prepared for the Government of the People's Republic of China
by the United Nations Industrial Development Organization

Based on the work of Jurgen Hartmann, UNIDO consultant
(Packaging of pesticides)

Backstopping Officer: B. Sugavanam
Chemical Industries Branch

* This document has not been edited.

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SUMMARY, ASSISTANCE TO PESTICIDES PACKAGING, DG/CPR/91/121

This report covers the period of April 11, 1994 to May 1st, 1994, in which the author was assigned as a consultant on packaging of pesticides to the Nanshen Chemical R&D Corporation (NSCC) at Nantong, Jiangsu province, China.

Objectives were

to analyse the safety and quality standards and to recommend measures for improvements,

to give assistance in layout-design of the packaging facilities for a formulation pilot plant,

to specify requirements and to find out how locally available raw materials could be used for packaging of agrochemicals,

to inform upon recent and advanced techniques in packaging and to give lectures in a two-day-workshop, which was held at NSCC, Nantong.

Findings:

The level of safety, of hygiene, of maintenance of the equipment and of general housekeeping needs improvement. Detailed proposals were made.

It has been recommended, to start with semi automatic equipment and raise the grade of automation stepwise. Priority is to be given to the production of liquids.

First contacts to manufacturers of suitable machines have been installed during the mission. It is concluded to use as packaging material plastic bottles for liquid products. No glass bottles should be used.

At the end of the mission, a workshop was organized for main suppliers of packaging material and staff-members of NSCC. The CTA participated. There was one contribution from a Chinese lecturer.

Recommendations:

- one of the 9 laboratories for the development of formulations should be dedicated to testing of packaging material,
- a graduated packaging engineer should be engaged,
- one of the NSCC-staff members should be made responsible as "safety engineer" for the implementation of international guidelines on safety and environmental protection,
- an investment of approx. $ 34.000 is required for the pilot plant/Phase I, filling of liquid products.

INTRODUCTION

This report covers the period of April 11, 1994 (arrival in Beijing) to May 1st, 1994 (departure from Nantong), in which the author, Jurgen Hartmann, was assigned as a consultant on packaging of pesticides to the Nanshen Chemical R&D Corporation (NSCC) at Nantong , Jiangsu province, China.

This support was intended to round-up the envisaged visits of international consultants on Formulation Technology, Analysis, Polution control, Safety and Integrated Pest Management for 1994

Objectives

1. To analyse the safety and quality standards and to recommend measures for improvements, if applicable. The necessity to lay stress upon the improvement of packaging and its impact on the environment was underlined during the introductory discussion with Mr. Miao Hongjun in Beijing.

As only two filling and packing plants within the NSCC–group of companies could be visited, and neither other pesticides filling plants, nor pesticides warehouses or sales points the consultant has been able to see, these two inspections can only be considered as random and may not be representative.

2. To give assistance in layout-design of the packaging facilities for a formulation pilot plant, small and medium sized packages, and to supply NSCC with specifications for packaging equipment, suppliers and cost estimates.

During the discussion it was clarified that the filling and packaging equipment for a pilot plant can only be used for a commercial production after a stepwise upgrading,.

3. To specify requirements and to find out how locally available raw materials could be used for packaging of agrochemicals.

4. To inform upon recent and advanced techniques in packaging.

5. To give lectures with emphasis on durability and safety, based on international standards.

Both objectives (4 and 5) were combined in a two-day-workshop, which was held at NSCC' s meeting room, Nantong.

All discussions were utilized as opportunities to give basic information on

__Packaging development:

to start with stability studies of actual sales packs as a prerequisite for the selection of material and the design of the container,

__internationally agreed safety standards which cover all steps from production upto the application of crop protection products

It has been the intention of the consultant to provide as much of basic information as possible to the staff of NSCC, which should enable them to follow up matters in own responsibility.

I ANALYSIS OF PRESENT SITUATION

A. China National Packaging Corporation

A discussion in the China Packaging Science and Technology Institute, Beijing, was intended to find out the present status of development and test requirements of packaging dangerous products.

Participants: Refer to Annex II, from NSCC Mr. Zhang Qiming. The discussion--without the possibility to visit a laboratory--revealed a very strong interest in new packaging technologies, e.g. multilayer coextruded barrier bottles or water soluble films.

Using glass bottles for poisonous products was critically remarked, however it seems to be no legal requirement to substitute glass bottles.

Nevertheless, the installation of closer contacts between NSCC and relevant national institutions could be fruitful for the pesticides industry (refer to recommendations).

B. Manufacturers of Primary Packaging Materials

Visits were payed to

Messrs. Tonghua Plastic Products CO. LTD. and

Messrs. Tongzhou Colour Print Factory, producer of flexible bags.

Further details refer to Annex III and Annex IV.

Participants from NSCC: Prof. Hong, Prof. Gao, Mr. Zhang

Plastic Bottles

After demonstration of the production machinery (which were partly in operation) there was an opportunity for an open-minded discussion on available technologies. Although test facilities were not shown, this company could serve as a supplier for HDPE- and PET-bottles with a volume from 0.1 to 1 liter. As this company designs and manufactures also the moulds, suitable designs for pesticides bottles could be produced.

Films and Flexible Bags (Mono- and composite films/ foils)

Also in this company, which has been awarded for "Total Quality Control", the frank discussion indicated, that either pre- fabricated bags for manual or semi- automatic filling operations or foils on reels for automatic filling on Form- /Fill- /Sealing- machines (FFS- machines) could be supplied.

A standard specification for WP- and WG- packages is in the normal program of lamination , printing and bag-making:

internal layer of 40 g/m^2 heat-sealable PE, barrier layer of 0.009 mm Al and external layer (printed) of 0.015mm OPP.

C. Pesticides Filling Plants

On April 15 resp. April 18, 1994, two of NSCC's EC- and WP- filling and packaging operations were visited.

Messrs. Nantong Chemical Factory

Nantong No. 2 Pesticide Factory (EC-plant)

Messrs. Nantong No. 3 Chemical Factory (WP-plant)

For further details refer to Annexes III and IV

Participants from NSCC: Prof. Hong Chuanyi, Prof. Gao Delin, Mr. Zhang Qiming

Filling and packing of liquids (No. 2 Factory)

At the time of the visit, a herbicide EC 60 (oral LD $_{50}$ of the A.I. : 2000mg/ kg) was filled in glass bottles (0.5 l).

The line is equipped with an automatic rotary 12-head piston filler, and a heat shrink tunnel (for guarantee caps).

All other operations--from feeding the line with empty bottles through closing, labelling, upto packaging in corrugated carton boxes are manual.

Approx 40 persons were working at the time of the visit.

The level of safety, of hygiene and of maintenance of the equipment is not yet in line with the relevant international guidelines.
General housekeeping needs improvement. Detailed proposals were made immediately after the inspection on site, emphasizing the urgent need to improve the safety by means of implementation of basic guidelines, but without substantial investment in equipment. The relevant international guidelines have been handed over. They were an important subject during the workshop.
Details: refer to Annex IV.
It was stressed-- and accepted by the participants of the discussion--that there is a relationship between the obligation to raise up of the working conditions (responsibility of the management) and the awareness of the workers for quality and safety.

Filling and packing of wettable powders (No. 3 Factory)

At the time of the visit, a fungicide WP (oral LD_{50} of the AI: 1000mg /kg) was filled into pre-fabricated PE- bags (1 kg). It is a complete manual process, in which 9 women fill and package the product in double PE- bags, the separate internal bag being unprinted. The bags are packed in corrugated cardboard boxes.
Equipment: Two hand-operated balances and simple rod-sealers.
The bulk product is taken from drums and heaped-up on the table.
All surfaces in the filling and sealing area are accummulated with product deposits.
Similar recommendations as given for the liquid filling and packing plant are applicable here.

Filling hall

The visit to this factory was utilized to see the designated halls for the new filling machines.
The one-storied hall appears to be principally suitable, however a complete renovation is essential prior to the installation of equipment. The flooring is raw and unprotected.
This hall offers space of approx. 360 m^2 . The requirements of filling lines for liquid and for solid products would be approx. 120 m^2 (6 X20m) each, in case of 2 liquid lines (phase III, refer to chapter II) the hall would be fully occupied. No space would then be available for empty packaging material and goods ready for dispatch.

II. EQUIPMENT, PILOT PLANT

A. Capacities and Options

The capacities of the formulation plant were given by NSCC' s staff as follows:

Liquid products

3 t (3 m^3) per day in 3 shifts.

Based on this quantity , the filling line must be able to handle (alternating)

100 ml: 30,000 units	83 units / min*
200 ml: 12,000 units	33 units / min*
300 ml: 6,000 units	17 units / min*

WP-products

1000 t /year, corresponding to 3.5 t /day (in 3 shifts, 285 days / year).
Required capacity of the filling and packaging line (alternating):

50 g: 100 kg/h	33 units / min*
(100 g)	
(250 g)	
500 g 200 kg/h	6-7units / min*

A full automatic filling line would have to be operated in 3 shifts in case of 50 g bags (approx. 2 t/ day) and in one shift in case of 500 g bags.
* basis: 360 effective minuts per shift

Options:

There is a considerable difference between the present condition of filling and packing, as seen during the inspections of EC- filling at Nantong Pesticide No. 2 Factory and WP-filling at Nantong Pesticide No. 3 Factory , and requirements of an automatic filling line. This is in respect of the observed safety measures as well as of a consistent quality of packaging material. It therefore seems to be advisable not to immediately invest in fully automatic filling and packing lines, but to start with semi automatic equipment and raise the grade of automation stepwise.

Furthermore, the budget lines, as explained during the discussions in Nantong, do not permit the installation of a full- capacity filling plant at once.

B. Time Schedule

Priority is to be given to the production of liquids. The flow sheet for the formulation of wettable powders is not yet available. The process for WG- formulation has not been decided.It is planned to start the production of liquid formulations by middle of 1995.

Based on this, the following time frame was made:

1994-06-01: 3 quotations on hand for liquid filling and packing, Phase 1.
1994-08 : placing of orders, delivery time
1995-02 : shipment
1995-03 : arrival of equipment in China
1995-03 : start of installation
1995-06-30: installation completed.

C. Packing Material and Equipment

Recommended packaging material

From the analysis of the overall conditions it is concluded to use as packaging material for

__ SC, FS, water-based: HDPE- bottles
__ SE, EW,EC, solvent-containing products: PET- bottles.

The closing concept should be aluminium roll-on pilfer proof caps. Contacts to the Singapore representation of the world leading manufacturer (ALCOA), whose products are being used in China, have been installed during the visit.

As far as the UNIDO-Pilot Plant Project is concerned, no glass bottles should be used.

It is recommended, that the use of glass bottles in full scale filling plant should be phased out as soon as possible. When multilayer coextruded bottles should be available, they should be given preference over PET.

For WP- and later on WG- formulations flat FFS-bags, made of Al- composite foil are recommended.

The selection of all containers is subject to proven suitability in stability studies (original product in original containers).

Phase I, Laboratory-sized equipment, liquid products

An Albro-semi automatic weigh-filler (for 500 ml and 1 l) had been recommended by the CTA.

Further proposals:

__ Masterfill S-1000-HS for 5- 1000 ml, RMB approx. 80,000 (corr. to $ 10,000)
__ Masterfill S-5000-S for 500-5000 ml, RMB approx. 120,000 (corr. to $ 15,000)

Characteristic: simple, upgradeable to a certain extent, representation in Hongkong. It is necessary to update the quotations (obtained by the CTA in 1993), landed Nantong.

These machines would offer a solution only for laboratory-sized trial batches. They are insufficient for a pilot plant with two vessels for receiving / supplying products of 1.3 m^3 each.

Phase I, Solid products

Suitable equipment is being enquired in Germany.

The earlier proposed PPM Albro Beta Fill is said to be suitable for free flowing WP and WG. However, the author has no experience on hand with the technology of fluidised products. A decision could only be taken after successful trial fillings on the basis of reliable references.

Phase II

For phase II it is assumed that 300-500 t liquid products per anno are to be filled in 250 and 500 ml bottles . This phase does not contain full scale filling of wettable powders. For this , an investment of approx. RMB 1 to 1.3 mio. would be required (equivalent to approx. 120,000 to 160,000 US $).

Piston filler	RMB 600,000 (DM 120,000)
Conveyor belts	RMB 100,000 (DM 20,000)
Closing machine	RMB 350,000 (DM 70,000)
Labelling machine*	RMB 250,000 (DM 50,000)

(* = optional)

Contacts to potential suppliers have been established during the visit.

To depend on one filling and packing line reduces the capacity to "zero", in event of any breakdown.

Phase III

This final step of upgrading allows automatic filling and packing of those quantities , which are given in chapter II. A. For details refer to Annex V.

To demonstrate the principle of a Form- Fill- and Sealing machine, a brief visit was paid to the dairy of Nantong , which operates two indigenous FFS- machines for filling of milk pouches.

Two filling lines for liquid products (incl. closing and labelling)are recommended:

—requirement in case of 100ml filling 83 units /min >capacity of 1 machine.

—in case of breakdown, repairs and maintenance, 50% of the capacity would be available.

The total investment would be in the range of RMB 3 mio (approx. 350,000 US$).

III . SPECIFICATIONS, PACKAGING MATERiAL AND QUALITY CONTROL

A manual of specifications, test equipment and test methods which was specifically prepared for the requirements of NSCC has been handed over to Prof. Gao and Mr. Zhang.

It has been discussed in detail and an extract of the information was simultaneously translated into Chinese. Specifications of the recommended primary containers— PET -bottles, coextruded bottles, composite foil-bags of printed OPP (0.015 mm) / Al (0.009 mm) /heat sealable PE (40 g/m^2) —are included.

For suppliers of test instruments, recommended types and contact addresses are given.

However, it is understood that basic instruments should be available in China. For further inquiries the relevant Chinese packaging research institutes should be contacted by NSCC Addresses have been given.

The investment on laboratory equipment (specific to package tests) should not exceed $ 10,000.

Contant of the manual: refer to Annex VI.

VI. WORKSHOP

On April 28 and 29, a workshop was organized by NSCC for main suppliers of packaging material and staff-members of NSCC. The CTA participated . Guests from Bayer Beijing Liaison Office and Bayer Shangshai Liaison Office followed the invitation .

The agenda has been jointly designed by the staff of NSCC and the consultant.

Program and list of participants: refer to Annex VII and Annex.VIII.

The aim of the workshop has been to transmit information on new technologies from abroad to China and to learn from Chinese partners of their developments and their problems. There was one contribution from a Chinese lecturer. The emphasis on safety requirements should have attracted special attention.

RECOMMENDATIONS

A .Research center

It is proposed that one of the 9 laboratories for the development of formulations will be dedicated to testing of packaging material, including stability studies of products in sales packs (or similar).

B. Specialist of packaging technology

Of utmost importance is the training and education of staff members of the Research Center in Packaging Technology. It is therefore proposed, to engage a graduated engineer from one of the b. m. institutes, and offer him a chance to specialize on packaging of pesticides. At first he should become familiar with the packaging operations of NSCC . Then a 2-months training program at the INDIA-institute of Packaging (Bombay) should round-up the education.
The recommended institutes are
—China Packaging Science and Technology Research Institute,
Chinese National Packaging Corporation, or of the
—Beijing Agriculture Engineering University/ Food Engineering Research Institute (Packaging).
Addresses have been given to NSCC.

C. Training course

For NSCC - and further specialists a training course should be organized at the time of the international exhibition on plastics and packaging industries, to be held in Shanghai on November 23-27, 1995 (if there is no sooner opportunity in China).
The combination of workshop and visit of an exhibition in one training course permits a dual curriculum: lessons in theory and practical demonstration at the trade fair.

D. Specifications for packaging material

Reliable quality of packaging material is an essential prerequisite for the operation of automatic filling and packing lines . The higher the grade of automation, the higher the demand on the quality of the packaging material.
NSCC should start now to specify the packaging material and introduce test procedures as soon as a laboratory in the Research Center will be available.

E. Engineering and maintenance

Workshop
Modern filling and packing lines are high sophisticated automatic machines. To operate and to maintain the equipment , NSCC should provide a workshop, which is under the supervision of a skilled and experienced engineer.
Training and service
The operators of automatic filling machines need training. Suppliers of equipment should include a training program in their quotations. An instant service from a basis near at hand should be an important argument when selecting suppliers.

F.Safety engineer

It is recommended that one of the NSCC-staff members is made responsible as a "safety engineer" for the implementation of international guidelines on safety and environmental protection. He should have the competence for auditing the procedures on a regular basis to ensure they are being followed.
The candidate must have control on written English.
NSCC will be a model for several hundred pesticides manufacturers in China. Awareness of the importance of safety and hygiene, and of environmental protection are not necessarily depending on the grade of automation.

G. Filling equipment

Pilot plant (phase I, refer to II. C)
Liquid products

Albro-weigh filler	approx. $ 8,600
Masterfill S-1000-HS	approx. $ 10,000
Masterfill S- 5000-HS	approx. $ 15,000

Solid products

Suitable equipment is being enquired in Germany.

ACKNOWLEDGEMENT

The author would like to convey his sincere gratitude for the invitation to serve the NSCC and the Government of the Peoples Republic of China in the field of development of packages. He would like to express his gratitude also to Prof. Hong Chuanyi for his well planned arrangements and excellent hospitality. He also wants to acknowledge his great thanks to all staff membe ; of NSCC, Nantong and especially to Mr. Zhang Qiming for his untiring translations and assistance throughout the visit to China.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Job Description

DG/CPR/91/121/11-07

Post title:	Packaging Expert (Pesticides)
Duration:	1.0 m/m
Date required:	February/March 1994
Duty Station:	Nantong and Beijing (2 days)
Purpose of project:	To assist the People's Republic of China in establishing capacity to move towards user and environment friendly pesticide formulations including maintaining safety/quality standards during storage and application.
Duties	The consultant, along with the project counterparts and other international experts (formulation technology) is expected to assist in layout design of pesticide formulation pilot plant with packaging facilities for handling solid and liquid formulations in small to medium size quantities for field and marketing trials. He/she should explain to them the recent and advanced methods in packaging techniques, requirements and how locally available row materials could be used for packaging of pesticides. He/she should provide them with specifications of packaging equipment, supplier, estimated cost. Such a packaging system should be located in the pilot scale plant to be erected at Nantong in China. The expert is expected to give lectures, discussions with emphasis on durability, international standards, lebelling and safety aspects. He/she should submit a report on his/her findings and recommendations.
Qualifications:	A chemist or technician with extensive experience in packaging technology in industries dealing with pesticides and their formulation. Must be familiar with international rules and regulations on packaging and transport of toxic chemicals. Experience in developing countries would be an asset.
Language:	English

Background Information: The People's Republic of China having realized the importance of agrochemicals inputs into agriculture has adopted a programme to develop necessary upgrading of its facilities for safe development and management of agrochemicals. In this, development of safer and more effective pesticide formulations are being given greater importance due to low level of technology known and available in the country. The Nantong (Jiangsu Province) has a long history of development of chemical industries and is well located on the banks of Yangtze river. The Government has provided sufficient staff, buildings and utility services for upgrading and training of the staff to carry out indigenous development of modern technology in pesticide formulation. In the long term this approach will be linked to integrated pest management to move towards overall reduction in the use of pesticide by improving their efficacy, safety, quality and minimizing damage to the users and the environment.

ANNEX II

SENIOR COUNTERPART STAFF OF NANSHEN CHEMICAL R & D CORPORATION (NSCC)

Prof. Hong CHuayi	President of NSCC
Mr. Leng Yang	Deputy president of NSCC
Prof. Gao Delin	Vice Chief Engineer of NSCC
Ms. Lu Rongli	Vice director of Business Dept. of NSCC
Mr. Zhang Qiming	Chemist

ANNEX III

LIST OF PEOPLE MET IN CHINA:

1994-04-11	Mr. Miao Hongjun	Programme officer, UNDP, Beijing
1994-04-13	Miss Fang ying	Director
	Mr. Guo Qiyuan	Vice Director
	Mr. Xu Riqing	Senior Engineer
	All of them are from China National Packaging Corporation · China Packaging Science and Technology Institute, Beijing	
1994-04-15	Mr. Cai Jinbao	President of Nantong Plastic Indust. Marketing CO.
	Mrs. Zhang Yan	Manager of Nantong Plastic Industrial Marketing CO.
	Mr. Xun Xiling	Manager of Tonghua Plastic Bottles CO. LTD
	Mr. Wang Yianxiang	Assistant Manager of Tonghua Plastic Products CO. LTD.
	Mr. Zhang Weixing	Vice Director, Engineer of Tongzhou Colour Print Factory
	Mr. Lu Zenan	Vice Director of Nantong Chemical Factory. Nantong No. 2 Pesticide Factory
1994-04-18	Mr. Wu Guangyiao	Vice Director of Nantong No.3 Chemical Factory
1994-04-20	Mr. Chui Fusheng	Assistant Director of Nantong Dairy Factory
1994-04-28-29	refer to workshop Packaging of pesticides in China, Program and list of participants	

ANNEX IV

DETAILS OF COPANIES VISITED

1. TONGHUA PLASTIC PRODUCTS CO. LTD.

   Standard program of production

   Plastic Bottles made of HDPE, PET, and PVC for various applications, including liquid pesticides.

   Characteristics

   __ own mould development
   __ extraordinary well arranged flow of material and housekeeping
   __ machines not upto latest standard, but satisfactorily maintained
   __ best overall impression of all production sites, which the consultant had the opportunity to visit

2. TONGZHOU PLASTIC COLOUR PRINT FACTORY

   Standard program of production

   Flexible plastic films and composite Al-foils, lamination, printing, bag-making, for food- and chemical industry, inclusive pesticides.

   Max. bag size: 30 cm (width) x 40 cm (length)

   Characteristics

   __ >200 employees
   __ 30 Million Y turnover
   __ main printing machine imported from Japan
   __ Al-foil for lamination being totally imported from Japan

ANNEX V

Recommended filling and packaging machines, Phase II and Phase III / Pilot Plant

Two	6-head piston fillers	2XDM	120,000
Two	conveyor belts	2XDM	20,000
Two	closing machines	2XDM	70,000
	roll on pilfer proof system(ALCOA)		
Two	semi-automatic labelling machines(Langguth)	2XDM	50,000
Two	ink jet coders (Domino)	2XDM	20,000
	Total:	DM	560,000
	approx.	$	330,000
		RMB	2.8 mio

(excluded freight, insurance, taxes, training)

One	form-, fill- and sealing machine, vertical, inclusive auger dosing system* and equipment for 4 different format sizes(Rovema, Bosch, TAM)		
	approx.	DM	400,000
One	check-weigher with feed-back (Tendency control)	DM	50,000
	Total:	DM	450,000
	approx.	$	265,000
		RMB	2.25 mio

(excluded freight, insurance, taxes, training)

* auger filler for WP exchangeable to alternative (gravimetric) system for WG

ANNEX VI

content of manual, specifications of packaging material and test instruments

A. Packaging material and packages

bags: vocabulatory and types, basic specifications, drawings,

plastic bottles, HDPE, coextruded multilayer, PET,

plastic resins, technical data,

Al- and tinplate containers,

corrugated canon boxes.

B. Quality Assessment

18 basic test methods, suitable for the preparation of specifications, for the assessment of the quality of locally available packaging material , for discussions with suppliers and for quqlity controls.

C. Equipment

Recommendations for the lay out of a test laboratory , including proposed equipment , structured in 3 parts

common , non-specific for packaging ,

basic requirements, specific for packaging, a budget of 10.000$ is proposed,

upgrade.

ANNEX VII

PROGRAMME FOR WORKSHOP PACKAGING OF PESTICIDES IN CHINA

1.	Introduction		0.5 h
	1.1 Welcome address	Mr. Hong Chuanyi	
	1.2 Welcome addres	Mr. A. Knowles	
	1.3 Welcome address	Dr. H. Lieber	
	1.4 Concept of workshop	Jürgen Hartmann (J.H.)	
2.	Development of Package 2x3 steps: Product-Packaging Material- Filling Equipment Laboratory-Pilot plant-production	J.H.	1.0 h
3.	Stability Studies GIFAP-Technical Monograph No. 17/1993	J.H.	1.0 h
4.	Design Criteria a tool to select the suitable container	J.H.	1.0 h
5.	GIFAP-Guidelines for transportation, warehousing, formulation, packaging and disposal	J.H.	1.0 h
6.	Chinese Regulatory requirements on packaging of pesticides	NSCC	1.5 h
7.	Chinese requirements/transporation regulations	NSCC	1.5 h
8.	Specification and quality control, basic test methods	J.H.	1.0 h
9.	New developments, co-extrusion Pet, Fluorine treatment, water soluble film	J.H.	1.0 h
10.	Questions and answers	all participants	1.5 h

PARTICIPANTS TO SEND THEIR QUESTIONS IN ADVANCE TO NSCC

Language: English + Chinese translation

TOTAL 12 h

ANNEX VIII

Name	Company / Institute	Activity
Mr. A. Knowles	CTA of CPR/91/121	
Mr. Gan Tao	Nantong Standardization Bureau	approval of Chemical and pesticide specification
Mr. Hansy Ding	Bayer Liaison Office, Shanghai	marketing
Miss Lin tong	Bayer Liaison Office, Beijing	marketing
Mr. Lu Zhenan	Nanton No.2 Pesticide Factory	technical director
Mr. Qu Jingxi	Nantong Plant Protection Station	agriculturalist
Mr. Qian Guanghui	Nantong Plant Protection Station	agriculturalist
Mr. Zhang Kai	Nantong Chemical Research Institute	formulation chemist
Mr. Zhou Binhua	Nantong Plastic Products CO.Ltd.	technical director
Mr. Wang Junling	Nantong Plastic Products CO.Ltd.	thenician
Miss Wu Ming	Nanton No.2 Pesticide Factory	technician
Ms. Qiu Huihua	Nantong Chemical Research Institute	formulation chemist
Mr. Song Jianrong	Nanshen Chemical R&D Corporation	analist
Mr. Hua Naizheng	Nanshen Chemical R&D Corporation	formulation chemist
Ms. Jia Yiangeng	Nanshen Chemical R&D Corporation	formulation chemist
Mr. Wu Guangyiao	Nantong No. 3 Chemical Factory	technical director
Mr. Shi Liancheng	Nantong No. 3 Chemical Factory	assistant engnieer
Mr.Shi Huiming	Nanshen Chemical R&D Corporation	formulation chemist
Prof.Gao Deling	Nanshen Chemical R&D Corporation	Vice Chief engnieer
Mr. Yie Zhengxiang	Nanshen Chemical R&D Corporation	Director of R&D Dept.
Mr .Zhang Qiming	Nanshen Chemical R&D Corporation	formulation chemist
Ms . Lu Rongli	Nanshen Chemical R&D Corporation	formulation chemist
Prof. Hong Chuanyi	Nanshen Chemical R&D Corporation	director of business Dept.
Mr. Leng Yang	Nanshen Chemical R&D Corporation	President of NSCC
Ms. Zhang Zhijun	Nanshen Chemical R&D Corporation	Deputy president of NSCC
Mr. Zhang Hancheng	Nantong Chemical Industry Bureau	formulation chemist
		technical Dept.

ANNEX IX

UNIDO'S SUBSTANTIVE COMMENTS ON THE REPORT OF

Mr. Juergen Hartmann, DG/CPR/91/121/11-07

The report provides an insight into the status of the packaging industry in China. Eventhough the expert covered only a small area .n a big countrv like China, it is clear that a number of steps need to be taken to bring packaging of pesticides in line with international standards. The consultant's recommendation not to use glasebottles in UNIDO project should be noted. Phasing in of packaging technology is also an important factor. If a laboratory is allotted for packaging standards, this could be useful as a model consulting laboratory for other pesticide formulators and distributors.

The workshop has definitely attracted good attention but such type of workshops (one or two days) should be conducted at various places in China to bring awareness and responsibility of the pesticide industry to safety and quality.