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PAKISTAN

Technical report: Findings and recommendations*

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

Based on the work of Erik Kirknel,
consultant in ecotoxicology

Backstopping Officer: B. Sugavanam
Chemical Industries Branch

United Nations Industrial Development Organization
Vienna

* This document has not been edited.

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Abstract

Title: Consultant for setting up Eco-toxicology Laboratory.

Objective: This second mission had the same objective as the first mission:
To plan the existing laboratories assigned to ecotoxicology to be designed or rearranged properly. To install analytical equipment, the facilities needed, to protect from dust, voltage fluctuations the type of analytical equipment needed for the work to be carried out. To prepare together with the National Project Director, the planned workshop in march 1994 on ecotoxicology in Pakistan.

Conclusions: Development of ERC is in good progress.

A mandate for the ERC has been developed (Appendix 5).

A specific mandate and a training project for the following four months for the CAL has been developed (Appendix 6 and 7).

GLP started in ERC, 25 SOP's produced.

Implementation of analytical equipment continues.

A list of necessary equipment for the biological laboratories has been made (Annex 4).

The final program for the workshop was agreed between Unido, PARC and consultant.

Recommendations: 1. Reduce both the planned activity of consultancy and courses abroad for members of The ERC in Islamabad and convert the saved resources into additional equipment. The staff members are sufficiently educated to start projects in Ecotoxicology. This is the most important recommendation.

2. Establishing a Technical Advisory Committee (TAC) for ERC. ERC needs a forum of scientists to discuss and criticize plans and results. No plan should be active before such a discussion has taken place, at least

the first 5 years. This does not at all mean that the staff is not qualified, but scientific communities tend to isolate themselves. Maybe environmentalist from UNDP and representatives from industry should also participate. ERC is positive to the idea.

3. A trained technical scientific staff member, a chemist, should be placed in the ERC more specific in CAL. The lab. will not be able to function in the long run without her/him. A second chemist should be hired too.

4. Get Dr. Matin in contact with IOBC, in order to calibrate his test methods with the principles developed by this organization.

5. To cancel the planned pesticide residue study for Dr. Yussef Khan, in Denmark. The reason for this step is:

It has been agreed on the ERC to commit the individual scientist to her/his profession and mainly let them operate within their profession. Pesticide residue analysis (like any other discipline) requires commitment and I am afraid of a low output from ERC if we don't commit staff members to restricted areas. It will certainly not optimize the economic (limited) resources if we let everybody do everything. Later on, a member from LCA should be selected for training, for example in Denmark.

6. Arrange petty cash with MFI available for local purchase. The only way of local purchase has been using private resources including consultants! This is an unacceptable situation for a project of this magnitude.

7. As fast as possible to finish rearranging the laboratories.

8. To continue implementing GLP in the lab. If authorities are going to respect reports concerning impact of pesticides on the environment, GLP will be a must for at least LCA.

9. Speeding up the delivery of the remaining items asked for.

10. Ordering spare parts for analytical instruments already received.

11. One auto injector for the two GC's should be ordered. It will increase the repeatability and utilize the technical labor in CAL. It is normal equipment today and especially in laboratories not continuously operating with injecting samples. It should actually have been ordered from the start, but was probably cut off for economic reasons. This is the wrong place to save resources! Training with the staff for a week has shown the necessity for an auto injector. It is fairly easy to change the auto injector from one GC to the other when necessary. Therefore only one.

12. Buying a car for the project. The type of car should be Toyota Landcruizer HJ-80 serie, diesel engine, no turbo, 4 liter. This type of car is especially made for field trips and have sufficient space in the rear to carry equipment. It is a simple construction designed to operate in remote areas.

13. The two GC's are equipped with simple integrators, not designed to handle data in appropriate manner. The consultant has earlier pointed this out and preferred that a Turbochrome software should be purchased (letter of 22/02/93 to backstopping officer. It is a true PC-based software, capable of storing data on tape continuously. Disks will be filled up too fast on the integrator and data should not be stored on the hard disk. The PC will furthermore be able to operate software Windows, Excel etc. for proper data handling.

Dr. Baloch is trying to negotiate with the local Perkin Elmer distributor for swapping the integrators to Turbochrome software and a PC. Extra resources may be necessary for this.

14. Ordering items for biological laboratories (will be forwarded directly from Islamabad to Unido within 2 weeks)

15. ERC expressed a wish for ordering the two computers planned to be delivered from Zitech in Denmark, to be ordered from Vienna. I will recommend this.

ABBREVIATIONS

PARC Pakistan Agricultural Research Council
NARC National Agricultural Research Center
GC Gas chromatograph
GLP Good Laboratory Practice, a quality assurance system based primarily on standard operating procedures (SOP's).
GLC Gas Liquid Chromatography
HPLC High Performance Liquid Chromatography
RENAP Regional network on Pesticides for Asia and the Pacific.
UNDP United Nations Development Program
UNIDO United Nations Industrial Development Organization
NPD Nitrogen phosphorous detector
FPD Flame photometric detector
ERC Ecotoxicology Research Center
CAL Chemical Analysis Laboratory
SOP Standard operating procedure.
TAC Technical Advisory committee
IOBC International Organization for Biological Control.

I INTRODUCTION

This report is made by Erik Kirknel, Research Center for Plant Protection, Dept. of Pesticide analysis and Ecotoxicology. Flakkebjerg DK-4200 Slagelse. The job description is reproduced in Annex I.

The first part of the mission took place on the 13-20th of february and the second on 9th october to 6th november 1993.

The primary objectives were "to advise the National Project Director during the first part of his mission to plan the existing laboratories assigned to ecotoxicology to be designed or rearranged properly, to install analytical equipment, the facilities needed to protect from dust, voltage fluctuations, the type of analytical equipment needed for the work to be carried out and also prepare themselves for the planned workshop on ecotoxicology in Pakistan."

The original objectives were in general obtained except to install all of the ordered analytical equipment. An important part of the analytical equipment has not arrived even when the mission finished. Nor were the laboratories fully redesigned.

The reports mentioned in Appendix III, describes the available reports done previously in the project.

II SITUATION AT ARRIVAL AT NARC

A. Status of the laboratories.

At the time of arrival, four laboratories and two offices were available to The ERC at the lower floor. One lab. was almost ready for implementing the analytical equipment. After a meeting with the chairman of PARC Dr. Zafar Altaf, the remaining job of cleaning and painting was finished within two weeks.

B. The status of glass ware, chemicals, small instruments and analytical instrumentation.

Most of the glass wares and other instrument were put on shelves and only the two GC's, the two HPLC's and the spectrophotometer were still unpacked. The reason for this was, that Perkin Elmer (PE) representative in Pakistan did not have the time to implement these instruments. Two weeks after my arrival PE started setting up the instruments and one week before my departure they finished the job. Little time was available to train the staff members in analysis of pesticides

before my departure. The system is yet not fully integrated, despite all our efforts, it did not live up to the promised expectations.

The previous consultant Mr. B. Croizer had checked most of the glasswares and minor instruments and I checked what has arrived after his departure. Only a rotavapor has not arrived. We discovered it was not shipped from the deliver. 3th of november, I got a message from Unido in Islamabad, the rotavapor could be expected any time. The purchasing lists coincided with the items present.

Unfortunately a very important part of my list to Unido, was not even ordered from Unido when I arrived. The fax from Islamabad nov.-93 describes the missing items. Therefore I was not able to instruct in use of the HPLC, and to a very limited degree in GC analysis. Fortunately I had brought some analytical standards from my lab. in Denmark so we could plan activities for the next four months

III FINISHING THE REARRANGING OF THE ANALYTICAL LABORATORIES

In my report from the first mission, a list of minimum requirements was set up for rearranging the laboratories, hall and offices. Few things are not yet done, the most important is the fume hoods and safety devices. They will be finished in the near future.

IV THE WORKSHOP FALL 1993

At meetings in Islamabad with Dr. Umar Khan Baloch, PARC and UNIDO's backstopping officer plans for the workshop in march 1994, were developed. Details shall not be given here.

But it was emphasized that the Ecotoxicology Center should be functioning, and demonstrated to the visitors.

V CONCLUSIONS

Development of ERC is in good progress.

A mandate for the ERC has been developed (Appendix 5).

A specific mandate and a training project for the following four months for the CAL has been developed (Appendix 6 and 7).

GLP started in ERC, 25 SOP's produced.

Implementation of analytical equipment continues.

A list of necessary equipment for the biological laboratories has been made (Appendix 4).

The final program for the workshop was agreed between Unido, PARC and consultant.

VI RECOMMENDATIONS

Reduce both the planned activity of consultancy and courses abroad for members of The ERC in Islamabad and convert the saved resources into additional equipment. The staff members are sufficiently educated to start projects in Ecotoxicology. This is the most important recommendation.

Establishing a Technical Advisory Committee (TAC) for ERC. ERC needs a forum of scientists to discuss and criticize plans and results. No plan should be active before such a discussion has taken place, at least the first 5 years. This does not at all mean that the staff is not qualified, but scientific communities tend to isolate themselves. Maybe environmentalist from UNDP should also participate. ERC is positive to the idea.

A trained technical scientific staff member, a chemist, should be placed in the ERC more specific in LCA. The lab. will not be able to function in the long run without her/him. A second chemist should be hired too.

Get Dr. Matin in contact with IOBC, in order to calibrate his test methods with the principles developed by this organization.

To cancel the planned pesticide residue study for Dr. Yusef Khan, in Denmark. The reason for this step is: It has been agreed on the ERC to commit the individual scientist to her/his profession and mainly let them operate within their profession. Pesticide residue analysis (like any other discipline) requires commitment and I am afraid of a low output from ERC if we don't commit staff members to restricted areas. It will certainly not optimize the economic (limited) resources if we let everybody do everything. Later on, a

member from LCA should be selected for training, for example in Denmark.

Arrange petty cash with USD available for local purchase. The only way of local purchase has been using private resources including consultants! This is an unacceptable situation for a project of this magnitude.

As fast as possible to finish rearranging the laboratories.

To continue implementing GLP in the lab. If authorities are going to respect reports concerning impact of pesticides on the environment, GLP will be a must for at least LCA.

Speeding up the delivery of the remaining items asked for.

Ordering spare parts for analytical instruments already received.

One auto injector for the two GC's should be ordered. It will increase the repeatability and utilize the technical labor in LCA. It is normal equipment today and especially in laboratories not continuously operating with injecting samples. It should actually have been ordered from the start, but was probably cut off for economically reasons. This is the wrong place to save resources! Training with the staff for a week has shown the necessity for an auto injector. It is fairly easy to change the auto injector from one GC to the other when necessary. Therefore only one.

Buying a car for the project. The type of car should be Toyota Landcruizer HJ-80 serie, diesel engine, no turbo, 4 liter. This type of car is especially made for field trips and have sufficient space in the rear to carry equipment. It is a simple construction designed to operate in remote areas.

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Ordering items for biological laboratories (will be forwarded directly from Islamabad to Unido within 2 weeks)

ERC expressed a wish for ordering the two computers planned to be delivered from Zitech in Denmark, to be ordered from Vienna. I will recommend this.

APPENDIX I

JOB DESCRIPTION

Purpose of proj. To assist the Asia Region in the safe development and management of pesticides especially with respect to assisting Pakistan to improve its capacity to study the ecological aspects related to pesticide production and use.

Duration: 1 week in february and 4 weeks in oct./nov. 1993.

Duty station: Islamabad, Pakistan with possible travel within Peshawar.

Duties: The consultant is expected to advise the National Project Director during the first part of his mission (one week in february 1993) to plan the existing laboratories assigned to ecotoxicology to be designed or rearranged properly to install analytical equipment, the facilities needed to protect from dust, voltage fluctuation, the type of analytical equipment needed for the work to be carried out and also prepare themselves for the planned workshop on ecotoxicology in Pakistan.

Following this he is expected to take his second mission along with another consultant to assist in the workshop by setting up necessary demonstration, lectures for the benefit of the participants coming from different Asian countries.

He is expected to submit a report after his first mission with his findings and recommendations.

Background information:

Asia region is going through an accelerated industrial growth during the last 10-15 years and the both per capita chemical production and the use have risen enormously. Unfortunately the corresponding awareness and actions to deal with the chemical contamination in the environment has been every limited in many countries due to lack of facilities and expertise. UNDP in association with UNIDO has established RENPAP to promote safe development and management of pesticides. In the network there are 14 member countries covering almost half of the worlds population. Some selected countries

have taken up specific areas to provide assistance to the region and UNIDO is providing technical assistance to increase the capacity of these countries in the chosen topics by linking with other national projects. The following topics are covered:

Formulation technology:	India
Quality control:	Rep. of Korea
Bio-botanical pesticides and Residue analysis:	Thailand
Occupational safety:	Philippines
Operational safety, Waste management and Environment safety:	Thailand
Application technology:	Malaysia
Data collection/Dissemination:	India
Ecotoxicology:	Pakistan

At present UNIDO is providing adequate support to Pakistan to establish an ecotoxicology center which should provide the necessary assistance not only to Pakistan but also to the region. With this it is planned to have a workshop in 1993 in Pakistan on ecotoxicology for the benefit of the Asia region. This regional project is intended to assist Pakistan in organizing the workshop and handle topics relevant to the region especially with regards to pesticides.

APPENDIX II

ITINIRARY

ACTIVITIES IN ERC FROM 7TH OCT TO 5TH NOV 93.

Finishing rearranging the laboratories after meeting with the director of NARC.

Checking items received.

Opened packages with equipment. Checking packing lists.

Starting hydrogen-, air- and nitrogen generators. Made things ready for receiving Perkin Elmer people.

Together with the two Perkin Elmer representatives, instructing three staff members in the use of GC, HPLC and spectrophotometer.

Introductory courses in GLP.

Introductory course in statistics. Distrib. curves, standard deviations, calibration curves, confidence intervals for calibration curves, limits of detection etc.

Introductory course in principles of GC, packed columns, wide bore columns, capillary columns.

Injection techniques, temperature programming, principles of the available detectors, data collection, interpreting chromatograms, developing methods, reanalysis of chromatograms etc.

Developing of mandates for the different laboratories.

Participating in discussions on specific projects.

Future development, strategies and working procedures of ERC has been a topic of intense discussions.

Twenty SOP's has been created. All analytical instruments and major items are registered in SOP's

SOP is made for registration for different

groups of chemicals in a database in order to keep track of date of purchase, expiration date, storage place etc.

SOP for registration of incoming samples for chemical analysis or for use in biological experiments.

SOP for planning and performing projects, including arguing for the project, resources used, methods, plans for hearings, intended date of publication, journals to apply for publication, national and international peer review etc.

Development of CV for all staff members and archived.

Made agreements on contacting different scientific communities in Europe for future plans.

APPENDIX III

REFERENCES AND REPORTS CONSULTED

1. **CALDERBANK, A.**
Unido report on environmental toxicology related to pesticides in Pakistan. DP/RAS/85/023. 1988.
2. **CALDERBANK, A.**
Unido report on an Ecotoxicology Research Center in Pakistan. DP/RAS/85/023. 1990.
3. **FLETCHER, K.**
Unido report on Establishment of an Ecotoxicology Center. US/PAK/90/294. 1992.
4. **KIRKNEI, ERIK**
Unido report on findings and recommendations on establishing an Ecotoxicology Center in Pakistan. DP/RAS/88/031. 1993.

APPENDIX IV.

Perkin-Elmer Autosystem GC and HPLC.

The following list of spare parts is made by the local PE representative, but should be checked by PE before purchase!!

GC

Cat. no	Text	Quantity	*
---------	------	----------	---

	Phosphorous filter for FPD!	1	
--	-----------------------------	---	--

	Auto injector	1	
--	---------------	---	--

It is very important to check the configuration of the GC before purchasing. Call Mr. Masood Ahmed Khan, Sr. service engineer, Zelin Karachi. Fax.: (92-21) 5662072. Zelin (Private) limited 2-C Sunset Lane 2 Phase II Ext. Defense Housing Authority Karachi-75500 Pakistan. Ph.: 549423-25.

N930-1178	Gas line moisture filter	4	
N930-1179	Oxygen trap	4	
N610-1041	Flow controller	1	*
N930-1191	Oxygen indicator trap	4	
N600-1554	Needle valve, comb. control	4	*
0009-1357	Septa Teflon faced	4	
N610-0097	Injector heater, 240V	1	*
N610-0006	Inj/det sensor	2	*
N612-0084	Trap split/splitless inj	2	
N610-0124	Split solenoid	1	
N610-0059	Oven sensor	1	*
N610-005?	Oven heater	1	*
N610-1102	Oven heater ceramic tube	1	*
N610-1374	Glass liner silicon O-ring	2	
N610-1378	Glass liner graphite O-ring	2	
0992-0105	1/6"*0.5mm id.cap.graph/vesp.	4	
0990-3981	1/8" graph. ferr. cap	2	
0990-3129	1/8" brass ferr. front	20	
0990-3130	1/8" brass ferr. rear	20	
N610-1292	Sensor as plunger	2	*
N610-1293	Sensor as vial	2	*
0992-0107	1/6"*0.8mm id.w.bore inj.ferr.	2	
N612-0093	NPD replacement bead	4	
N612-0020	1/8 to 1/6" det. adaptor	1	
N612-0205	ECD heater	1	*

Autosampler add on kit

N600-0971	2-ml autosampler starter kit	1	
N930-1385	2-ml vials	4	
0009-2205	Crimps caps with septa	1	
0992-3031	4-ml waste-wash vials	4	
0992-3032	Screw caps for 4 ml vial	4	

N610-1276	Diffusion cap for 4 ml vials	4
N930-2780	Waste-wash vial septa	20
N610-1252	0.5ml repl.autos.syr.0.63od	4
N610-1253	0.5ml autos.syr.0.47mm od. use with 0.53mm on col.mode	2
N610-1251	5 microliter syr.	2
N610-1380	5 microliter syr for wide bo.	2

Sank kit? N610-0200 includes most of the spare parts marked with *. *-items should therefore be omitted if kit is purchased.

Configuration of system is required (autosampler, detectors etc.). Ask Masood, Karachi.

HPLC

A list of necessary spare parts was promised from Zelin before departure, to be sent to my home address, but not arrived yet!

APPENDIX V

Mandate of ERC.

1. Evaluation of impact of agro-chemicals on the wildlife with emphasis on non-target biotic (flora and fauna) compartment of the environment.
2. Assessment of impact of agro-chemicals on the soil-/water micro flora with emphasis on beneficial microbes in the agro-eco-system.
3. Investigation on the fate of agricultural and industrial xenobiotics in the environment.

Functions of labs.

1. Terrestrial Ecology Laboratory (TEL)
 - 1.1 Investigate the impact of agro-chemicals on reproduction, survival and activities of wildlife fauna, particularly mammals and birds in the agro-ecosystem.
 - 1.2 Study the impact of pesticides on the beneficial insects (predators and parasitoids) of arthropod pests of crops.
 - 1.3 Assess the short and long term risks associated with the use of agro-chemicals on the beneficial macro-fauna (e.g. earthworms) in the soil ecosystem.
2. Agrochemicals Microbiology Laboratory (AML)
 - 2.1 Assess the microbial ecology of pesticide contaminated soil and water samples.
 - 2.2 Evaluate the tolerance, detoxification and degradation by the predominant microflora associated with the pesticide contaminated soil and water samples.
 - 2.3 Investigate the impact of pesticides on beneficial/non-target organisms.
3. Chemical Analysis Laboratory (CAL)
 - 3.1 Monitor agro-chemical residues in the soil and water in their agro-ecology.
 - 3.2 Evaluate the wind drift and fall out of pesticides in their agro-ecosystem.
 - 3.3 Study the occupational hazards associated with

the production and use of agro-chemicals.

APPENDIX VI.

Specific mandate for CAL from 4th of nov. 93.

OUTLINE OF ACTIVITIES FOR CAL

Background.

The vast use of pesticides and other xenobiotics in the world, has created a need for monitoring of these synthetic chemicals. The effect on humans and other mammals, residues in food has been an area of activity for many years. We have discovered negative effects to such a degree, that some of the chemicals, being in use for many years, have been abandoned.

Residues in the environment is an issue of growing concern, but in many areas yet still of second priority. This is so, despite of the fact, that some of the effects seen in the environment, are long lasting and difficult to repair for example the presence of pesticides in ground water. In Pakistan and in many other countries, presence of xenobiotics and their effects on the environment, is an area that has been neglected.

Presence of these chemicals in ground water, lakes, impact on the stability on the different ecosystems and occupational hazard (man is a part of the ecosystem), is some of the more serious items, but only top of the iceberg.

Pakistan have decided to go into this area, by establishing an Ecotoxicology Research Center (ERC), in Islamabad and a couple of local laboratories in areas with high load of these chemicals.

Objective.

The objective for CAL will be to investigate the fate of xenobiotics, mainly agricultural but also industrial, in the environment.

CAL will have its own projects running, and collaborate with other laboratories, primarily within ERC, but to a high degree try to be the initiator and project coordinator of inter-institutional activities, not only in Pakistan but in the near asian area.

CAL will strive towards building up a pool of knowledge in chemical analysis to such a degree it will be the center of these activities in Pakistan and the near asian area.

Therefore it will be extremely important to introduce an

internationally accepted type of quality, namely GLP, Good Laboratory Practice in order to obtain accept of produced reports from national authorities. The introduction of this kind of project managing, is in favor of the present status of CAL. It is newborn.

The projects of CAL will naturally change with time.

The following will outline two tiers, the first tier from november 93 to march 94, the second tier will be after march 94.

No time consuming activity in the lab. should take place, without prior proper written plans, and information of the content to the staff.

FIRST TIER:

Establishing the lab.

SECCND TIER:

Projects.

The reason for this first step is obvious. CAL has just started its activities and is even not equipped to fully perform simple analysis not even in the spirit of GLP! The laboratory needs to be completed according to the Unido consultants report spring 1993. The training of technicians have just started, and 4 months is a ~~minimum~~ of time for training. Not even after mar/94 the team will be able to work full capacity.

All efforts should be put into being able to invite members of the planned workshop to visit CAL and show the contour of a GLP lab!

Months before march, drafts of plans in the following areas should be worked out to be in action fully or in part in 1994. It is emphasized to work out plans in details (including literature studies) before any field activities will take place.

1. Analysis of pesticides in soil and ground water of frequently used pesticides in agricultural areas, preferably in cotton areas with high level of ground water.
2. Analysis of lake-water and sediments for pesticides in agricultural areas.
3. Occupational hazard studies, exposure of spraying personnel and factory workers of pesticides and use of

biomarkers.

4. Wind drift of pesticides in agricultural areas.

Methods.

Only methods for the first 4 months will be described.

The personnel available for this period of time will be :

Mr. Mohammad Mumtaz, chemist,
Mrs. Seema Tahir, biologist,
Mr. Tahir Anwar, biologist.

The main objective for the group will be:

- 1 Intense working in handling the two GC's. This include starting, optimizing, calibrating and running standards of organophosphates as a beginning.

The background is 3 technicians having been abroad and trained especially in pesticide residue analysis. They have been working with normal daily procedures of making standard solutions by weighing and diluting. They are trained in extracting samples with organic solvents and handling of compressed hazardous gasses. They have been using GC's for quantifying trace amounts of the same pesticides being used in Pakistan. They have seen and worked with procedures for cleaning used glassware, storing glassware appropriate e.t.c.

Furthermore, two of them are trained biologists, used to work in laboratories.

I am confident that these 3 technicians will be able to perform simple procedures of GC analysis.

Furthermore, they have experienced the implementation of both GC, HPLC and spectrophotometer for a period of one week. This include data handling on integrator as well.

After this time the consultant have been working with the team for one week prior to departure.

The consultant will before departure in details discuss with the team what to accomplish in the future.

This will include producing reports of repeatability for the individual technician in injecting standard solutions of pesticides, calibration curves and statistic

evaluation.

2. **Spiking water samples with organophosphates and report of recovery.**

The background for this activity is the above mentioned activity plus the experience of the chemist Mr. Mumtaz.

It should be pointed out that no work should be performed with organic solvents without sufficient ventilation in fume hood!

3. **Producing SOP's.**

The team has been introduced and experienced with making SOP's. Each individual will produce SOP's in accordance with the type of work she/he will perform. Details will be agreed with consultant.

4. **Intercalibration.**

The primary goal before jan. 94 will be planning an intercalibration with consultants lab. Details will be agreed later.

Reports and responsibilities.

Detailed reports from the daily work performed and the results accomplished of the individual will be available at any time and should frequently be discussed with the responsible leader of CAL , Dr Mumtaz.

Monthly written and signed reports of accomplished, will be made by Mr. Mumtaz and directed to the responsible leader of ERC Dr. Matin.

If any obstructions show up in accomplishing the planned activities, it is the responsibility of Mr. Mumtaz to make a report to Dr. Matin whenever it may happen.

It will be the responsibility of Dr. Matin to make a report to Dr. U. K. Baloch of the accomplished and obstructions for the planned activities within the next four months.

APPENDIX VII.

Project for CAL nov.-march 1994.

(Written according to SOP: Planning)

1. Name of project.
Training of staff in CAL in residue analysis of pesticides.

Authors names.

Mohammad Mumtaz, Sema Tahir and Tahir Anwar.

Budget, months total: 3 scientific staff 4 months.

Budget exclusive manpower, total 4 months: xxx Rs

Contacts to scientific groups on this project.

National: Pesticide residue lab., Karachi.

International: Danish Institute of Plant and Soils Science, Dept. of Ecotox. and Residue Anal., Erik Kirknel.

Other institutions collaborating: none.

Date of proposal of project: 4/11/93.

Date of intended start of project: 4/11/93.

Planned duration of project: 4 months.

Date of hearing in steering committee of ERC.

First hearing: 1/12/93

Second hearing: 1/1/94

Third hearing: 1/2/94

Final hearing and final report: 1/3/94

Members of peer review: Not to be published.

National:

International:

Planned date of publication:

Planned periodicals to apply:

Suggestions for popular articles etc.:

Signature:

2. Background.

The background for this project is implementing analytical instruments in CAL november 93.

It has been decided to develop CAL into a lab. working according to the principles of GLP within one year.

The staff involved have different background in residue analysis, but need training for proper handling of the selected equipment.

Special emphasis will be put on the precision and repeatability of injected standards in gas chromatographic analysis.

This type of analysis requires long practice before reliable results will be obtained. The precision needed to be documented, before analysis of samples can be performed.

3. Objective.

The objective of the project is to develop skill in CAL for residue analysis with high repeatability in GLC.

The hypothesis will be, that manually training of staff and statistical evaluation of obtained results will show improved repeatability in this first part of pesticide residue analysis.

Future analysis will certainly benefit of this intensive training.

4. Methods.

Two GC's equipped with ECD and NPD will be used

If an ordered P-filter for the FPD will arrive within short time, this detector will also be involved.

OP-compounds should preferably be run on NPD and FPD.

Add 0.5 L of tap water.

Add 1 ml of ethyl acetate standard 5 $\mu\text{g}/\text{ml}$ (OP-compounds) or 1 $\mu\text{g}/\text{ml}$ (cypermethrin) to the first separatory funnel.

Add 1 ml ethyl acetate to the second separatory funnel.

Add now 30 ml dichloro methane (fume hood!) to each funnel.

Shake well for 1 minute.

Stand in rack until the two layers separate.

Underneath the funnels, a small funnel with small cotton plug and sodium sulphate (anhydrous), round bottom flask and cork.

Let dichloro methane drop on sodium sulphate.

Repeat with 30 ml dichloro methane in separatory funnel.

Shake 1 min.

Leave until layer separate.

Release dichloro methane on sodium sulphate.

Repeat with 30 ml dichloro methane.

Rinse finally sodium sulphate with 30 ml dichloro methane.

100 ml dichloro methane will be in round bottom flask now.

Add 1 ml "keeper" (10% propylene glycol, 90% dichloro methane) to round bottom flask. Add 6-8 small glass beads.

Evaporate to just dryness in rotavapor.

Let stand in fume hood to evaporate last traces of dichloromethane, or blow slowly dried nitrogen down in flask until dry.

IF YOU ARE USING ECD IT IS EXTREMELY IMPORTANT TO REMOVE ALL TRACES OF DICHLORO METHANE BEFORE INJECTING. ADD FEW ML OF SOLVENT (ETHYL ACETATE, HEXANE OR WHAT EVER YOU HAVE SELECTED), EVAPORATE TO DRYNESS AGAIN!!!!

Transfer quantitatively the sample with pasteur pipette and small volumes of ethyl acetate to 5 ml volumetric flasks.

Make up to volume.

Ready for GC-analysis.

Make a good calibration curve and determine the quantity.

Calculate the recovery in percentage.

Repeat with different pesticides.

Repeat with lower dosages.

Make SOP for extracting these pesticides in water.

Third hearing 1/2/94

Ready for inter calibration.

Details will be forwarded to Islamabad according to the degree of progress so far.

Final hearing and conclusion 1/3/94

UNIDO'S SUBSTANTIVE COMMENTS ON THE REPORT OF

MR. ERIK KIRKNEI

The report gives an elaborative description of the status of the ecotoxicology centre just getting started and making necessary preparations for the forthcoming ecotoxicology workshop in March 1994. The mandate of the Ecotoxicology Centre and the organization set up given in the report are important to establish a basic foundation for the Centre.

The suggestion to reduce training and expert component and increase equipment component will have to be carefully reviewed in future, taking into account the progress made by the Centre. As the capability of the staff is improved, they can move to more and more sophisticated/reliable analytical experiments. For this, set standard should be established and in this the consultant's recommendation for GLP/SOP and inter-laboratory calibration are vital. The Centre has a highly qualified staff and with motivation and provision of proper linkage with industry and agriculture, the Centre would be able to provide the necessary services to the country by contributing to risk reduction in dealing with toxic chemicals.

Further, the workshop planned in March 94 will be a platform for the region to approach with care in dealing with chemicals. (toxic and hazardous)