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Institutional Excellence Project

FINAL REPORT

Submitted to

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Project Manager

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National Management Consultants (Pvt) Ltd.

FINAL REPORT

1.0 INTRODUCTION

National Management Consultants (Pvt) Limited was entrusted with the work of an overall picture of research activities of different specified universities and their interaction with relevant industries by USAID.

The work encapsulates the following activities, reviewing of the research capabilities of different universities based on already completed research works, assessment of university research capabilities in regards to relevant industries, the drawbacks and strengths of the different departments of universities in equipment, finances, personnel (faculty) etc.. and ways they can benefit the relevant industrial sectors.

Surveying industries (small and large) in the correlating research areas of the university and the benefits and rewards that can be reaped by the concerned industries through related research works.

Anti-dotes to the existing problems of different industries on the behest of the concerned senior management of the industry.

To arrange and facilitate discussions between the concerned personnel of both the university and industry and expedite co-operative relations in pursuance of the proposals written in collaboration with the personnel of USAID and NMC relating university/industry interaction of applied research, personnel involved, schedule to be adhered to, accruing costs, anticipated results, monitoring process and technology transfer process. Further more to conduct a study on university/industry relationship and bringing about a technological improvement through further efforts at co-operation between the two.

2.0 METHODOLOGY.

In the initial stages a survey was done to determine the areas where industry/university relationship can thrive and flourish. For this purpose all the probable areas of Pakistan promising the desired atmosphere were visited. The most promising areas were identified by the surveying team and their strengths and drawbacks were analysed. A number of visits were conducted to the places promising such results which could facilitate and boost the existing technology. The second step was to facilitate the relationship and discussions which were a resultant of the initial efforts. The second stage comprised of assisting departments/centres in drafting of proposals and the arrangement of meetings between the different universities/industries and ways and means to further promote relations between the two to facilitate the existing works and new technology. A detailed survey has been carried out with fruitful results. Stated below are the activities concerning the specified universities/industries.

List of Industries Involved.

<u>Sr.No</u>	<u>Industry</u>	<u>Address</u>	<u>Contract Person</u>
1.	Biology Chanar Sugar Mills Limited.	Channar Sugar, Shadman II, Lahore	Mr. Javed Kayani.
2.	Biology Wyeth	Wyeth Laboratories,	Brig. M. Naeem

	Laboratories.	Kot Lakhpat, Lahore.	
3.	Punjab Drug House	Punjab Drug House, Railway Road, LHR.	Dr. Mahmood Alam.
4.	Paramount	Paramont, Ahmad Block, Garden Town, Lahore.	Dr. Muneer Ahmad
5.	Karachi Chemicals	Karachi Chemicals, Federal B Area, Karachi.	Mr. A. Saboor
6.	Islamabad Pathological Laboratories.	Islamabad Pathological, Blue Area, Islamabad.	Dr. Javed W Khan
7.	Babar Medicine	Babar Medicine, National Medicine Market, Karachi.	Mr. Javed Akhtar.
8.	Murree Brewery	Murree Brewery, Rawalpindi.	Mr. M.P. Bhandara.
9.	Dr. Ehsanullah Laboratories.	Dr. Ehsanullah Laboratories, Nazimabaad, Karachi.	Dr. Ehsanullah
10.	Jaffar Brothers	Jaffar Brothers, Saddar, Karachi.	Dr. Mansoor Ahmad.
11.	Diagnostic Services	Diagnostic Service, Rimba Plaza, Karachi.	Dr. Ayaz Alam
12.	D Labs	D Labs, Saddar, Karachi.	Dr. Fahim Ansari.
13.	Modern Diagnostic Service	MDS, Khalid Bin Waleed Road, Karachi.	Dr. M. Qasim
14.	Dr. Ziaddin Hospital.	Dr. Ziaddin Hospital, North Nazimabad, Karachi.	Dr. M. Siraj
15.	Chemical Iqbal Silk Mills	Iqbal Silk Mills, Landhi, Karachi Sattar.	Mr. Azim A.
16.	Hamdard laboratories	Hamdard laboratories, Super Highway, Karachi.	Dr. Hafiz M. Ilyas.
17.	Kurram Industries	Kurram Industries, Sihala Road, Rawalpindi.	Mr. Shamsul Haq
18.	Dewan Suleman Fibres.	Dewan Suleman Fibers, Hattar, Haripur.	Mr. Zia Dewan
19.	Cieba Giegy	Ciba Giegy, West Warf, Karachi.	Mr. Tariq Allauddin.
20.	Islamabad Board Mills.	Islamabad Board Mills, Hattar, Haripur.	Mr. Ateque Rehman.
21.	F. Rabi & Company	F. Rabi & Company,	Mr. Mumtaz

		Bank Square, Lahore	Ahmad.
22.	Chemicals Fine Plastic Industry, Chemistry.	Fine Plastic, I-9, Islamabad.	Mr. Majeedullah
23.	Qureshi Industries	Qureshi Industries, Samanabad, Lahore	Mr. Iqbal Qureshi.
24.	Electrical ESCORTS Group.	ESCORT Group, Davis Road, Lahore.	Dr. Kazi Ainuddin.
25.	Anwar Industries.	Anwar Industries, G.T. Road, Gujranwala.	
26.	Pakistan Switchgears	pakistan Switchgear, The Mall, Lahore.	
27.	Bilal Engineering	Bilal Engineering, Allama Iqbal Road, Lahore.	
28.	Climax Engineering	Climax Industries, G.T. Road, Gujranwala.	
29.	ARCON Engineering	ARCON, Canal park, Gulberg, Lahore.	
30.	Faizi Industries	Faizi Industries, G.T. Road, Gujranwala.	
31.	AETCO	AETCO, Mcleod Road, Lahore.	
32.	The Imperial Electrical Company	IEC, The Mall, Lahore.	
33.	ICI Pakistan Ltd.	ICI house, Lahore.	Mr. Zahid Haneef
34.	Hyderabad Electronics	Hyderabad Electronic, Site, Hyderabad.	Mr. Rasheed
35.	SABRO Industries,	SABRO, I-9, Islamabad.	Mr. Ch. Sadiq
36.	Syed Bhai Ltd.	Syed Bhai Limited, Ferozpur Road, Lahore.	Mr. Mahmood Ahmad.
37.	DESCON	DESCON Manufacturing, Kot Lakhpat, Lahore.	Mr. Ghulam Kafeel Majal.
38.	Multilines	Multilines, Kotlakhpat, Industrial Area, Lahore.	Mr. M. Khaliq
39.	Carrier Telephone	CTI, I-9, Islamabad.	Mr. M. Azhar
40.	Geology Qaddus Stone Crushing, Company.	Margala, Taxila,	Mr. M. Anwar
41.	KSB Pumps Ltd.	KSB Pumps,	

		Hasanabdal.	Mr. Tariq Yar
42.	Pakistan Oil Fields Limited.	POL House, Morgah, Rawalpindi.	Dr.A. H. Gardezi.
43.	Rastagar Industries I-9, Islamabad.	Rastagar Industries,	Mr. Imtiaz Rasgar
44.	Awan Mineral	Awan Mineral, Industrial Estate, Haripur.	Mr. M. Ashiq
45.	Khawaja Glass Industries.	Khawaja Glass Industries, Hasanabdal.	Khawaja Tahir
46.	Habib Mines (Pvt) Limited.	Habib Mine, Old Karachi.	Mr. M. Habib
47.	Oil and Gas Development Corporation.	OGDC Main Office, Markaz F-8, Islamabad.	Dr. Arif Kamal

3.0 CENTRE OF EXCELLENCE IN GEOLOGY. **UNIVERSITY OF PESHAWAR.**

3.1 Background

Centre of Excellence in Geology, Peshawar (NCEG) was established in 1974. It was established in the same premises as of Geology Department of the Peshawar University, where it still functions but has been growing steadily in terms of enrollment of students and increase in the members of the faculty. The faculty has developed many international linkages with research centres of Europe and US and Canada are actively involved in research mostly of Pakistan's geological resources and developments. The department is working in active collaboration with different universities, but has not worked with any industry on any applied research, other than providing some laboratory testing services. It has greater potential to provide assistance to industries and related government organizations which are being tapped through this IEP project.

The capabilities of Centre of Excellence in Geology, Peshawar are in the area of conducting geological surveys, identification of different industrial raw materials from minerals and in carrying out geological investigations. In these broad areas the research topics that were discussed and finalized includes one for carrying out sedimentological studies in Hydrocarbon bearing strata of Kohat region for oil and gas development corporation and assistance to glass industry in identification of silica sand sources and also critical analysis for inclusion in finished glass sheets, with the suggestion and recommendations for the methods of quality control.

3.1 PERSONNEL INVOLVED

The centre was visited by Mr. John Monagle and Mr. Hamid Hasan Khan a couple of times to assess its research potential and area of interest. Visits on a binary basis for the benefit of industry personnel and the faculty of the university were arranged so as different possibilities of improvement in different areas could be reviewed by the industrial personnel themselves.

Faculty personnel who are participating in this program

Dr. Qasim Jan and Dr. S. Hameed ullah

The persons from the industry.

Mr. Tahir Jamal of Khawaja Glass Industries (Hasanabdal).

Mr. Arif Kamal of Oil and Gas Development Corporation (OGDC), Islamabad.

3.3 INDUSTRIAL INVOLVEMENT.

Khawaja Glass Industries.

Oil and Gas Development Corporation (OGDC).

The proposals submitted by the department have been accepted by the industries involved. The proposal for the glass industry was finalized in consultation with Dr. John Monagle, Qasim Jan and Mr. Tahir Jamal of Khawaja Glass Industry.

The proposal for Oil and Gas Development has also been finalized and accepted by Mr. Arif Kamal of OGDC. The OGDC proposal was also finalized by Mr. Qasim Jan and Dr. John Monagle.

The proposals are being processed by USAID and as soon as the funds are sanctioned the research work will be initiated.

The research work apart from benefitting the faculty members and students of the university will doubly benefit Khawaja Glass factory. The type of hindrances the industry at the present is facing in bringing about a better production of Glass and Glass products will be gradually overcome by the facilitatory research work to be done at the university laboratory.

With the research work on Silica sand and ultimately its use in the manufacture of glass, a finer quality of glass will be produced thus bringing about a substantial increase in the exports of the industry which at the present are not upto the desirable mark.

Similarly the studies carried out by the research department for identifying flaws and their sources a lot by funds of the industry will be saved presently wasted due to these defects.

The research studies by the Geology department around Kohat region for sources of Hydro-carbon will provide a valuable source data for OGDC thus increasing possibilities of added production of oil and gas in the near future.

3.4 PROPOSAL (a).

IDENTIFICATION AND CHARACTERIZATION OF QUALITY OF SILICA SAND RESOURCES FOR GLASS MAKING.

Silica sand is one of the basic constituents of glass and thus is in great demand by the glass industries. At the present silica sand used in the manufacture of glass contains a high iron content thus giving the glass a greenish hue causing great difficulties in the manufacture of translucent glass. At the present silica sand is utilized from the deposits at Khushab and Kalabagh, Paniala district D.I. Khan, Mansehra, Tendepeni etc... All these deposits contain a high iron content thus the project activities propose to locate additional silica sand deposits in NWFP and North Punjab regions.

Field work in the districts of NWFP and North Punjab will be executed by the field parties to form a data based on mineral content texture, chemicals and other elements of interest. Following the analysis of the data collected in the first 9 months the promising areas will be surveyed for silica sand

deposits.

EQUIPMENT AND BUDGET

*6 months
5-1-1987*

Equipment	Model	Part No	Price US\$
High Temperature Furnaces	Fisher	10-505-22	12,381.00
Crucibles 15 ml	Ohaus	90-5775-05	2,616.00
Crucible Cover	Ohaus	90-5795-05	144.00
Printed Circuit XRP (4) Shimadzu Japan	Shmadzu		8,100.00
UPS System 20 KVA Single Phase + AMF(1)	USA	Model 20	32,000.00
Total of Equipment			US\$ 55,241.00

Materials and Consumables	Amount US\$
Consumable	2,000.00
Total of Consumables.	US\$ 2,000.00

Overhead/Indirect Costs	Amount Us\$
Field Work	4,100.00
Others	2,200.00
Total of overhead	US\$ 6,300.00

Total budget US\$ **63,541.00**

3.5 PROPOSAL (b)

INCLUSION STUDIES OF SHEET GLASS.

One of the major problems in glass manufacturing is inclusions of various types such as bubbles and nodules which in finished goods appear as flaws rendering the product unacceptable. Studies will be carried out to identify the source of these inclusions and suggest possible remedies. Generally the inclusions results from these sources.

1. Raw material
2. Flux

3. Industrial Fire bricks.

A lot of wastages are incurred resulting in losses to the company's overall financial position due to these defects.

Samples will be collected to form data through petrographic scanning electron microscopy, chemical analysis and XRD studies. Sources of the inclusions will be identified through these studies and remedies suggested.

EQUIPMENT AND BUDGET

Equipment	Model	Part No	Price US\$
Additional Channel for Microprobe (1).	JEOL	Japan	99,000.00
Automatic Polisher (1)	Hoefer	USA	12,200.00
U.P. Single Phase 15 KVA (1)	USA	Model 15,	27,300.00
Total of Equipment			US\$ 138,500.00
Materials and Consumables			Amount US\$
Supplies			2,000.00
Total Materials & consumables			US\$ 2,000.00
Total Budget			US\$ 140,500.00

3.6 PROPOSAL (c)

REVIEW OF ANALYTICAL PROCESS AT KHAWAJA GLASS COMPANY.

Khawaja Glass industry requires a chemical analyses of their raw materials and determination of its purity. An important factor is the time required for the analyses. The project aims at comparing different methods used for analyses of raw materials.

NCEG will compare instrumental and classical methods of mineral analyses used by KGC.

It will duplicate the analysis at its laboratories to find sources of error

inherent in the method, instruments used and also if there is inconsistency in the operation involved. On these basis new methods will be derived to suit the requirement of the Khawaja Glass Company by training their personnel on the equipment at the centre.

EQUIPMENT AND BUDGET.

Equipment	Model Part No	Price US\$
Cathodluminescence Microscope	Hoefer	16,266.77
Impregnation set (1)	Hoefer	4,066.69
Sieve Shaker (IACH)	USA	4,066.69
	Total of Equipment	US\$ 24,400.15
	Total Budget	US\$ 24,400.00

3.7 PROPOSAL (d).

SEDIMENTOLOGICAL STUDIES IN POTENTIAL HYDROCARBON BEARING STRATA, KOHAT, PAKISTAN.

Area around Kohat has a significant potential for hydrocarbon production. A thorough study of the Eocene Kohat basis will take place to determine the resources for hydrocarbon. As a result of these studies future potential hydrocarbon resources within the region could also be made. This study will be carried out with the help and co-operation of OGDC.

The project being field oriented will be composed basically of field studies comprised of 2 parts [reconnaissance work,detailed field work] which will include detailed section measurements of the Eocene Strata. Samples from southern, central and northern Kohat will be collected for laboratory studies which include processing of field data thin section studies for the carbonate rocks and XRD studies for the fine grained rocks. Correlation of strata within the Kohat plateau will be the derived thus providing a valuable source data for OGDC.

OGDC will provide vehicles and 2 geologists for the entire time period of the project. Apart from that camping facilities for field work will also be provided to the staff and the students.

EQUIPMENT AND BUDGET.

Equipment	Model	Part No	Price US\$
Automatic Thin Section Making Machine.			20,000.00
Deionization Plant			3,300.00
Electronic Maintenance lab			8,100.00
Fax machine (1)	USA		1,200.00
ICP (Equipment)	USA		12,200.00
Total of Equipment		US\$	154,600.00
Overhead/Indirect Costs			Amount US\$.
Others			1,200.00
Wages			750.00
Total of Overhead		US\$	1,950.00
Total Budget		US\$	156,550.00

Total Budget of National Centre for Excellence in Geology, Peshawar.
US\$ 3 5 3 3 5 0 . 0 0

4.0 BIOLOGY DEPARTMENT (QUAID-I-AZAM UNIVERSITY, ISLAMABAD.

4.1 INTRODUCTION.

It is one of the youngest departments of the university established in 1972 but at the same time has achieved the capability to provide teaching and research facilities in a number of contemporary disciplines of Biology. The graduates from this department, besides being absorbed in the teaching profession are employed by various research organizations.

This department was visited by Dr. John Monagle, Dr. M.A. Qazi and Mr. Hamid Hasan Khan. A meeting took place with Dr. Hafeez chairman of the department and faculty members. A great many topics were discussed which ultimately converged into 3 major research topics, which were:

1. Bating Enzymes for tannery industries.
2. Bio-insecticides.
3. Use of organic waste from food/beverage industries to generate Bio-gas or other useful products.
4. Diagnostic Kits for pathological laboratories.

THE PERSONS FROM THE FACULTY.

Dr. Hafeez (Chairman)
Dr. Zafaryab Khan.
Dr. S. A. Malik.
Dr. Hameed.

INDUSTRIES INVOLVED.

Three proposals were submitted by the department to the concerned industries.

Consequently discussion and meetings were arranged between the personnel from the department and the industries. The industries which are earnestly involved with the present research proposals are Murree Brewery and Jaffar Brothers. A proposition for the holding of a workshop and the participation of the industries and department involved is to be held at CAMBS Lahore and HEJ Karachi where the proposals will be finalized.

The collective research studies on bating enzymes by HEJ and Qaid-i-Azam university will bring about a better and final quality of leather.

With the local production of enzymes a lot of foreign exchange will be saved presently spent on pancreatic bates (oropon) and also will improve the quality of the leather being produced. The improvement of quality will ultimately result in more exports alongwith a cheaper mode of manufacture of leather and leather goods.

Presently the spent wash a major waste of Murree Breuery company is serving no significant purpose except adding pollution to the environment. The spent wash containg a lot of nutrents will ultimately be used in the production of Bio-Gas after collaborative research studies with the university. The production of Bio-Gas will be an added means of energy aspect apart from the traditional oil and gas sources.
A brief review of the proposals.

PRODUCTION OF BATING ENZYME FROM BACTERIA.

Bating is a process in the manufacturing of leather where all impurities attached to the hide are removed to give it a soft texture. Bating materials are enzymes obtained from three sources. Pancreatic bates are obtained from pancreatic glands of the slaughtered animals. Bacterial bates are obtained from bacteria and fungus enzymes are obtained from growing fungus on a suitable medium. At present the industries are using pancreatic bates (oropon) which is imported from other countries. Bacterial

bates are as good as pancreatic bates and research work is being done with excellent results in the concerned departments. With the preparing of bacterial bates within the country a lot of foreign exchange will be saved presently spent on the import of oropon.

An inoculum will be prepared by growing bacteria on the medium with gelatin, casein hydrolysate glycerol. At the end of 24 hours number of bacteria will be determined. Several factors like inoculum size, media, temperature etc.. will be studied to get optimum results. At different stages like pilot scale tests concentration of crude enzymes temp etc..will be studied for the efficiency of enzyme. A crude prepared, the resultant of all the tests and experiments will be applied in the leather manufacturing industries with the consent of the concerned authorities to analyze the effects of the enzyme substituting for oropon.

PRODUCTION OF BIO-GAS FROM SPENT WASH.

Spent wash is a major waste in Murree Brewery company. It has a lot of nutrients, chemicals which are wasted and pollution results. To avoid pollution the waste will be used in the production of bio-gas. By treating of spent wash in two stages through upflow anaerobic sludge blanket (UASB) process bio-gas is produced reducing BOD from 40,000-45,000 mg/lit to 2000-3000 mg/lit. The sequence of activities will be:

- a) Estimation of BOD and COD in spent wash.
- b) Isolation of methane bacteria from cowdung.
- c) Preparation of reactor for initial start up.
- d) Preparation of neutralized water.
- e) Preparation of substracts for final gas production and
- f) Final Pilot Plant work.

5.0 UNIVERSITY OF ENGINEERING AND TECHNOLOGY LAHORE (Electrical Engineering Department).

5.1 INTRODUCTION

It is the oldest and largest of the four major engineering schools in Pakistan. The UET electrical engineering department is a principal institution in Pakistan's technological development and the only one authorized to grant the Ph.D degree. Its contribution is of major importance for the economic development of Pakistan through its graduate and post graduate programs.

The Electrical Engineering was visited by Dr. Junaid Ahmad, Dr. John Monagle, Mr. Hamid Hasan Khan, Mr. Afzal Malik, where meeting was held

with Dr. Durani (Chairman), Mohammad Zubair, Dr. Chughtai and Dr. Aftab.

The strength of electrical engineering of UET is in their teaching staff where number of them have done their doctorate degrees from abroad and have acquired experience in areas of microprocessing applications, power engineering and computers.

The University was visited by Dr. Junaid Ahmed and Dr. John Monagle, Hamid Hasan and Afzal Malik who met with the chairman Dr. Durrani and other faculty members including Mr. Mohammed Zubair Dr. Chughtai and Dr. Aftab. A number of possibilities were discussed industry the following.

- 1) Design and development of an expert logic controller for data acquisition and process control.
- 2) Microprocessor based multimetering energy and tariff meter.
- 3) Low cost industrial inaction with data logging capacity.
- 4) A railways transcheduling system.
- 5) A diagnostic system based on the pressure pulse in the radial arteries.
- 6) Design of supervisory, process control system based on Neural Network Technology.

A lot of meetings between the industries and the department were arranged where views were exchanged. A number of proposals were presented of which three gained a lot of attention accepted by the concerned industries.

PERSONNEL INVOLVED.

From the University.

Dr. Durrani (Chairman)
Mohammad Zubair
Dr. Chughtai
Dr. Aftab.

FROM THE INDUSTRY.

Col. M.A. Khaliq (Managing Director), Multiline Engineers (Pvt) Limited, Lahore.

Mahmood Ahmed (Managing Director), Syed Bhai (Pvt) Limited, Lahore.

Dr. Qazi Ain Uddin (Sr. Ex. Director), Escorts Group of Companies, Lahore.

Mr. Ghulam Kafeel Majal (Manager Marketing), Descon Manufacturing (Pvt)

Limited, Lahore.

Zahid H. Chaudhary, Planning and Contracts Manager, ICI Pakistan Limited, Lahore.

INDUSTRIES INVOLVED.

Multiline Engineers, Multilines and Descon. Three proposals have been selected and are to be utilized by the industries. Two of which were given by the industry to the department for developing the products which have promising commercial prospects. Comments have been despatched to the department for finalization.

With the research activities at the UET and correlative support from Escort, Descon and Multilines a revolutionary change will be brought about in electrical gadgetry and an ultimate benefit for consumers (Industrial and domestic) all over the country.

The production of the meter will plug the drain on foreign exchange presently being spent on import of materials and also save energy being wasted due to indiscriminatory attitudes of different energy providing departments and consumers. Innovations in the meter introduced gradually through collaborative efforts by Escort and UET will apart from bringing monetary gains for the industry also benefit Wapda.

Similarly with the control of AC drives by the production of micro-computer system based controllers by Descon will result in better maintenance of machines.

With a long line of electrical products to their name multilines present venture (development of UPS unit) with UET will bring about a significant change in the working of machines in different industries by providing U.P.S. thus bringing about smooth operations which will save time, effort, wear and tear etc...

A brief review of the proposals is as follows.

PROPOSAL (a).

MICROPROCESSOR BASED MULTI-METERING ENERGY AND TARIFF METER.

To curb the unnecessary use of electricity by the consumer WAPDA the main energy provider of the country resorts to different methods. WAPDA is planning to implement certain tariff schemes which will discourage the waste of energy.

A microprocessor based system designed for the KWH measurement has been necessitated to curb unnecessary use of electricity through a energy and tariff meter which records and gives information on use of energy at different times of the day. With the development and production of such a meter which is the main objective of the proposal, a lot of foreign

exchange will be saved.

A prototype system will be designed by the department and after verification of the results under the scrutiny of the industry personnel a working model based on micro-computer chips will be designed.

PROPOSAL (b).

DEVELOPMENT OF A MICROPROCESSOR BASED INVERTOR CONTROL FOR AC DRIVES USING PWM TECHNIQUE.

Control of AC drive in almost all industries is necessary to avoid the unnecessary wear and tear of motors that ensues with the improper control of AC drives. The controllers at the present being produced by different manufactures are manually driven. These manually driven controllers have inherent disadvantage regarding efficiency, reliability and wear/tear. But once these are converted to a microprocessor which will control various parameters such as stop/forward/reverse/increase/decrease speed control etc.. As a result the machines will run in a more efficient manner with the increase in the life of motors, minimization of wear and tear of machines etc....

Initially the department will prepare a model based on microcomputer system and after verification of results by the industry involved a prototype working model will be developed.

PROPOSAL (c)

DEVELOPMENT OF AN UNINTERRUPTED POWER SUPPLY UNIT.

For the various devices installed in different concerns their proper functioning an uninterrupted power supply is necessary. Developed countries have surmounted the problem of uninterrupted power supply whereas such an impediment to the developing countries still exists. With the disruption in power supply a whole lot of factors arise thus impeding the continuous working of machines and industries and ultimately the country. Many manufacturers at the present are providing UPS but their designs do not conform with the international standards.

A model based on microcomputer system will be designed and ultimately a prototype model based on micro-computer chips will be developed. With the development and production of such a UPS a continuous supply will be ensured for the machines affecting the different industries in a most beneficial way.

**CENTER OF ADVANCEMENT OF MOLECULAR BIOLOGY-PUNJAB
UNIVERSITY, LAHORE.**

INTRODUCTION.

The center has been recently moved into their new building, which was very impressive and the laboratories are excellently equipped and well maintained. The centre is keeping close linkage with international research institutions in microbiology field, but has never worked with any industry. The center maintains the best laboratories in the field of molecular biology in Pakistan, and is involved in number of academic research assignments.

The center was visited by Dr. John Monagle, Mr. Hamid Hasan Khan and Mr. Afzal Malik. The faculty members whom the visitors met were Dr. S. R. Raziuddin, Dr. Amin Akhtar and others. A number of possibilities were discussed in numerous arenas of molecular biology and a few promising projects were finalized which included development of diagnostic kits for detecting ER/PR from human breast, uterus, ovary and prostate biopsies, also bio-insecticides for the control of linseed pests of cotton.

Two proposals have been selected and discussed at great length with the industry. The proposals are development of diagnostic kits for detecting ER/PR from human breast, uterus, ovary, and development of bio-insecticides for pest control.

PERSONNEL INVOLVED.

From the Centre.

Dr. S. Raziuddin
Dr. Amin Akhtar
Dr. Anjum sohail
Ms. Esthar Khan
Mrs. Shaheen N. Khan.

From the Industry.

Dr. Mahmood Alam
Brig (Rtd) M. Naeem
Mr. Mumtaz Ahmad
Dr. Mansoor Ahmad
Tariq Allauddin.

INDUSTRIES INVOLVED

The proposals have been accepted by the industries. Further meetings with the industries ensured and topics and areas discussed where CAMBS can help the insecticide industry. The industries involved are Punjab Drug House, Wyeth Laboratories.

F.M. Rabi and Company.
Jaffar brothers and

Ciba Giegy.

For the diagnostic kits Punjab Drug House is the co-operative partner whereas for bio-insecticides Jaffar brothers and Ciba Giegy is offering its patronage and support.

The production of bio-insecticides a joint venture between CAMBS and Q.A. University in collaboration with Ciba Giegy and Jaffar Brothers will be a revolutionary and evolutionary step in the field of pesticides for a toxic free atmosphere and increased crop output. Apart from monetary gains for Ciba Giegy the country will benefit directly by increased cotton crop output. Innovative measures by the industry will increase the efficiency of the bio-insecticide for use in other cash crops of the country thus bringing in an increased export and foreign exchange.

Similarly the development of Diagnostic Kits by the collaboration research efforts of CAMBS and HEJ will save a huge amount of foreign exchange for the country and result in monetary gains for the industry by directly benefitting mankind. These kits will save the patient from operative and post operative complications by detecting real cause of the disease and suggesting different therapies.

A brief review of the proposals are:

PROPOSAL (a).

BIO-INSECTICIDE IN THE CONTROL OF INSECT PESTS OF COTTON.

The use of pesticides (chemical) is on the rise showing the awareness of the farmer of its qualities such as increased harvest output and other such traits but there are a lot of drawbacks, among them are harmful effects on humans and all other life, a development of immunity by the pest to the use of insecticide, and other complexities which necessitate a development of some other means of crop protection against pests. Bio-Insecticides have emerged as powerful alternatives. These are natural products made by micro organisms existing in nature without any resistance to them. They are harmless to other non-target species. Insect pest control at the moment is threatened by the increased resistance of the pest to chemical pesticides. With this in mind scientists all over the world are trying to resort to natural ways of pest control. Similarly scientists in Pakistan are also doing research work to develop insecticides from nature. At the present pests of cotton a major export of the country are the target of research as cotton is extremely sensitive and prone to insect attacks. The researchers will make a search in local environments for *Bacillus thuringiensis* [which are capable of producing biological pesticides] and their characterization by conventional staining techniques, phase contrast microscopy and protein profiles.

Establish rearing and maintenance of cotton bollworms in the laboratory on artificial diets. Initial bio-assays to establish potency against these target vectors.

Cultural and fermentation information about preservation of viability and

activity of the toxic isolates improvement of field potency by culture selection and fermentation manipulation. In the end the selection of several most suitable, easily propagated active candidates for potential field use.

PROPOSAL (b).

DEVELOPMENT OF DIAGNOSTIC KITS FOR DETECTING ER/PR FROM HUMAN BREAST, UTERUS, OVARY AND PROSTATE OF BIOPSIES.

The most common cancer among woman is of the breast (usually is due to steroid sex hormonal imbalance) which is operated upon without any other diagnostic steps taken to verify the available results which brings about a lot of post operative complications otherwise avoidable. These post operative complications can be avoided through diagnostic tools which estimate human steroid sex hormone receptor levels thus identifying the real cause of the disease. The patient is subjected to anti-hormone therapies and rescued from surgery.

The development of diagnostic kits for determining Estrogen and progesterone receptors from human breast tissues is the main objective of the research studies.

The receptor protein extracted from biopsy specimens will be used for estrogen and progesterone receptor analyses through competitive binding of the receptor to the ligand. Depending upon the ligand binding assay, tumor specimens will be grouped as ER-/PR- , ER-/PR+ , ER+ /PR+ , ER+ /PR- and endocrine therapy will be suggested to the patient.

Biopsies will be performed in women suspected of having breast cancer and that tissue will be frozen in liquid nitrogen after surgical removal. The tumor specimen will be subjected to experimentation and tests for analyzing estrogen and progesterone receptor levels. The receptor proteins will be purified and ER/PR content determined by hormone binding assays. Experiments by injecting ER/PR in animals will be conducted. Antibody formation after injecting will be observed in the rats against ER and PR. Through further process the antibodies showing no cross activity will be used in EIA for human ER and PR isolated from breast carcinoma specimens.

HEJ RESEARCH INSTITUTE OF CHEMISTRY, UNIVERSITY OF KARACHI.

INTRODUCTION.

The Hussein Ebrahim Jamal Research Institute of Chemistry was established in 1966 in chemistry building of Karachi University. Renowned scientist Dr. Salimuzzaman Siddiqui was its first head, who developed a team of scientists including Dr. Atta-ur-Rehman the present Director of the

Institute. The Institute continued to expand through major research and collaborative work with other international research centres.

The HEJ Research Institute maintains one of the best laboratories in the field of chemistry of natural products in Pakistan and is involved in a number of international research assignments.

The HEJ was visited by Dr. John Monagle and Dr. Junaid Ahmad who met with Dr. Atta-ur-Rehman, Dr. Zafar H. Zaidi and other faculty members. A number of research proposals were received. A lot of meetings followed at the Institute participated by Dr. John Monagle, Dr. Junaid Ahmad, Mr. Hamid Hasan Khan, Mr. Dilshad Khaleeq, Dr. Hafiz M. Ilyas, Dr. Zafar H. Zaidi, Dr. Atta-ur-Rehman and Dr. Syed Ehsanullah.

The meetings converged on two topics that of development of diagnostic kits and pilot plant studies for its production. Other topics discussed were investigation of medicinal plants for anti-diabetic activity, preparation of glycyrrhizine and deglycyrrhized extracts of liquorice etc...

PERSONNEL INVOLVED

From the Institute.

Dr. Atta-ur-Rehman.
Dr. Zafar H. Zaidi.

From the Industries.

Mr. Mumtaz Ahmad Director F.M Rabi and Company, Lahore.
Tariq Allaudin Plant Manager Ciba Giegy, Karachi.
Dr. Hafiz M. Ilyas Managing Director Hamdard Laboratories (Waqf), Karachi.
Dr. Saiyede Ehsanullah of Dr. Ehsanullah Lab (Pvt) Limited, Karachi.

Industries Involved.

After in-depth evaluation of the initial proposals three proposals are in the final stage. The industries involved are F.M. Rabi and company, Hamdard Laboratories, Ehsanullah laboratories and Ciba Giegy.

HAMDARD LABORATORIES.

Since its inception Hamdard Industries have been serving humanity through different ventures. They have been serving through Education, providing science facilities, helping the cultural environment, children's development etc... But their main concern is the producing of herbal medicines, an ingrained belief of the founder of the effectiveness of the eastern medicines (medicine through nature). A strong belief denying and defying the fact that nature is crude by effectively producing medicines and treatments acknowledged world wide and presently an increased trend in the western countries adopting eastern medicative measures. With its affiliation worldwide Hamdard will serve humanity again by finding a cure for diabetes (a debilitating disease) by a thorough research on plants

which are believed to have curative properties. By ultimately producing and marketing it worldwide a disease will be if not totally overcome atleast will be harnessed effectively.

A brief review of the proposals are as follows.

Proposal (a).

INVESTIGATION OF MEDICINAL PLANT FOR ANTI-DIABETIC ACTIVITY.

One of the most common health disorders in Pakistan is Diabetes. Various remedies are adopted by the people of the region but most of them resort to herbal treatment. This is an age old method of treating diseases through nature. Countries using this method of treatment include China, Indo-pak Sub-continent, South America and Africa. Plants having curative qualities will be thoroughly subjected to experimentation and extracts will be made which will be applied on animals examining sugar lowering effects. Plants which appear to be safe will be further experimented upon for the isolation of bio-active components responsible for the hypoglycemic activity.

PROPOSAL (b)

DEVELOPMENT AND PILOT PLANT PRODUCTION OF MEDICAL DIAGNOSTIC KITS.

The diagnostic kits produced abroad at the moment being imported and utilized at different labs of the country to detect alteration in the biochemical processes of the body are essential for diagnoses of disease and the evaluation of the given therapy. The imports of the kits is a drain on the country's foreign exchange resources whereas the technical know-how for the manufacturing of these kits is available in the country they can be developed locally.

The kits after being made at the institute will be given to two different labs of Karachi for verification of its activity. Antibodies developed after experimentation on animals and isolation and characterization of the same will be carried out.

DEPARTMENT OF CHEMISTRY, GOMAL UNIVERSITY, D.I KHAN.

INTRODUCTION.

Gomal University was established in 1974 and is located on a new, visually attractive campus 14 km north of the city of Dera Ismail Khan. The university has fifteen departments, of which the Departments of Chemistry, Physics and Pharmacy constitute a core with primary responsibility for teaching and research in science. There are 24 members in Chemistry Department faculty and 72 students distributed between the M.Sc previous and final classes. Graduate programs leading to M. Phil and Ph. D. degrees

are currently available. Because these programs are relatively new, and because of the general lack of facilities, the graduate programs are in an early stage of development. The existence of a well-trained senior faculty and a pool of enthusiastic students, coupled with the pervasiveness of Chemistry throughout modern industry, indicate that the Department of Chemistry has the potential of playing a significant role in the economic development of Pakistan, both as a resource and a driving force.

The senior faculty have a wide range of research interests, most stemming directly from their Ph.D thesis research. The immediate goal of Chemistry Assessment Team an IEP is to organize the talents of the senior faculty into 2 or 3 research programs that are highly focused towards Pakistan's technological development. The long-term longevity of these programs will be issued by giving the junior faculty on opportunity for graduate training in related areas, and by linking these programs to Pakistan's evolving industry. Specific areas to developed include applied biochemistry, polymer technology, and natural products chemistry. In addition, a spectroscopy laboratory, which will include as a core facility to provide services and training in analytical chemistry to the program staff.

Meetings were arranged between Dr. Junaid Ahmad, Mr. Hamid Hasan Khan, Dr. John Monagles and Dr. G.A. Miana (Vice Chancellor) of the university. The meetings were also attended by the faculty of the university. The main topics of discussion during the meeting were:

- a) Commercial exploitation of Azadirachtin rich neem extract from Azadirachtin indica and other natural insecticides.
- b) Commercial exploitation of Taxol. A potent anti-cancer drug.
- c) Encapsulation of pesticides.

Proposals on the above three were received from the university on two of which meeting with the industry was conducted.

PERSONNEL INVOLVED

From the University.

Dr. G.A Miana (Vice Chancellor).
Dr. Saeed Anwar.
Miss Hafsa Bibi.

From the Industry

Mr. Shamsul Haq.

INDUSTRY INVOLVED.

The proposals were sent for review by the industry personnel and NMC. The industry involved with the university is Khurram Chemicals and Qurshi

Dawakhana, Lahore, who have received the proposals and asked the department of chemistry to revise them on the basis of the comments.

Through collaborative efforts with Gomal University, Kurram Chemicals by commercially exploiting taxol (anti-cancer drug) will be serving humanity apart from saving a lot of foreign exchange presently invested on the import of the drug.

Another menace threatening the country is toxic pollution created due to uneven and irregular administering of pesticides to the crops. Ciba Giegy with collaborative research steps being taken by the Gomal University Chemistry department for encapsulating the pesticides will free the atmosphere from toxicity. The technique will bring about a significant change in pesticide applicatory techniques by controlling the amount of pesticides for application to the crop. Apart from increased output of crops and monetary gains for Kurram Chemicals and the country a lot of indirect benefits will ensue in the future presently a little vague.

A brief review of the proposals is as follows.

PROPOSAL (a).

COMMERCIAL EXPLOITATION OF AZADIRACTIN-RICH NEEM EXTRACTS FROM AZADIRACTA INDICA AND OTHER NATURAL INSECTICIDES.

The protection of crops as they are the major source of food has been of utmost importance and different methods have been adopted all over the world to fight off the natural enemies (Pests).

Neem tree or Margosa (*Azadirachia Indica*) is indigenous to Pakistan, with its natural insect repellent qualities it has come under the researchers scrutiny. Countries all over the world have adopted methods to extract and use neem derivatives as repellents and different neem products as natural insecticides have been floating in the market. Similarly in Pakistan efforts are underway to make use of neem derivatives and methods are being employed for extraction and other processes adopted to develop a product.

Concentrate powders will be prepared from the seeds using a number of solvent system. Their insecticidal repellent qualities will be verified by experimentation procedures at different laboratories. The most active fraction will be identified and semi-pilot plant studies will be undertaken to standardize the extraction procedures.

Structural and spectral structure will be undertaken to standardize the product. Finally large scale extraction of the Azadiractin-rich product at the Kurram Chemical Company for commercial purpose will be done.

PROPOSAL (b)

COMMERCIAL EXPLOITATION OF TAXOL.

Cancer since ages has been the most threatening and intellect bogging disease. Scientists all over the world have been making research to find ways to fight this ever impending enemy.

Taxol is one of the drugs which has been discovered and extracted from Taxus species plants after great research. It is a potent inhibitor of invading cancer cells.

The drawback is that large quantities of bark from trees yield very little Taxol. No systematic studies have ben undertaken to isolate Taxol from Taxus wallichiana found in the regions of Pakistan. Using known procedures is a simple matter but the problem lies in the identification of the source which would give the highest yield of Taxol. For that all parts of the plant would be collected separately and screened for the presence of Taxol. Fraction giving highest yield will be selected for large scale extraction at Kurram Chemical Company after verification at the university laboratory.

ENCAPSULATION OF PESTICIDES.

With the increase in the population of the world there is a relative decrease in the food supplied thus with the population increase demand for food increases but yield from crops either remains the same or is decreased due to the natural enemies of the crop. To avoid this reduced agricultural output, protection against the pest is required, as a result, a number of Toxic chemicals are synthesized or extracted from plants for the protection of the crops. These are pesticides which are necessary for a better yield of crop but the draw-back is that they create a big problem of environmental pollution. This problem arises due to the uneven distribution of the pesticide, sometimes the crop is overdosed and sometimes it is done at the wrong time etc.. This causes a lot of wastage. To avoid overdosage and wastage, a method of application of these pesticides called "encapsulation of pesticides" is introduced.

In this the required amount of pesticides is released at the right time.

The pesticides will be encapsulated or will be closed in a capsule made of polymer. Two techniques are used for encapsulation.

- 1) Coacervation techniques.
- 2) Interfacial polymerization.

In the first technique pesticides will be mixed with a polymer solution. The polymer will precipitate around the pesticide particles, which are dried and cross linking carried out. The size of the capsule will be controlled by varying the rate of addition of precipitant and the concentration of the

polymer.

In the second technique emulsion with the monomer and the pesticide particles is made in the aqueous phase. By adding a reactive monomer to the phase a reaction will be carried out. Cross linking will be controlled by varying the amount of reactive monomer. Using different techniques of interfacial polymerization the size of the particles from sub-micron to 100 μm diameter can be varied.