OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

RESTRICTED

21154

DP/ID/SER.A/1733
20 June 1995
ORIGINAL: ENGLISH

STRENGTHENING OF PESTICIDE DEVELOPMENT CENTRE

DP/IND/89/128

INDIA

Technical report: Findings and recommendations*

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

Based on the work of Keith S. Johnson,
environment consultant in pesticide formulation technology

Backstopping Officer: B. Sugavanam
Chemical Industries Branch

United Nations Industrial Development Organization
Vienna

---

* This document has not been edited.

V.95 55226

CONTENTS

1. Summary

2. Recommendations and Actions

3. Introduction

4. Training Workshops - Effluent Treatment, Operational Safety and Packaging Technology

4.1 Training Programme
4.2 Venues and Delegate Attendance
4.3 Course Presentation
4.4 Course Subjects and Content
4.4.1 Effluent Treatment
4.4.2 Waste Management and Disposal
4.5 Discussion
4.5.1 Future Perspective
4.5.1.1 Specific Training Needs - Environmental Pollution Control and Safety

5. Site Visits

5.1 Voltas Ltd, Secundrabad
5.2 Central Insecticides Board (CIB), Faridabad

6. Support to IPFT, Gurgaon

6.1 Progress Review - Against 1994 Actions
6.1.1 Effluent Collection, Storage and Treatment
6.2 Waste Disposal
6.3 IPFT - Site Appearance and Maintenance

7. Environmental Training Courses - Future Proposals - IPFT Gurgaon

8. Revenue Generating Opportunities - IPFT Environmental Services to Industry

9. IPFT Safety Manual

10. References

Acknowledgements

Appendices I - V

1. SUMMARY

An account is given of a series of training courses in Environmental Pollution Control, Operational Safety and Packaging Technology recently promoted (February 1995) by the Institute of Pesticide Formulation Technology (IPFT) Gurgaon in liaison with pesticide associations in India.

These were held at separate locations at Ahmedabad, Bombay (2) and Hydrabad. Some 150 delegates in total were in attendance.

Course impact, delegate participation and response is reviewed along with suggestions for the promotion of possible similar initiatives in the future.

An ongoing programme of practical assistance, guidance and training in environmental-related topics at IPFT is discussed along with a review of progress against actions identified during March 1994.

Proposals are submitted for the integration of elements of environmental and safety training into existing established formulation courses at IPFT.

Opportunities for revenue generating initiatives by IPFT in services to industry, including environmental monitoring, analysis, effluent treatment and waste disposal, are identified.

A brief account is given on assistance to IPFT on the provision of environmentally-related inputs to the safety manual currently under preparation.

Reference is made to site visits to Voltas Ltd, Secundrabad, manufacturers and formulators of pesticide products; also to the Central Insecticides Board (CIB), Faridabad, with particular reference to environmental pollution controls, packaging technology and product registration.

MARCH 1995

2. RECOMMENDATIONS AND ACTIONS

2.1 Training Courses at Ahmedabad, Bombay and Hydrabad

Feedback questionnaire to be circulated by IPFT via appropriate pesticide associations to all delegates who attended these courses (Section 4.5).

ACTION:- IPFT

2.2 IPFT Centre, Gurgaon

2.2.1 Waste Management (Section 6.2)

Initiate a system of site waste collection, storage and disposal.

Identify and construct a dedicated area for storage, pending disposal, of site rubbish and lightly-contaminated wastes.

Install a small metal box or drum incinerator to burn site combustible and lightly-contaminated wastes.

ACTION:- IPFT

2.2.2 Site Landscaping (Section 6.3.3)

On completion of the Training Centre, initiate a programme of site landscaping and maintenance.

Also, consider the acquisition of a power-driven mower or grass-cutter.

ACTION:- UNIDO/UNDP/IPFT

2.2.3 Environmental Training Programmes (Section 8)

Consider the formation and integration of environmental/safety training elements (as outlined in Appendix V) into existing established formulation training courses currently ongoing at IPFT.

ACTION:- UNIDO/UNDP/IPFT

2.2.4 Revenue Generating Initiatives - IPFT

Consider the provision, at cost, of a range of environmental services to industry as outlined in Section 8 of this Report.

ACTION:- UNIDO/UNDP/IPFT

3. INTRODUCTION

3.1 This Assignment, conducted during the period 15 January - 9 February 1995, represented a continuation of technical support to the Institute of Pesticide Technology (IPFT) Project DP/IND/89/128/11-59 which initially commenced during November 1994 and March 1995 (Ref. 1).

3.2 Purpose of Current Visit (1995)

This was three-fold:-

3.2.1 To participate in a series of one- and two-day training courses/workshops on environmental pollution controls, operational safety and packaging technology within the pesticide formulation industry.

3.2.2 To continue with practical assistance to IPFT at Gurgaon on environmental training and the implementation of on-site controls for effluent treatment, waste management and disposal and other related topics.

3.2.3 To assist, where appropriate, with inputs to sections on environmental controls within the IPFT Safety Manual, currently under preparation (Project DP/IND/89/128/11-65).

In addition, separate accounts are given of site visits to:-

i. Voltas, Pesticide Manufacturing and Formulation Plant at Secundrabad,

ii. Central Insecticides Board, Package Testing Registration Facility, Department of Agriculture, at Faridabad.

4. TRAINING WORKSHOPS ON EFFLUENT TREATMENT, OPERATIONAL SAFETY AND PACKAGING TECHNOLOGY

4.1 The Training Course Programmes were organised by IPFT in collaboration with the Gujarat Pesticide Formulators Association (GPFA), Pesticide Formulators Association of India (PFAI), Association of Basic Manufacturers of Pesticides (ABMP) and Pesticides Association of India (PIA).

4.2 Four training sessions were presented at the following venues and attended by some 152 delegates:-

4.2.1 Hotel Rivera, Kanpur, Ahmedabad
(GPFA) 30 delegates

4.2.2 World Trade Centre, Bombay
(PFAI) 81 delegates

4.2.3 Hoechst India Ltd, Bombay
(ABMP) 23 delegates

4.2.4 Viceroy Hotel, Hydrabad
(PIA) 18 delegates

Programme details of the four seminars are listed in Appendix I a, b, c and d respectively.

4.3 Course Presenters

Mr R P Luthra, IPFT	Pollution Control in Pesticide Industry - Indian Perspective
Mr V N Dutta, IPFT	Safety in Pesticide Industry - Indian Perspective
Mr K S Johnson, UNIDO	Effluent Treatment and Waste Disposal
Mr C M Harmer, UNIDO	Operational Safety including Transport and Storage
Mr A H Gregory, UNIDO	Packaging Technology

Chairmen for the respective venues were elected by the local Pesticide Association as appropriate, IPFT and UNIDO Experts acted as co-Chairmen on a rotational basis.

4.4 Course Subjects: - Effluent Treatment and Waste Disposal

4.4.1 Effluent Treatment

This session covered a complete approach to the collection, containment, treatment and final disposal of aqueous effluents arising from the formulation of pesticide products.

4.4.1.1 The treatment process, based upon a two-stage system, consisting of:-

i. chemical flocculation and clarification to remove suspended solids, including pesticides;

ii. physical/activated carbon adsorption of soluble organics including residual pesticides.

This process currently represents the Best Available Technology (BAT) for the treatment of pesticide formulation effluents and is being increasingly adopted and used in both developed and developing countries.

A summary paper of the lecture delivered, giving process details, plant layout and examples of final effluent quality is listed in Appendix II of this Report.

4.4.1.2 New and Developing Technologies

Details of new technologies gaining application in the field of effluent treatment were discussed and included:-

i. ozone technology

ii. ultra-violet (UV)/peroxide oxidation.

The application of these technologies is expensive in terms of both equipment and running costs and is currently confined to the tertiary treatment of post-carbon adsorption, where Discharge Consents require the virtual elimination of organics and pesticides in the final effluent.

4.4.2 Waste Disposal - Pesticide Formulation Plants

This lecture presented a broad approach to on-site waste management and included the elements of:-

4.4.2.1 Waste Minimisation

- Point Source, Recycling and Re-use
- Product Concentration (liquids) using Membrane Technology - Ultrafiltration and Reverse Osmosis

4.4.2.2 Waste Handling

- Waste Identification and Segregation
- Contaminated Containers and Low Density

Wastes - Compaction, Crushing and Shredding
- Packaging, Labelling and Records
- Safe Storage Awaiting Disposal

4.4.2.3 Waste Disposal

Current methods of waste disposal (where available) used by the pesticide industry were presented and discussed (Ref. 2). These included:-

Landfill

Incorporating the principles of chemical fixation, monofill, co-disposal and cell containment.

Incineration

High temperature 1200°C

- Package Plants	100 kg/hour
- Large Fixed Hearth	> 1000 kg/hour
- Rotary Kilns	> 1000 kg/hour
	(continuous operation)

Cement Kilns

Particular attention was given to the increasing trend in developed countries in the disposal of selected, blended, wastes for use as primary fuel sources in cement kilns.

These units, operating at high temperatures 1500 - 2000°C and long residence times, are capable of destroying most organic molecules; the alkaline atmosphere within the kiln effectively neutralises 'in-situ' the acidic gases of combustion.

The cement industry is widely distributed in most developing countries and the potential of cement kilns is worthy of exploration as a possible interim waste disposal outlet pending the provision, in the longer-term, of custom-built high-temperature incinerators.

Reference was made to ongoing UNIDO/RENPAP initiatives to assess the potential use of shared incineration facilities and cement kilns to service clusters of pesticide plants within specific regions, ie Gujarat (Ref. 1)

4.4.2.4 Disposal of Time-Barred Pesticide Stocks

This category of materials are perceived to present a difficult disposal problem in most developing countries.

The course presentation objective was to establish interaction and exchange between presenters and delegates to both establish the magnitude of the problem and to investigate possible disposal outlets for these materials.

The response to this approach was disappointing and almost without exception at each course venue, the delegates were reluctant to acknowledge the existence of any such problems and declined to enter into any positive discussion or debate on this subject (see also Section 4.5).

4.5 Discussion

The training workshops were well organised by IPFT and the respective local Pesticide Associations.

The venues and facilities provided were excellent with full support given to the course presenters.

The overall attendance by some 150 delegates to the four workshops provided is indicative of the current interest in environmental, safety and packaging technology topics presented.

However, in contrast with the earlier workshop held in Ankleshwar in November 1993 which was well attended and strongly interactive, the delegate response and participation from the floor during the current series of training sessions was restrained and disappointing.

With one exception (Hoechst, Bombay), the delegates were both courteous and attentive but showed a marked reluctance to express viewpoints, problems or participate in discussion on the topics or related subjects presented.

It was noted, however, by all the course presenters that many delegates were keen and interested in discussing the course topics in considerable depth on an individual basis outside the lecture room.

The exception was the workshop held at Hoechst India Ltd where all sessions presented were attended by senior, technically qualified management and staff. On this occasion, an active and energetic interaction between delegates was maintained throughout the proceedings to the mutual benefit and satisfaction of both sides.

The background and disciplines of the delegates attending the

workshops were, for the most part, not known. Complications of status and chain of responsibility within their respective organisations may have been a contributory factor to the inhibited response and participation experienced during these recent events.

Similarly, the opportunity to obtain feedback from delegates was missed owing to the absence of a questionnaire.

This factor has been retrospectively addressed with the preparation of a questionnaire which will be circulated by IPFT for comment, to all delegates via the local Pesticide Associations.

4.5.1 Future Perspective

The attendance overall of some 200 delegates at the 1994 (Ankleshwar) and current series (1995) training courses is indicative of the need for initiatives in these areas currently provided by UNIDO, IPFT and Pesticide Trade Associations.

These courses are invaluable in upgrading local knowledge and better understanding of pollution control and safety requirements currently incumbent upon the pesticide industry; also necessary available technology and resources to ensure compliance with legal controls.

4.5.1.1 Specific Training - Environmental Pollution Control and Safety

In addition to general workshop training topics, a need exists for more specific and practical training on environmental safety subjects for implementation and integration into daily workplace process applications.

Examples of these include:-

- on-site effluent evaluation and treatment,
- waste minimisation and overall waste management including safe disposal,
- monitoring and associated analysis,
- introduction to pollution control legislation and perspective.

More specific and in-depth practical training of this type could possibly be integrated on a module-basis with ongoing pesticide formulation courses currently provided, at intervals, by IPFT at Gurgaon. (See also Section 7.1.)

5. SITE VISITS

5.1 Voltas Ltd, Secundrabad

A visit was made to the Voltas Ltd factory on 29 January 1995 by arrangement with the General Manager, Mr W V B Bramlingham.

The factory site is large, occupying some 50 acres, employing 300 people.

Voltas manufacture and formulate a range of pesticide products including phorate, phosilone, chlorpyrifos, monocrotophos and ethion.

Future production will include quinalfos and glyphosate along with ethylene oxide-based chemicals as organic intermediates.

Voltas have developed liaison with Rhone-Poulanc, France, involving their product phosilone.

5.1.1 Safety and Environment Issues

5.1.1.1 Safety

The site has a good record with 1.5 million hours with no lost time accidents!

5.1.1.2 Environmental Controls

The site is equipped with a high temperature incinerator 800-900°C for the destruction of gaseous and liquid wastes. Acid gases from combustion are neutralised and scrubbed.

Methyl chloride arising from the production of monocrotofos is incinerated along with organic phosphate wastes.

Hydrogen sulphide arising from the manufacture of organo-phosphates is scrubbed with sodium hydroxide and the resulting sodium hydrosulphide is sold on as a product.

Liquid Effluents

These are chemically tested and passed to solar evaporation ponds on-site. The ponds are lined with impervious liners; odour problems are a source of nuisance particularly during the hot season.

Periodically solid residues and other site solid wastes are disposed of to a local toxic waste landfill site.

Information was given on a Government

Initiative for the construction of a central effluent treatment biological activated sludge plant to provide second-stage treatment and disposal of partially treated effluents arising from local industries.

A commercial treatment plant operated by a cooperative of some 30 members from industry was reported as 'not operational' largely due to inadequate initial design. Some cooperative members have already withdrawn from the arrangement.

The local Pollution Control Board in Secundrabad was reported as being strongly pro-active.

Several factories have been closed down for non-compliance with effluent discharge standards - others have been threatened with closure.

Public Relations

Every effort is made to maintain good relations with the local community.

A large garden centre within the site cultivates shrubs and trees which are given away to local residents as a token gesture of goodwill.

Site Appearance

The site is currently undergoing expansion involving building works on the construction of a new R & D Centre and modifications to existing synthesis plants. These activities create an impression of general congestion and untidiness.

Efforts are being made to improve site appearance with a programme of landscaping and the planting of large rose gardens.

5.2 Central Insecticides Board (CIB), Department of Agriculture, Government of India, Faridabad

A visit was made to CIB on 6 February.

Discussions were held with the Joint Director of Packaging and Processing, Mr V C Bharava, Eng, and his team; also Dr A D Pawar, Head of Registration Services.

5.2.1 The prime reason for the visit was to discuss packaging developments and testing in India with particular reference

to the pesticide industry.

These aspects are covered in some detail in the report of the packaging technology Expert. The general impressions were that the current range of containers used by the pesticide industry fell short in process material and design compared with those currently in use in the developed market sectors.

It is also hoped that the latest packaging technology data provided to CIB by the UNIDO Experts will be of use in future developments within this field in India.

5.2.2 Discussions with Dr A D Pawar, Registration, produced interesting and useful information.

The Registration Authorities follow the FAO code of conduct on the use of pesticides.

Some 140 registered pesticides are for exports.

All internationally restricted or banned pesticides are regularly reviewed against the Indian situation.

To date some 13 pesticides have been banned and a further 40 compounds are under review on the basis of toxicity and environmental sensitivity.

There is an increasing move towards the use of naturally occurring pesticides including neam and thungeris bacillus, both of which are available in Asia.

DDT is now banned for agricultural use but is still used for public health insect control.

BHC currently remains in use but manufacture is scheduled to cease in 1997. A subsequent period of grace on BHC product-use is anticipated to use up residual stocks of the material.

5.2.3 Time-Barred Pesticide Products

Discussions on this problem disclosed that no strategy or system exists to address this situation, ie segregation, re-packing and return to suppliers for re-processing.

Problems are generated when forecasting of product types is incorrect, ie seasonal changes inhibiting fungal growth, low frequency emergence of insects, etc, resulting in large stocks of un-used product.

The Government is encouraging the avoidance of stock carry-over by introducing unit packs adequate for single application thus avoiding storage of un-used or part-used products. These are being promoted at subsidised cost.

6. SUPPORT TO INSTITUTE OF PESTICIDE TECHNOLOGY, GURGAON, HARYANA

6.1 Progress Review Against Actions Identified During the Last Site Environmental Visit, March 1994

6.1.1 Effluent Treatment and Disposal

Package Effluent Treatment Plant

An Allman Sentinel MK II effluent treatment plant has been ordered. The unit was despatched ex-UK during late March and delivery to IPFT is awaited.

6.1.2 Effluent Collection, Storage and Treatment

6.1.2.1 The current reorganisation and demarcation of facilities and services between IPFT and Hindustan Insecticides Ltd at Gurgaon has delayed the commencement of this work.

6.1.2.2 All trade effluent drains from IPFT laboratories and pilot plant have been re-designed and will be re-routed to a common collection sump at a new location adjacent to the pilot plant. The modified drainage layout is shown in Appendix III.

6.1.2.3 The new effluent treatment plant will also be located in this area to treat and de-toxify all IPFT site trade effluents.

The treatment system will comprise of:-

i. underground collection sump,

ii. untreated effluent storage vessel,

iii. Sentinel MK II effluent treatment plant,

iv. Final treated effluent storage vessel.

The plant and storage vessels will be assembled on newly-laid concrete hardstanding adjacent to the pilot plant (see Appendix IV).

Treatment chemicals storage and effluent testing will now be located within the adjacent pilot plant, thus dispensing with the need for a separate building as originally recommended.

6.1.2.4 Final Effluent Disposal

Subject to satisfactory analytical quality checks, two disposal options exist for treated effluents:-

i. discharge to the site surface water soakaway system,

ii. irrigation to grassland in close proximity to the pilot plant area.

6.2 Waste Disposal

6.2.1 Waste Collection, Segregation, Storage and Disposal

Little progress has taken place since the last visit. Site wastes, mainly paper and rubbish, continues to be deposited indiscriminately in piles on waste ground within the site.

This is unsightly, bad practice and in conflict with the IPFT site policy of continued environmental improvements.

6.2.1.1 A designated area on-site should be identified for the disposal of combustible and lightly-contaminated wastes. The provision of a small metal box or drum incinerator would provide a suitable disposal outlet for these waste types.

6.2.2 Toxic Waste Disposal - High Temperature Incineration and Cement Kilns

6.2.2.1 Meetings have continued between UNDP/IPFT and the National Cement Board. Proposals for the use of cement kilns for the disposal of selected wastes has been approved in principle by the Government. Initiatives to implement pilot-scale studies are currently under consideration by UNIDO, Vienna.

Currently, a study, sponsored by UNIDO, is in progress in both Continental Western Europe (CWE) and United Kingdom (UK) to gain information from direct experience in the use of high temperature incineration and cement kilns for the disposal of industrial wastes, including pesticides.

6.2.2.2 Shared Incineration Facilities/Clusters of Pesticide Plants - Gujarat

A meeting was held during April 1994 to explore this option.

This was attended by UNDP/IPFT, Central Poliution Control Board, Cement Research Institute and pesticide industry representatives from Gujarat.

The possibility of organised sharing of a common incineration resource was considered

feasible and a pilot project proposal has been prepared and submitted to UNIDO Vienna for consideration and support.

6.3 Site Appearance

6.3.1 Work on the new Conference Centre has been delayed and awaits completion.

Similarly, no progress has been made in landscaping and improving overall site appearance.

The large areas of grassland are neglected and overgrown giving the site a generally untidy and unkempt image.

6.3.2 With the completion of the new Conference Centre, training facilities will expand, attracting increasing numbers of delegates from the pesticide industry to the site.

It is vitally important that the site appearance is upgraded and maintained to complement the Centre of Formulation Expertise already identified with IPFT at Gurgaon.

6.3.3 A programme of phased landscaping and improvements could, with a minimum of resource, be implemented in phases in the grassing of areas along the approach from the site entrance upto and around the new Conference Centre.

Similarly, regular grass cutting and mowing of the land area within the tree-line surrounding the IPFT laboratory block and pilot plant would considerably improve the appearance of this area while diverting attention from adjacent waste land which is difficult to keep under control.

6.3.3.1 A motorised grass-cutter or lawn-mower would greatly assist with the maintenance of all the grass areas on-site and it is recommended that consideration be given to the acquisition of a suitable machine.

7. ENVIRONMENTAL TRAINING COURSES, IPFT

7.1 Proposal

Practical training and guidance in all aspects of site pollution controls and waste management are an essential and integral element of pesticide formulation activity.

Training courses in pesticide formulation technology are now a regular and increasing feature at IPFT.

Scope exists for the integration of associated environmental training as an extension of existing formulation courses. Subsequently, if required, these could be expanded to separate safety, health and environmental training ventures specific to the requirements of the pesticide industry.

An initial introduction to this initiative could be based on a modular approach covering the essential elements of pollution controls, effluent treatment and waste management.

An outline of environmental training modules is given and further expanded in Appendix V.

8. REVENUE-GENERATING OPPORTUNITIES - IPFT

8.1 Proposal

A large proportion of the pesticide formulation industry, currently faced with environmental performance improvements, is ill-equipped to implement programmes of monitoring, chemical analysis, effluent treatment evaluation and waste identification.

IPFT has well-equipped analytical laboratories with state-of-the-art analytical instruments capable of advanced residual pesticide assays essential to environmental monitoring and pollution controls.

Scope exists for the development of a series of revenue-generating environmental services utilising existing site resources and expertise and could initially include:-

- effluent treatment evaluation
- analytical services including method-development
- site surveys - contaminated land and groundwater
- effluent treatment plant design
- systems for on-site waste management.

9. PREPARATION OF THE IPFT SAFETY MANUAL PROJECT DP/IND/89/128/11-65

Although not formally assigned to this Project, the author at the request of IPFT has assisted during the period 1993-1995 with the environmental sections of this manual with contributions to:-

- effluent treatment
- waste management and disposal
- waste minimisation.

10. REFERENCES

1. UNIDO Report: Environmental Pollution Controls - India. Implications And Necessary Controls For The Pesticide Formulation Industry, Project DP/IND/89/128/11-59, K S Johnson, environmental Consultant in Pesticide Formulation Technology, March 1994.

2. Disposal Of Unwanted Festicide Stocks, Guidance On The Selection Of Practical Options, GIFAP Publication, Avenue Albert Lancaster 79A, 1180 Brussels, Belgium.

ACKNOWLEDGEMENTS

The Author expresses his grateful thanks to the management and staff of UNDP, RENPAP and IPFT for their kind assistance, cooperation and hospitality shown during his recent visit to India.

BACKGROUND

Institute of Pesticide Formulation Technology, a Govt. of India Society has been set up in May 1991 presently engaged in implementing 'Pesticide Development Centre' a UNDP assisted project. The project's aim and objectives are to assist the pesticide formulation indusry in the country in the areas of development of newer formulation, upgradation of technologies, industrial safety and pollution control, application of pesticides etc. The Project has access to the international experts as an input from UNIDO to assist the pesticide formulation industry. It has also plans to set up a safety laboratory. It is in this context that in collaboration with Gujarat Pesticides Formulators Association a training cum meet is being organised at Ahmedabad Gujarat to facilitate interaction between the industry and experts in this area.

In the present meet, three reputed international experts Mr. Keith S.Johnson, Mr. C.M. Harmmer and Mr. A.H. Gregory are visiting India and IPFT took the opportunity to arrange this programme in collaboration with GPFA for the benefit of pesticide industry. In addition to the international experts, the experts from the industry and IPFT shall be sharing their view on the area of pollution control, industrial safety and packaging of pesticide formulation and during the meet cum training sessions.

The meet will highlight the topics relevant to incineration water and odour related technologies, other important areas of plant designs and safety measures and packaging of pesticides formulations. The full potential of the programme of the seminar is designed to create not only awareness about the present needs but to focus on the serious national efforts required to bridge the technological gaps if any in this vital aspect of pesticide industry.

INSTITUTE OF PESTICIDE FORMULATION TECHNOLOGY

Announces

Training cum Meet on
Industrial Safety, Effluent Treatment and Packaging
in
Pesticide Formulation Industry

21 and 22 January 1995
at
Hotel Rivera, Khanpur, Ahmedabad-380 001

Organised by

INSTITUTE OF PESTICIDE FORMULATION TECHNOLOGY
Sector 20, Udyog Vihar, Gurgaon -122016
Haryana

In Collaboration with

Gujarat Pesticide Formulators Association
Ahmedabad

PROGRAMME

21 January 1995	
09.00 - 09.30	Registration
09.30 - 10.30	Inauguration
10.30 - 10.45	Tea/Coffee
Session I	
10.45 - 12.15	Introduction of IPFT & Presentation of Status paper on pollution control in pesticide industry indian perspective - Mr. R.P. Luthra, Dy. G.M. HIL
12.15 - 13.45	International approach to effluent treatment and disposal in pesticide formulation industry - Mr. Keith Johnson, UNIDO Expert
13.45 - 14.45	Lunch
Session II	
14.45 - 15.45	Types of treatment and diposal methods - incineration water and other related technologies, Mr. Keith Johnson, UNIDO , Expert
15.45 - 16.00	Tea/Coffee
Session III	
16.00 - 17.00	Discussion on experience of industry in disposal of time barred pesticides and pollution control in industry - Moderator - Mr. R.P. Luthra, Dy. GM, HIL
22 January 1995	
Session IV	
10.00 - 11.15	Presentation by industry representatives on pollution related experiences in design and operation of effluent treatment plant.
11.15 - 11.45	Tea/Coffee
Session V	
11.45 - 13.00	International Safety standard in Pesticide Industry Implementation and monitoring - C.M. Harmer, UNIDO Expert
13.00 - 14.00	Lunch
Session VI	
14.00 - 15.00	Packaging of Pesticides Formulation - Indian Industry Perspective - Industry Expert
15.00 - 16.00	Packaging of Pesticides formulation - Mr. A.H. Gregory, UNIDO Expert
16.00 - 16.15	Tea/Coffee
16.15 - 17.00	Summing up discussions and concluding session

ADMINISTRATIVE DETAILS

Venue	:	**Hotel Rivera, Khanpur, Ahmedabad-1**
Dates	:	**21-22 January 95**
Time	:	09.30 am to 5.00 pm
Fees	:	Rs. 1,500/- per participants including course materialTea/Coffee/Working lunch
No. of Participants	:	40-50
Last date of nomination	:	10 January 1995
		Nomination along with cheque / demand draft may please be sent in favour of **GUJARAT PESTICIDE FORMULATORS ASSOCIATION** to
		Gujarat Pesticide Formulators Association, 20, Embassy Market, Near Dinesh Hall Ahmedabad-380009
Phone	:	400558
Telex	:	011-74538 AIMC

Outstation participants requiring any assistance for hotel booking etc at Ahmedabad may contact Mr. P.S. Trivedi, Hony. Secretary, Gujarat Pesticide Formulators Association, 20, Embassy Market, Near Dinesh Hall, Ahmedabad-380 009

No. of Participants	:	75 -100
Last date of Nomination	:	21st January, 1995
Mode of payment	:	Nomination along with Cheque/Demand Draft may please be sent in favour of 'Pesticde Formulators Association of India' to :

Pesticide Formulators Association of India
B-4, Anand Co-Op Housing Society
Siddadevi Temple Road, Mahim (West)
Bombay - 400 016

Phone : 4375279 - Mr. H.J. Kakodkar (Ex. Offr.)
Fax : 6116736 / 6117761 Tlx. 011-74538 AIMC

Outstation participants requiring any assistance or hotel booking etc. at Bombay may contact Mr. H. J. Kakodkar of Pesticide Formulators Association of India

Background

Institute of Pesticide Formulation Technology, A Govt. of India Society has been set up in May 1991, presently engaged in implementing "Pesticide Developent Centre" a UNDP assisted project. The Project. The Project's aim and objectives are to assist the pesticide formulation industry in the country in the areas of development of newer formulation, upgradation of technologies industrial safety and pollution control, application of pesticides etc. The project has access to the international experts as an input from UNIDO to assist the pesticide formulation industry. It has also plans to set up a safety laboratory. It is in this context that in collaboration with Pesticides Formulators Association of India a training cum meet is being organised at Bombay to facilitate interaction between the industry and experts in this area.

The Pesticides Formulators Association of India(PFAI) came into existence in the year 1968 with a need to provide platform for small scale pesticide formulators, a important sector which represents around 70% production of formulated pesticides in India. PFAI initiated by small scale pesticide formulators has now grown into an effective body whose membership includes medium and large scale industries, basic manufacturers and manufacturers of intermediates required for pesticides. The association represents the pesticide industry on a national basis with a strength over 350 members.

In the present meet, three reputed international experts Mr. Keith S. Johnson, Mr. C.M. Harmer and Mr. A.H. Gregory are visiting India and IPFT took the opportunity to arrange this programme in collaboration with PFAI for the benefit of pesticide industry. In addition to the international experts, the experts from the industry and IPFT shall be sharing their view on the area of pollution control, industrial safety and packaging of pesticide formulation and during the meet cum training sessions.

The meet will highlight the topics relevant to incineration water and odour related technologies, other important areas of plant design and safety measures and packaging of pesticides formulations. The full potential of the programme of the Seminar is designed to create not only awareness about the present needs , but to focus on the national efforts required to bridge the technological gap if any in this vital aspects

Institute of Pesticide Formulation Technology
(a Govt. of India Society under department of Chemicals & Petrochemicals)

Announces

Training - Cum - Meet on

Industrial Safety, Effluent Treatment and Packaging in Pesticide Formulation and Chemical Industry

24 and 25 January 1995 at

World Trade Centre, Hall Wista(30th Floor), Bombay

Organised By

Institute of Pesticide Formulation Technology
Sector 20, Udyog Vihar, Gurgaon 122 016 (Haryana)

in collaboration with

Pesticide Formulators Association of India
B-4, Anand Co-Op Housing Society, Mahim(West), Bombay - 400 016.
Tel. No. 4375279/Tlx No. C/O : 011-74538 AIMC/Fax No. C/O:022-6116736

FACULTY: FROM UNIDO & IPFT

PROGRAMME

24 January 1995

09.00 - 9.30	Registration
0.930 - 10.30	Inauguration/Appreciation Awards by PFAI to Mr. R.D. SHROFF(chairman & Managing Director) of United Phosphorous Ltd, Bombay for his significant contribution in Pesticide Industry.
10.30 - 10.45	Tea/Coffee
Session - I	
10.45 - 11.30	Introduction of IPFT & Presentation of Status paper on pollution control in Pesticide Industry Indian perspective - *Mr. R.P. Luthra,Dy.G.M., H.I.L.*
11.30 - 12.15	Future of flowables and water dispersible Granules in India World Market and formulation technique - *Dr. Ram Das , IPFT.*
12.15 - 13.45	International approach to effluent treatment and disposal in pesticide formulation industry - *Mr. Keith S. Johnson, UNIDO Expert.*
13.45 - 14.45	Lunch
Session - II	
14.45 - 15.45	Types of treatment and disposal methods - Incineration water and other related technologies *Mr. Keith S. Johnson*
15.45 - 16.00	Tea/Coffee
Session III	
16.00 - 17.00	Discussion on experience of industry in disposal of time barred pesticides and pollution control in industry - Moderator - *Mr. R.P. Luthra.*

25th January 1995

Session IV	
09.30 - 10.15	Presentation by industry representative on pollution related experience in Design and operation of Effluent treatment Plant.
10.15 - 11.15	Safety in Pesticide Industry - Indian perspective *V.N.Dutta, IPFT.*
11.15 - 11.45	Tea/Coffee
Session V	
11.45 - 13.00	International safety standard in Pesticide industry its implementation and Monitoring *Mr. Charles M. Harmer, UNIDO Expert.*
13.00 - 14.00	Lunch
Session VI	
14.00 - 14.30	Packaging of Pesticides in Indian Industry perspective, Indian Expert.
14.30 - 15.00	Pesticides Registration in the European Community Council by *Mr. Geoff Byrne, CChem, FRSC, Head, New Market Development of Inveresk Research International Ltd., Scotland.*
15.00 -16.00	Packaging of Pesticide Formulation International perspective: *Mr. Anthony H. Gregory, UNIDO Expert.*
16.00 - 16.15	Tea/Coffee
16.15 - 17.00	Summing up discussions & Concluding session

ADMINISTRATIVE DETAILS

Venue	:	World Trade Centre, Hall Wista (30th Floor), Bombay
Date	:	24-25,January,1995
Time	:	9.30 a.m to 3.00p.m.
Fee	:	Rs. 1200 per participant for PFAI Members Rs. 1500 per participant for non PFAI Members [Including Course material, Tea / Coffee & Working Lunch]

ADMINISTRATIVE DETAILS

Venue	:	HOECHST INDIA LIMITED L.B.S. Marg, Mulund (West), Bombay
Date	:	27 January 1995
Time	:	09.30 am to 5.30 pm
Fee	:	Rs. 1,000/- per participants including course materialTea/Coffee/Working lunch
No. of Participants	:	30
Last date for Nomination	:	16 January 1995
		Nomination along with cheque / demand draft may please be sent in favour of "ASSOCIATION OF BASIC MANUFACTURERS" to
		Mr. D.C. Deo, B-9, Saroj, Paralkar Road, Shivaji Park, Dadar, Bombay-400 028
Phone	:	455238

Outstation participants requiring any assistance for hotel booking etc at Bombay may contact Mr. Mr. D.C. Deo, B-9, Saroj, Paralkar Road, Shivaji Park, Dadar, Bombay-400 028

INSTITUTE OF PESTICIDE FORMULATION TECHNOLOGY

Announces

Training cum Meet on
Industrial Safety, Effluent Treatment and Packaging
in
Pesticide Formulation Industry

27 January 1995
at

HOECHST INDIA LIMITED
LBS Marg, Mullund, Bombay

Organised by

INSTITUTE OF PESTICIDE FORMULATION TECHNOLOGY
Sector 20, Udyog Vihar, Gurgaon -122016
Haryana

In Collaboration with

Association of Basic Manufacturers of Pesticides (ABMP)
Bombay

Background

Institute of Pesticide Formulation Technology, a Govt. of India Society has been set up in May 1991 presently engaged in implementing 'Pesticide Development Centre' a UNDP assisted project. The project's aim and objectives are to assist the pesticide formulation indusry in the country in the areas of development of newer formulation, upgradation of technologies, industrial safety and pollution control, application of pesticides etc. The Project has access to the international experts as an input from UNIDO to assist the pesticide formulation industry. It has also plans to set up a safety laboratory. It is in this context that in collaboration with Association of Basic Manufacturers of Pesticides a training cum meet is being organised at Bombay to facilitate interaction between the industry and experts in this area.

In the present meet, three reputed international experts Mr. Keith S. Johnson, Mr. C.M. Harmer and Mr. A.H. Gregory are visiting India and IPFT took the opportunity to arrange this programme in collaboration with ABMP for the benefit of pesticide industry. In addition to the international experts, the experts from the industry and IPFT shall be sharing their view in the area of pollution control, industrial safety and packaging of pesticides formulation during the meet cum training sessions.

The meet will highlight the topics relevant to incineration, water and odour related technologies, other imporiant areas of plant design and safety measures and packaging of pesticides formulations. The full potential of the programme of the seminar is designed to create not only awareness about the present needs but to focus on the serious national efforts required to bridge the technological gaps if any in this vital aspect of pesticide industry.

PROGRAMME

27 Janurary 1995

09.00 - 09.30	Registration
09.30 - 10.15	Inauguration - Opening remarks by ABMP & IPFT
10.15 - 10.30	Tea/Coffee
10.30 - 11.45	Pollution Control in Pesticide Industry Indian Perspective - R.P. Luthra, Dy. GM, HIL
11.45 - 13.00	International Approach to Effluent Treatment and Disposal in Pesticides Formulation Industry - Keith Johnson, UNIDO Expert
13.00 - 14.00	Lunch
14.00 - 15.15	International Safety Standard in Pecticides Industry, its implementation and Monitoring - C.M. Harmer, UNIDO Expoert.
15.15 - 15.30	Tea/Coffee
15.30 - 16.30	Packaging of Pesticides Formulations A.H. Gregory, UNIDO Expert
16.30 - 17.30	Open House Discusison / Summing up.

ADMINISTRATIVE DETAILS

Venue	:	VICE ROY HOTEL Tank Bund Road, Hyderabad-500 380
Dates	:	30 January 95
Time	:	09.30 am to 5.30 pm
Fees	:	Rs. 1,000/- per participants including course material Tea/Coffee/Working lunch
No. of Participants	:	30
Last date for Nomination	:	15 January 1995
		Nomination along with cheque/demand draft may please be sent in favour of VOLTAS LIMITED MR. W.V.B. Ramalingam, General Manager (operation) IDA Phase II Patancheru-502319 Medak District
Phone	:	084543-2225-2226
Telex	:	0422-232, Fax : 91-0842-821053

Outstation participants requiring any assistance for hotel booking etc at Hyderabad may contact Mr. W.V.B. Ramalingam, IDA, Phase II, Patancheru-502319, Medak, Dist. Andhra Pradesh, Phone : 084543-2225, 2226, Telex : 0422-232, Fax : 91-0842-821053

INSTITUTE OF PESTICIDE FORMULATION TECHNOLOGY

Announces

Training cum Meet on
Industrial Safety, Effluent Treatment and Packaging
in
Pesticide Formulation Industry

30 January 1995
at

VICEROY HOTEL
Tank Bund Road
Hydrabad-500 380

Organised by

INSTITUTE OF PESTICIDE FORMULATION TECHNOLOGY
Sector 20, Udyog Vihar, Gurgaon-122016
Haryana

In Collaboration with

Pesticide Association of India
New Delhi-110 001

Background

Institute of Pesticide Formulation Technology, a Govt. of India Society has been set up in May 1991 presently engaged in implementing 'Pesticide Development Centre' a UNDP assisted project. The project's aim and objectives are to assist the pesticide formulation indusry in the country in the areas of development of newer formulation, upgradation of technologies, industrial safety and pollution control, application of pesticides etc. The Project has access to the international experts as an input from UNIDO to assist the pesticide formulation industry. It has also plans to set up a safety laboratory. It is in this context that in collaboration with Pesticide Association of India, New Delhi a training cum meet is being organised at Hyderabad to facilitate interaction between the industry and experts in this area.

Pesticides Association of India is the main representative body of this important agricultural input industry PAI's membership comprises of both Public & Private Sector large scale (including multinaitons) medium scale and small scale manufacturers, formulators and distributors.

In the present meet, three reputed international experts Mr. Keith S. Johnson, Mr. C.M. Harmmer and Mr. A.H. Gregory are visiting India and IPFT took the opportunity to arrange this programme in collaboration with PAI for the benefit of pesticide industry. In addition to the international experts, the experts from the industry and IPFT shall be sharing their view on the area of pollution control, industrial safety and packaging of pesticide formulation and during the meet cum training sessions.

The meet will highlight the topics relevant to incineration water and odour related technologies, other important areas of plant design and safety measures and packaging of pesticides formulations. The full potential of the programme of the seminar is designed to create not only awareness about the present needs but to focus on the serious national efforts required to bridge the technological gaps if any in this vital aspect of pesticides industry.

PROGRAMME

30Janurary 1995

09.00 - 09.30	Registration
09.30 - 10.15	Inauguration - Opening Remarks by PAI & IPFT
10.15 - 10.30	Tea/Coffee
10.30 - 11.45	Pollution Control in Pesticide Industry Indian Perspective - R.P. Luthra, Dy. GM, HIL
11.45 - 13.00	International Approach to Effluent Treatment and Disposal in Pesticides Formulation Industry - Keith Johnson, UNIDO Expert
13.00 - 14.00	Lunch
14.00 - 15.15	International Safety Standard in pesticides Industry, Its implementation and Monitoring - C.M. Harmer, UNIDO Expoert.
15.15 - 15.30	Tea/Coffee
15.30 - 16.30	Packaging of Pesticides Formulations - A.H. Gregory, UNIDO Expert
16.30 - 17.30	Open House Discusison / Summing up.

APPENDIX II

SUMMARY PAPER

TREATMENT AND DISPOSAL OF AQUEOUS EFFLUENTS ARISING FROM THE FORMULATION AND PACKAGING OF AGROCHEMICAL PRODUCTS

AUTHOR: K. S. JOHNSON - UNIDO

1. Introduction

Pesticides in general have a low solubility in water and are usually manufactured in the form of wettable powders, granules, suspension concentrates or miscible liquids.

The breakdown in stability by chemical treatment of mixed effluents causes the flocculation and settlement of a high proportion of the pesticide ingredient in the form of a dense sludge. Soluble organic substances including pesticide residues are removed by adsorption onto activated carbon. This process offers a convenient method of detoxifying aqueous plant effluents arising from the formulation of pesticides.

2. Treatment Process

The collection of plant effluents in a common sump offers storage capacity, and means of buffering the changes in composition of effluent which can frequently occur.

The flocculation process is normally conducted on a batch treatment

system using a conical-based cylindrical vessel. This allows the settlement of sludge residues in the cone, and a means of decanting the supernatant clarified effluent.

2.1 Chemical Treatment

Optimum conditions for flocculation/clarification of effluent are pH 10-12. The addition of iron salts and lime (calcium hydroxide) to aqueous pesticide effluent normally induces rapid flocculation of all suspended solids.

The inclusion of a small amount of polyelectrolyte will serve to accelerate the coagulation of flocculants and subsequent settlement.

The addition of an adsorbent clay and powdered activated carbon can be beneficial in the removal of trace residual pesticide if this is deemed to be necessary.

Dosage rates of chemical flocculants need to be established for specific effluents but the following can serve as a starting point:-

	mg/litre
Lime pH 11 - 12	500
Perric sulphate (40% solution)	200
Polyelectrolyte (anionic type)	5
* powdered clay	1000
* powdered activated carbon	500

* carbon and clay are normally dosed as a secondary stage following initial flocculation and separation/removal of sludge.

Ideally a vessel 5 - 10 m^3 capacity with mechanical agitation is suitable for collection and treatment.

2.2 Physical Adsorption

To maintain a consistent standard of high quality final effluent, a second stage of activated carbon adsorption should be considered. This should comprise of at least two beds of activated carbon operating in series flow (see Figure I).

High activated carbon granules (14/44 mesh), surface area >1000m^3/g should be used.

Coal or wood-based carbon granules will give the best adsorption performance. Coconut shell carbons, by virtue of their relatively small pore sizes, are generally unsuitable for pesticide effluent treatment.

Flow rates of clarified sand-filtered effluent should be regulated through the carbon beds to allow a minimum of 1-hour contact residence time.

3. Effluent Quality

Final effluents are normally clear, virtually colourless and non-toxic.

Examples of final effluent quality for specific pesticides and organic contaminants are shown in Tables 1 and 2.

4. Effluent Disposal

Disposal with consent of controlling authority can be directed to a sewer, soakaway (not above or near an aquifer), or in hot climates possible to an evaporation pond. Direct discharge of effluent to a water course is not recommended.

5. Sludge Disposal

Sludges from the process can be dried in shallow drying beds and subsequently disposed of to a designated waste disposal site, or preferably, if available, by high temperature incineration.

Figure I

EFFLUENT TREATMENT PLANT
SCHEMATIC DIAGRAM

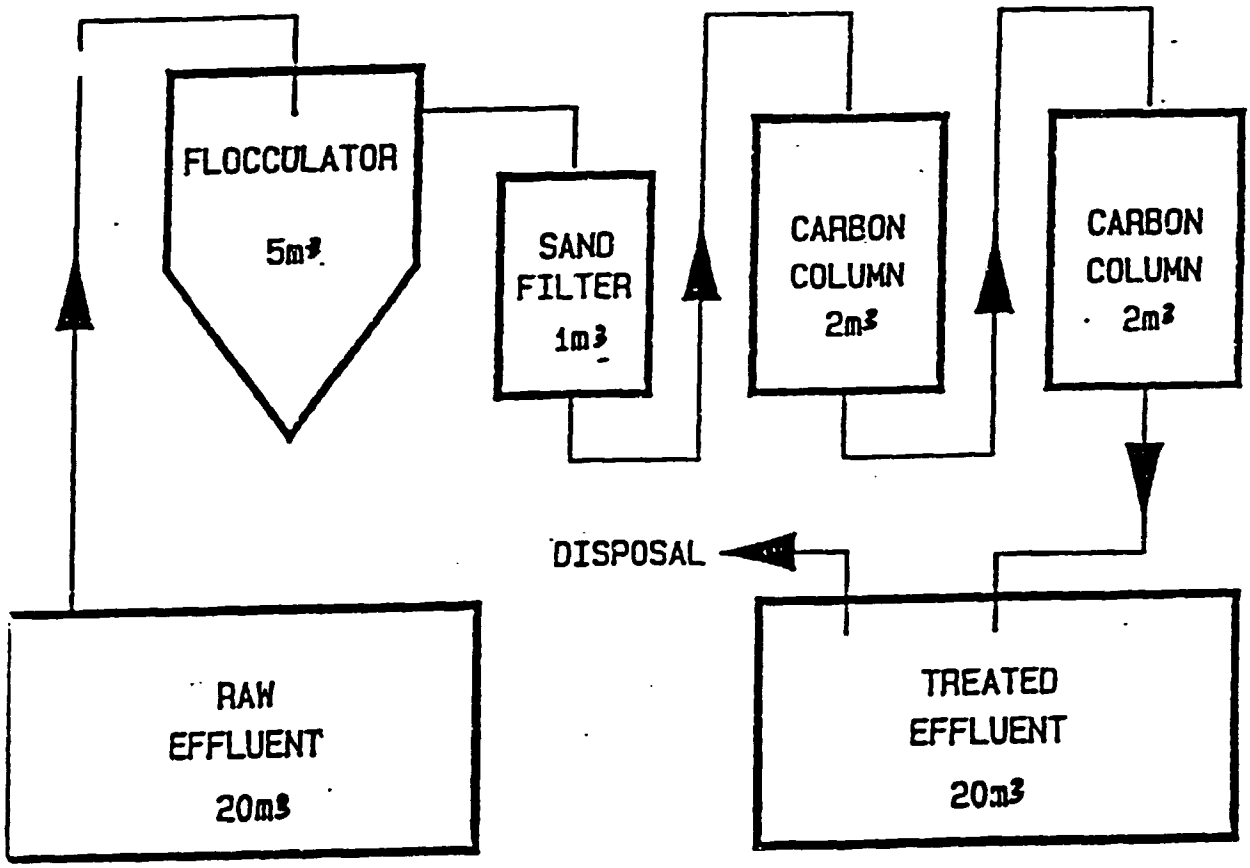


Table I

Effluent Quality Obtainable by

Chemical Treatment and Physical Adsorption

Specification/Parameter	Effluent Quality		
	Untreated mg/l	Chemical Treatment mg/l	Final-activated adsorption treatment mg/l
Biological Oxygen Demand [a]	-	-	-
Chemical Oxygen Demand (COD)	Upto 5000	1500	200
Total Organic Carbon (TOC)	Upto 2000	1000	100
Total Suspended Solids (TSS)	Upto 1000	100	50
pH	?	10 - 12 [b]	6 - 8 [c]
Pesticides [d]			
- Organo-Chlorines	Upto 1000	< 100	< 0.01
- Organo Nitrogen	Upto 1000	< 100	< 0.01
- Pyrethroids	Upto 1000	< 100	< 0.01
- Phenoxy Compounds	Upto 1000	< 100	< 0.01

[a] Biological Oxygen Demand (BOD) is not a reliable parameter as some effluent components may be non-biodegradable.
[b] Process is alkaline at this stage.
[c] pH adjusted in final effluent before discharge.
[d] Broad examples; there are in excess of 500 pesticide compounds in existence. Each group at least will require separate treatment evaluation to assess pesticide removal efficiency.

Table 2

TREATMENT PERFORMANCE

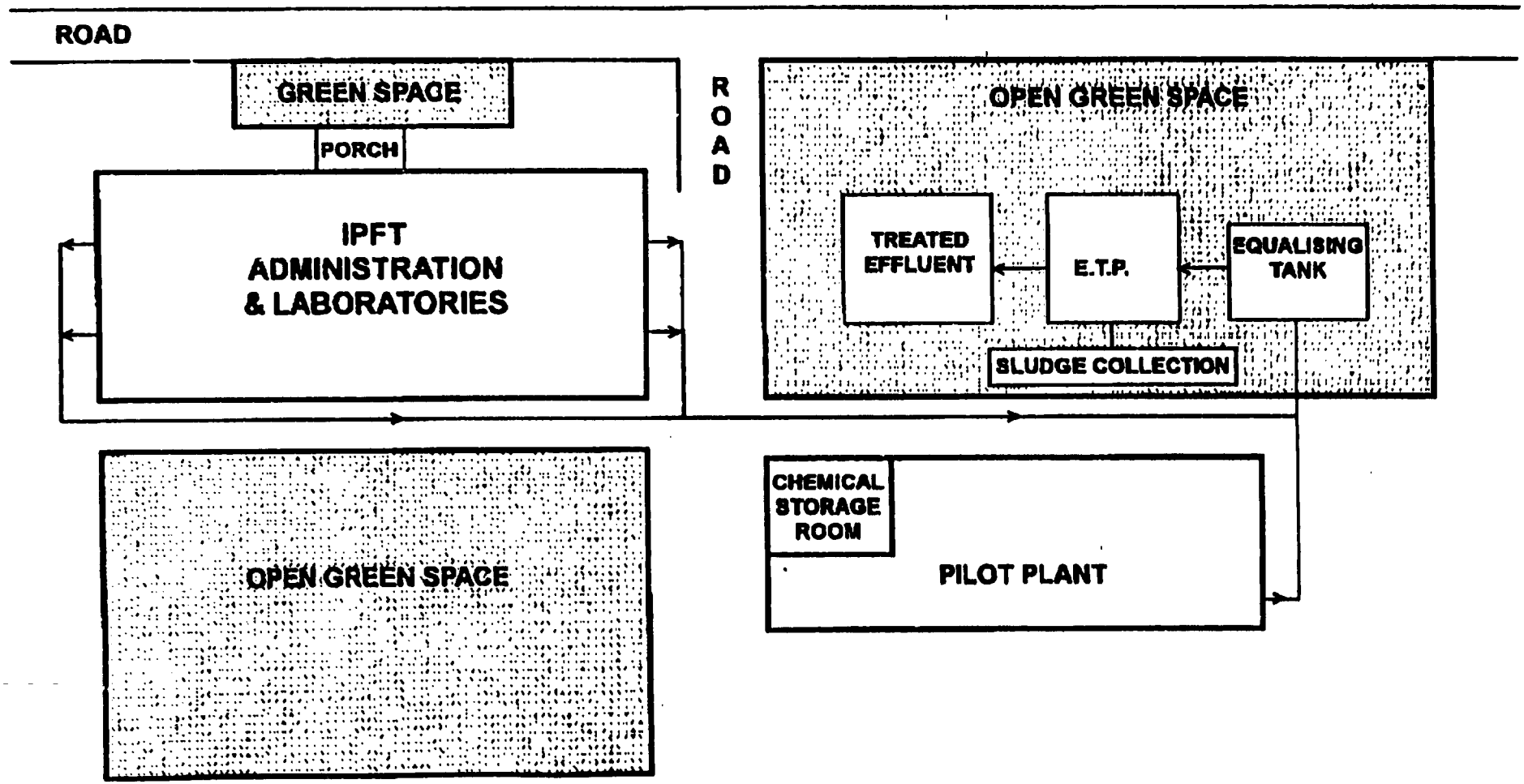
The performance of the above described treatment process for the removal of pesticides from aqueous effluents is summarised in the table below.

Product	Effluent Initial Loading µg/l(ppb)	Residue in Treated Water µg/l(ppb)	Reduction %	Limit of Detection µg/l(ppb)	Source
atrazine	5,100.000	4.0	>99.9	0.4	USA
atrazine	240,000	ND	>99.9	0.06	Nether-lands
alachlor	795,000	<4.8	>99.9	0.4	USA
Bentazon	480,000	ND	>99.9	0.075	Nether-lands
permethrin	237,500	ND	>99.9	0.4	USA
cyper-methrin	50,000	ND	>99.9	0.02-0.04	UK
pirimicarb	225,000	ND	>99.9	0.02-0.04	UK
carbaryl	225,000	ND	>99.9	0.02-0.04	UK
dicamba	35,000	ND	>99.9	0.02-0.04	UK
2,4-D	200,000	ND	>99.9	0.02-0.04	UK
paraquat	200,000	ND	>99.9	0.02-0.04	UK

ND = not detectable

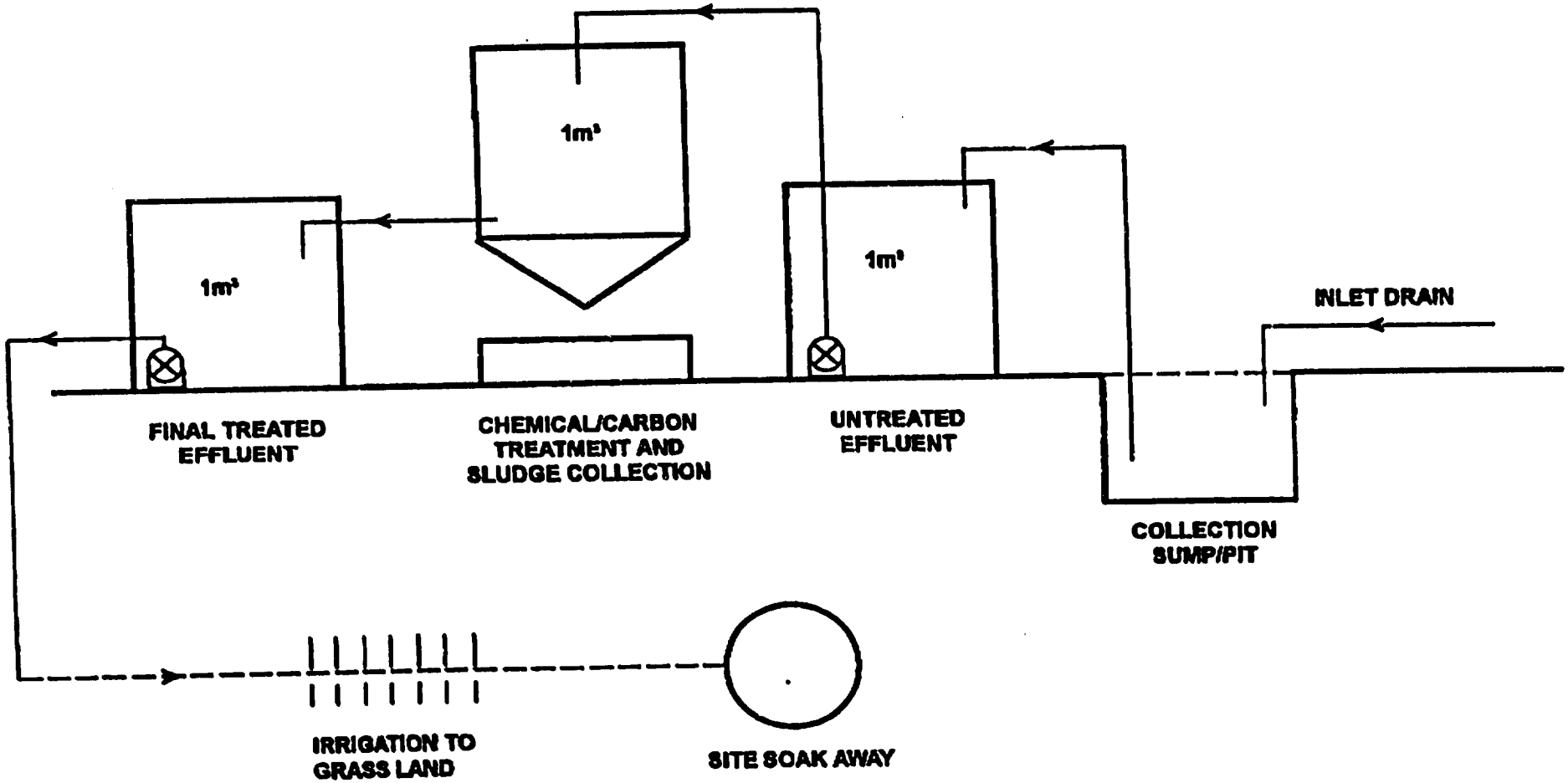
PROPOSED EFFLUENT TREATMENT PLAT LAYOUT FOR IPFT

APPENDIX 3



EFFLUENT TREATMENT PLANT - SCHEMATIC LAYOUT

APPENDIX 4



IPFT GURGAON HARYANA

EFFLUENT/LIQUID WASTE TREATMENT

Module I

Effluent/Waste Classification

Treatment evaluation.
Treatment technology - selection of options:-
- chemical,
- physical - adsorption techniques
- biological treatment systems.

Module II

Treatment Plant Design

- Batch process
- Continuous flow

Module III

New Technology

- Membranes - reverse osmosis/ultra filtration
- Ozone
- Ultra violet (UV)/peroxide oxidation

Module IV

Effluent Quality

- Monitoring
- Chemical analysis
- Final effluent quality

TOXIC AND HAZARDOUS WASTE MANAGEMENT AND DISPOSAL

Module I

Legislation

Typical legal framework based upon UK and CWE (EC) practise

- Duty of Care
- Licensing
- Transport
- Disposal
- Site remediation.

Module II

Waste Handling

- Identification and classification
- Segregation and containment
- Packaging, labelling and records
- safe storage.

Module III

Waste Minimisation - Theory and Practice

- Reduction at source
- Plant and process modification - new and existing plants
- Point source recycling
- Recovery and re-use.

Module IV

Waste Pre-treatment and Preparation for Disposal

- Chemical fixation
- Wet-air oxidation
- Shredding
- Crushing
- Compaction and over-packing.

Module V

Waste Disposal - Selection of Best Available Options

- Landfill
- High temperature incineration
  - fixed hearth - small and large package units
  - rotary kiln
  - cement kilns.

Module VI

Interface and Liaison with Controlling Authorities

- Records
- Training needs
- Resource planning

UNIDO COMMENTS

The report No. III covers all aspects related to environmental aspects with respect to operation of pesticide industry. The training courses covering roll on - roll off type at different centres clearly indicate that UNIDO/IPFT approach of covering the whole country in a most cost effective way. The three reports clearly indicate that the impact of the courses to the industry has been very valuable.

This third report covering pollution control aspects clearly brought to the surface the various techniques available to industry and how a training programme could be established on a modular basis to industry personnel at different levels.

While giving various actions taken by industry and the registration board to move towards global standards, simple issues such as maintenance of buildings, landscaping, dust protection and presentation of laboratories are vital for image building. In this the author's suggestions for IPFT under 6.3 are vital and the counterparts and the steering committee should take necessary measures especially when IPFT is projected as a centre of excellence.

The three reports form an excellent compilation of safety aspects with regard to operational and environmental safety.