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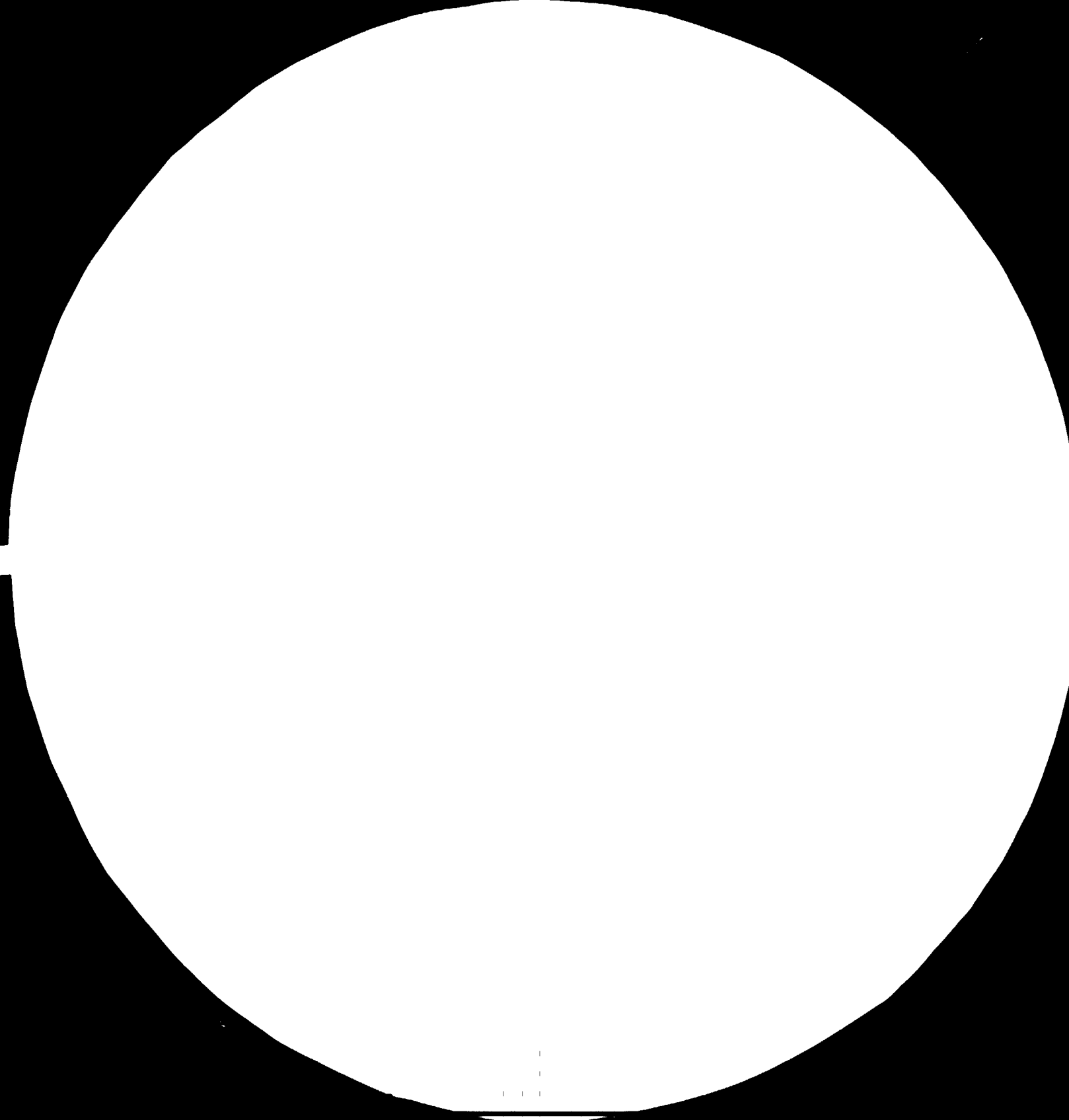
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RESTRICTED
ENGLISH
Vienna
March 1983

FIELD MISSION REPORT

MISSION TO

THE INDUSTRIAL RESEARCH CENTRE, LIBYA,

28 February 1983 -

20 March 1983

by

DP/LIB/77/001

Rich. H. Westergaard
Senior UNIDO Consultant

12982

Foreword to the Field Mission Report

The purpose of the mission was to prepare inputs to the in-depth evaluation of the UNIDO project "Assistance to the Industrial Research Centre (IRC), Phase II" in Tripoli, Libya.

The report also provides input for the tripartite review meeting and for the preparation of the Project Document for Phase III. The report consists of three parts:

Part I Draft Project Document

IA Background and Justification

IB IRC Activities, Capabilities and Services

IC Project Design

Part II Assessment of the Assistance Project

Part III Suggestions for IRC's consideration

Each part is self-contained and can be used as required by UNIDO/UNDP. The draft has been given to the UNDP Resident Representative in Tripoli, the project co-ordinator and the evaluation team. Final typing has been done in Vienna.

The report has attempted to address all the problems relevant to the success of the IRC and the assistance project, even in cases when it reflects negatively on some Government practices. The Resident Representative of the UNDP and UNIDO will have to decide if, or to what extent, it serves a useful purpose in passing it on to the Libyan authorities.

R.H. Westergaard
March 1983

PART I

DRAFT PROJECT DOCUMENT

- IA Background and Justification
- IB IRC Activities, Capabilities and Services
- IC Project Design

PROJECT DOCUMENT DRAFT

FOREWORD

The UNIDO Consultant should, according to the job description, produce a draft project document. The draft presented in this chapter has addressed the more technical aspects of the project document.

Some of Part A and Part B are not written in a style which can go directly into a project document. Possibly Part A and B will be used as an annex or a reference and only Part C Project Design will be part of the signed project document. Some of the chapter of Part A and B, such as IA 2.0, 2.1, 3.0, 3.1, 3.2, 4.0, 5.0, can probably go directly into the project document.

PART I A

BACKGROUND AND JUSTIFICATION

Foreword

- 1.0 Introduction
- 1.1 UNIDO is not assigned the role as institution
builder per se
- 2.0 IRC Background and justification
- 2.1 Conclusion
- 3.0 UNIDO project justification
- 3.1 IRC is an obvious success
- 3.2 Conclusion
- 4.0 Special Considerations
- 5.0 Institutional Framework

Foreword

Phase III is a continuation of an on-going project. It is obviously needed. IRC is doing well and is given high Government priority. It is necessary however in the project document to justify the UNIDO project. However, the need for the continuation of the project became obvious very quickly to the Consultant because of the large remaining tasks. Therefore, attention is focused mainly on how to do Phase III and its scope in terms of experts, objectives and activities.

Phase III has a high cost-sharing and UNIDO cannot use undue pressure on the Government in terms of a rigid assistance programme schedule or making availability of experts subject to the availability of suitable counterparts. It is not possible to foresee at which pace the IRC can expand to the 700 people which is the goal and also the planned capacity of the new buildings. It is the Government's (and IRC management's) privilege to use the experts for direct support. It is difficult in many cases to foresee which experts will have adequate counterparts or not or to which extent they will give direct support.

Under such circumstances only a five-year plan which is extremely flexible is realistic! This does not imply that planning the assistance project is impossible. Detailed plans for one year at a time with bi-annual adjustments and a forecast for one more year is realistic. By not making the work plan part of the project document the trouble of frequent project document adjustments, seen in many projects, can be avoided.

In this project document, IPFI stands for Industrial Research and Service Institutes in general, IRC for Industrial Research Centre. The IRC is an IRSI.

1.0 Introduction

The project has already had two five-year phases each, and one year of Phase III with the status of Preparatory Assistance (it has rather been a continuation of Phase II up to now). In principle the project is one of institution building. In practice there has been given a good deal of direct support.

IRC's activities can broadly be stated as follows:

- Undertake geological surveys and mapping
- Identify raw-materials and industrial opportunities
(So far mainly geological resources and building materials)
- Perform feasibility studies as inputs for Government decision making.
- Do product and process R+D
- Assist in improving existing industry in technology and management
- Provide various laboratory services, mainly testing and analysing, so far.
- Provide technical information services.
(for details see part IB)

1.1 UNIDO is not assigned the role as institution builder by the IRC

UNIDO's assistance has been used to establish various capabilities and to run the services until counterparts can take over after training by the experts. Because of a lack of counterparts the experts have often run the services alone (direct support).

The plans for the new IRC have been produced by the Swedish consulting firm SWECO. In 1975, a very comprehensive 200 page book was prepared to dimension the new IRC facilities. There are several other SWECO reports on all matters required to construct the new facilities.

In 1975, the UNIDO project was quite small and did not contribute substantially. The IRC and the project have been eagerly waiting, and indeed suffering, while waiting for the completion. In 1979, IRC finally awarded the construction job to an Italian contractor. SWECO supervised the execution and had to frequently interfere. Many problems had to be

overcome and only now, early 1983, has the time come to just about move in. UN experts have given advice on equipment needs, prepared lists of equipment, specifications and recommended the best suppliers. Few technical equipment items are in stock in Libya and suppliers do not have local representatives. Equipment procurement is a demanding and time consuming undertaking and mistakes or things left out cause severe problems later on. In their progress reports some of the experts have clearly stated the various constraints, but little could be done until the IRC had moved.

It will be desirable if the project can in the future play a more active role as institution builder, for instance, participate in short and long-term planning and the very critical matter of IRC administration.

2.0 IRC background and justification

Libya has decided to use much of its oil revenue to secure a high standard of living for future generations after the oil has run out. The oil revenue is, to a large, extent, used to prepare for this situation and prevent the country from being too dependent on the oil industry. The oil revenue is in this connection used to create:

- a good infrastructure
- educate people on all levels
- upgrade and expand agriculture
- establish industry to achieve lesser dependency upon import and hopefully to export industrial products and agricultural products to pay for imports
- besides oil, food production and construction dominate the economy.

All important industries are nationalized. The established industry hardly has any staff and facilities for research and related activities. In this situation it appears to be the best solution to provide these services from centralized institutions.

The IRC is such an institution, catering to industry directly, but also indirectly by producing decision making inputs for the governmental department of light industries, and to some extent the department for heavy industries.

The strategy of industrialization in most developing countries is to invite foreign companies to establish themselves in the country. Such factories can lean on the mother company's expertise and research, and do not need a national IRSI.

Libya follows a different policy. It imports turn-key factories and operates them as Government-owned enterprises. Expatriates are hired as seen fit. These factories can only to a limited extent rely on the supplier's research and have no research themselves. For this reason Libya needs a central IRSI capacity much more than most other developing countries of a similar size. It also has a greater need because of its great industrial ambitions.

It must not be forgotten that most manufacturing processes and technologies are in steady development. Without an effort to secure plant maintenance, development and modernization, most plants will soon become obsolete and inadequate. In this process of preventing deterioration and securing steady development, the IRC has an important role to play.

2.1 Conclusion

The IRC is beyond any doubt needed for the rapid industrialization of Libya and it would be justified to expand even beyond the planned 700 people if things go well for Libya and for the IRC.

3.0 UNIDO Project Justification

The IRC is not yet self-sufficient with respect to the capabilities up to the present assisted. Some of these activities will need assistance for several years to come.

In the new expanded IRC many new capabilities will be established for which no competent staff are available in Libya. Therefore, expert training and other training is needed.

UNIDO has already assisted the IRC for eleven years and it is reasonable to ask two questions:

- Is it necessary to give assistance also in the future?
- Is the project a failure since the IRC still needs assistance?

The answer to the first question is YES, to the second it is NO. The reason why assistance is needed for so long is that the future needs for research and related services will be very large compared to the IRC's present size and scope. An industrial country like Norway with a population not much larger than that of Libya has at least 50 industrial research institutes with at least 6000 people and an even higher number in industry. It can be foreseen that if Libya succeeds in its ambitious programme of industrialization, it will also (in order to succeed) need to expand its IRSI facilities well beyond the 700 planned for the IRC.

The IRC is a multi-branch, multi-discipline, multi-purpose IRSI steadily taking on more responsibilities and expanding its scope. Assistance will be needed for decades to IRC or to more specialized branch IRSI's which may be shedded off in the future.

3.1 IRC is quite successful

The future success is subject to continued assistance, because Libya is too short of well-educated engineers and scientists, and people with industrial backgrounds are very scarce. This has made it necessary to use experts to a great extent for direct support. The alternatives to using experts for direct support are:

- reduce the ambitions, which at the moment is unthinkable
- buy external services from abroad
- hire expatriates
- bilateral arrangements.

The Government has opted for substantial UNIDO direct support and counterpart training, probably because it has the best development effect. Libya pays most of the project by cost-sharing, it is the Government's privilege to opt for direct support, but it should be spelt out in the project document. A high level of direct support is an indication of the staffing problems the IRC faces. But, this does not indicate failure of the project, or of the IRC; it indicates a high need for assistance.

3.2 Conclusion

There can be no doubt whatsoever that the UNIDO project is justified, as long as the Government wants to use UNIDO.

4.0 Special considerations

- The IRC is created to promote the industrialization of a developing country which is one of the goals of the United Nations' new international economic order.

- The IRC can promote (in the longer-term), regional co-operation by giving services to neighbouring countries, train their people, do geological surveys to find raw materials, Libya does not have kaolin and alumina for example. It can then import them, if found in a neighbouring country.

- The IRC can help to prevent pollution from industrial effluents to air and water. It can analyse for heavy metals, pesticides and other pollutants and thus is instrumental in environmental conservation.

5.0 Institutional Framework

It has been difficult to find out which IRSI-related institutions exist in the country.

- Atomic research and possibly military research and petroleum production research live their secluded life without any relations with the IRC.
- Other Government agencies take care of standardization and water supply.
- The National Consulting Bureau has good soil mechanic Laboratories. It may be merged with the IRC in the future. Also, the Ministry of Housing has some testing facilities which will be transferred to the IRC. There is also a Food Control Laboratory.
- The University has natural sciences and engineering faculties and laboratories. It has a huge food processing pilot plant, which the IRC has taken advantage of on a few occasions. The IRC has a good deal of contact with the university, but no formal relationship.

It is not known that there are other institutions related to the IRC. The IRC is evidently given a very large role to play and enjoys considerable autonomy, it reports to the Secretary of Light Industries. A different status is under consideration.

PART I B

IRC FACILITIES, SERVICES ACTIVITIES

- 1.0 Introduction
- 2.0 Schedules
- I Geology
- II Building materials
- III Metallography
- IV Chemical analysis and related
- V Food technology laboratory
- VI Textile and leather
- VII Assistance direct to Government and ministry
- VIII Possible new fields
- IX Library and information services
- X Stores and stocks
- XI Mechanical workshops and maintenance
- XII Administration

1.0 Introduction

In order to secure that the UNIDO assistance matches the IRC needs, it is useful to have a baseline which facilitates the planning, reporting and evaluation of progress. A schedule of IRC activities and facilities today and in the future and the degree of self reliance is, therefore, prepared with assistance from the project and IRC staff. The project output is IRC capability. At present IRC has 2 technical divisions and 9 sections. As it triples its scope, there will be more divisions and sections and the present schedules are only to some extent related to the present administrative structure.

Future capabilities will hopefully not be established before there is a sufficient volume of work. In such cases it is better to send the samples abroad. Sophisticated equipment will be of no use unless it is used frequently.

2.0 Schedules

The facilities, capabilities, services and activities have been grouped into twelve separate schedules. Its purpose is to identify needs for assistance, help, planning and implementation of the new IRC as well as progress reporting and evaluation. For various reasons of convenience, the IRC organizational structure is only to some extent used. Without the assistance of Mr. Halmos this work could not have been done properly. He has performed the same job in much greater detail, when a more detailed breakdown is needed his schedule should be consulted.

I. GEOLOGY

1. Geological field surveying (surface)
2. Air surveying
3. Geophysical survey
4. Petrography
5. Micro paleontology
6. Coring
7. Production of maps 1:250 000
8. Production of maps 1:50 000
9. Spot survey of interesting finds
10. Natural radioactivity
11. Economic geology

Linkages: Building materials, chemical analysis, feasibility studies

I GEOLOGY

NO.	STATUS	UNIDO	REMARKS
1	Well established		This field is much older
2	Contracted out		than IRSI and is functioning
3	Partly established	May <u>need assistance</u>	well.
4	Established	Only some UNIDO experts in the past	
5	Established		
6	Well established		
7	Soon completed		
8	Just started		Should possibly be limited to selected areas
9	Established		
10	Established		
11	Is done to some extent		

II BUILDING MATERIALS

1. Characterization of minerals for making building materials
2. Characterization of minerals for more or less related processes
3. Mechanical properties of building materials
4. Metals and plastic property
5. Mechanical properties of building elements
6. Accoustic transmission of building materials
7. Fire resistance
8. Own chemical and other investigation of minerals
9. Thermal investigations: DTA, thermobalance, thermomicroscopy
10. Environmental load resistance of building material, water, humidity temperature including cycling loads and chemical attack (environmental chambers, weatherometer, salt spray etc. for accelerated testing)
11. Fire-clay, cermaics and fire-bricks
12. Participating in feasibility studies

Linkages: Geology, feasibility studies, chemical anal

II BUILDING MATERIALS

NO.	STATUS	UNIDO	REMARKS
1	)	The Section has one long-term Expert. In the future, assistance should soon be reduced to short-term experts.	This division works very well and has competent staff.
2	) Well established		
3)		
4	New activity planned for implementation		
5	- do -		
6	- do -		
7	- do -		
8	Established		
9	- do -		
10	New activity planned for implementation		
11	Some is done		
12	Well established		

III METALLOGRAPHY

1. Etching and microscope
2. Microhardness
3. Fatigue and corrosion fatigue

Scanning microscopy and micro-probe See IV.7

III METALLOGRAPHY

NO.	STATUS	UNITO	REMARKS
1	} Partly established	May need assistance	
2	}		
3	Not planned		

IV CHEMICAL ANALYSIS AND RELATED

1. Classical analysis
2. Spectrometry: infra-red, visible light, ultra-violet light,
X-ray defraction, X-ray flourescence
3. Electro-chemistry
4. Cromatography
5. Refractometry
6. Calorimetry
7. Microscopy also electron
Microscopy and scanning
Electroscopy with microprobe
8. Fatty acid determination
9. Amino acid determination
10. Dust sampling and characterization
11. Distillation: retification, vacuum and molecular distillation
12. Radioactive tracer techniques

Linkages: Geology, building materials research, food, general chemistry

IV CHEMICAL ANALYSIS AND RELATED

NO.	STATUS	UNIDO	REMARKS
1	Established		Competent staff
2	Is or will be established	Done by UNIDO expert	Rudimentary competent staff only for all except 1 and 12
3	Barely existing		
4	Established	As for 2	
5	- do -		
6	New activity		Rather straightforward
7	Optical microscope established		
	Electronic microscope a new field	Assistance needed	
8	Established		
9	Can do some		
10	Only crude equipment	short-term assistance	should be established
11	Some exists		
12	Not yet foreseen		
			<p>General:</p> <p>Many of these activities require relatively high and specialist skills, expatriates could provide most of it.</p>

V FOOD TECHNOLOGY (LABORATORIES)

1. Cereals and cereal products
2. Reology
3. Dairy products and milk
4. Bottled drinks
5. Hygienic bacteriology and industrial hygiene
6. Fermentation
7. Analysis of water for use in food and beverage production
8. Fats, edible oils and soaps
9. Canning services
10. Polarography
11. Packing and packing materials
12. Keeping properties of food (environmental chambers)
13. Organoleptic evaluation and test kitchen
14. R+D, bench scale and pilot plants (called workshops)
15. Analysis of mercury, trace metals, pesticides and food additives

Linkages: chemical analysis, feasibility studies

V FOOD TECHNOLOGY (LABORATORIES)

NO.	STATUS	UNIDO	REMARKS
1))
))
2))
))
3))
))
4	) Well established		) Qualified staff on the
	)		) technician level and in
5	)		) some cases, on the
	)		) professional level
6))
))
7))
))
8))
))
9))
10	Exist		
11	New field	Assistance needed	
12	- do -		
13	- do -		
14	Some R+D		
15	Partly established		

General:
 The field is very important. Valuable assistance has been received. In Phase III experts, long and short term will be needed.

VI TEXTILE AND LEATHER

1. Studies of natural fibre raw materials
2. Study of synthetic fibres
3. Yarn testing and faults
4. Mechanical properties of fabric
5. Faults in fabrics
6. Fabric wear resistance
7. Colour and colour matching and dyeing
8. Flameability and fire resistance
9. Colour fastness
10. Shrinking
11. Wash properties
12. Electrostatic properties
13. Various quality tests of leather

VI TEXTILE AND LEATHER

NO.	STATUS	UNIDO	REMARKS
1	Established		Competent staff.
2	- do -		This activity is
3	- do -		functioning quite well
4	- do -		but may still need some
5	- do -		expatriate or UNIDO help
6	- do -		
7	- do -		
8	To be expanded		
9	- do -		
10	Is done		
11	- do -		
12	New field	Assistance wanted in	
13	- do -	the whole field	

VII ASSISTANCE DIRECT TO GOVERNMENT AND INDUSTRY

1. Management consulting
2. Feasibility studies and market studies
3. Industrial maintenance
4. Boiler and pressure vessels, water treatment, inspection,
control, safety
5. Difficult analysis and quality of raw materials and products
6. Establish quality control
7. Propose industrial standards
8. Information services

VII ASSISTANCE DIRECT TO GOVERNMENT AND INDUSTRY

NO.	STATUS	UNIDO	REMARKS
1.	Planned, today little activity	Not recommended. Better to associate with an outside consulting firm.	SWECO has estimated 70 consultants
2.	Well established	3 experts, mainly industrialists	80% contracted out, but done in good co-operation. Three competent staff assisted by other sections.
3.	Planned some activity		(Very important in Libya
4.	Nothing today, not planned		(IRC could be instrumental (in establishment of (maintenance contracting (firms and assist such firms (when laboratory work is (needed. ((Should be done by IRC or a (separate body.
5.	Is done		
6.	Is done		
7.	Is done		
8.	Planned but only rudimentary activity to now.	Expert needed	No competent staff Expatriates should be hired, staff trained.

VIII POSSIBLE NEW FIELDS

1. Extractive metallurgy
2. Electronics, microprocessors
3. Cybernetics: robotics, automation, process instrumentation and process control
4. Metrology
5. Telecommunication
6. Electrical network analysis
7. Operations analysis: logistics, risk benefit, various types of risk analysis and decision making under uncertainty, statistics and related.
8. Computer software development related to technology and management. Simulations on computer models
9. Bio engineering
10. Bio technological equipment, hospital equipment, aids for handicapped etc.
11. Plastic goods production technology
12. Environmental monitoring of air and water related to industrial effluents.

VIII POSSIBLE NEW FIELDS

NO.	STATUS	UNIDO	REMARKS
1	Under consideration		Should wait
2	Limited activity planned		Is very important in most IRSI's
3	Not planned		
4	Planned		Should not be overdone, as is often seen in developing countries
5	May be		
6	Not foreseen		Depends upon needs
7	Not planned		Is very important and should be considered
8	Not planned		Is very important in an industrial country, should be included
9	Considered		Can wait
10	Not considered		Can wait
11	Considered		May be very useful
12	Not planned some <u>ad hoc</u> activity		Systematic approach needed

IX LIBRARY AND INFORMATION SERVICES

1. Maintain an orderly library for books, magazines, publications and reports and reference books
2. Library budgets, purchase and cataloging
3. Undertake literature search for IRC and clients
4. Reproduction (Xerox) and procurement of documents ad hoc
5. Online information search on databases abroad (computerized search)
6. Computer search own literature
7. Teach IRC staff and others how to use the services

IX LIBRARY AND INFORMATION SERVICES

NO.	STATUS	UNITED	REMARKS
1	Poor and deteriorating	Has had assistance, but no trained counterparts left. Recommendations not been implemented.	
2	Poor		
3	Not possible today		
4	Very difficult because of bad administration procedures		
5	Not planned	Short-term assistance needed	Should definitely be implemented
6	Was done Need to be taken up again		

X STORES AND STOCKS

1. Purchase, inventory control, delivery of goods
(applies to all stores)
2. Stationery and office supplies
3. Chemical glassware and related
4. Chemicals and related
5. Electronic components
6. Building and other maintenance supplies, fittings, spares,
light bulbs etc.
7. Instrument Depot for portable instruments when not in use.
Possibly loan outside IRC, maintenance, calibration, fine
mechanics and electronic components.

X STORES AND STOCKS

NO.	STATUS	UNIDO	REMARKS
1.))
))
2.	) Poor or missing		) Expatriates can help
	)		) out
3.	) (building and)
))
4.	) administrative)
))
5.	) constraints))
))
6.))
))
7.	Not planned	Possibly	Highly recommended

XI MECHANICAL WORKSHOPS AND MAINTENANCE

1. Machining: turning, drilling, milling, grinding, etc.
2. Sheet work, welding and blacksmith work
3. Carpentry and painting
4. Plumbing, sanitation
5. Electrical installations and repair
6. Maintenance of various electrical and electronic devices in
the building and radio station
7. Garage
8. Glasswork, blowing, annealing, ground points, repair

XI MECHANICAL WORKSHOPS AND MAINTENANCE

NO.	STATUS	UNIDO	REMARKS
1	New activity))
2	- do -))
3	- do -))
4	- do -	No UNIDO assistance	) In lack of national staff,) expatriates will be used.
5	- do -	)	) Some of the Italian) contractors staff building
6	- do -	)	) the new IRC will be offered
7	- do -	)	) expatriate status.
8	Nothing today, plans vague		

XII ADMINISTRATION

1. Purchase department and supervision of IRC stores and inventory
2. Budgets and finance, billing when applicable
3. Long and short-term planning
4. Personnel administration, salaries, promotion, leave, social benefits, health care, recreation, canteen, transportation of personnel
5. Staff development and training school
6. Promotion and external relations
7. Automobiles, garage, drivers
9. Housekeeping, cleaning, sanitation, water supply and effluent
10. Office management: typing, reproduction, English and Arabic word processing, clerical and secretarial services, work distribution, mail handling
11. Central files
12. Switchboard, radio, telex, reception
13. Computer services related to: timesheet processing and project cost accounting, salaries, leave etc.
14. Library: See IX

XII ADMINISTRATION

NO.	STATUS	UNIDO	REMARKS
1	Unsuitable procedures		
2	Need to be improved	Assistance very much needed but political constraints may make use of the experts advice impossible as many methods used in other countries are not applicable here.	
3	- do -		
4	- do -		
5	Missing		
6	Needed	More IRC autonomy could relieve the situation.	
7	New, some seminars may have been held		
8	No comments		
9	Very poor, radical improvement needed and planned		
10	Needs to be improved		Word processing recommended
11	No comment		
12	Planned		
13	Inadequate plans	Assistance needed	
<p>General:</p> <p>The IRC administration is special and very difficult. There has been no UNIDO assistance in the past. Assistance in the future is highly recommended, if applicable.</p>			

PART I C
PROJECT DESIGN

- 1.0 Objectives
- 2.0 Inputs
- 3.0 Outputs
- 4.0 Activities
- 5.0 Development Support, Communication
- 6.0 Project Monitoring

1.0 Objectives

1.1 IRC Development Objectives

The national purpose of the IRC is to promote the transformation of Libya into an industrialized nation.

1.2 IRC Immediate Objectives

- Establish the IRC in the new premises
- Strengthen some of the already existing capabilities (see Part III)
- Establish several new capabilities (for details see IB and UNIDO inputs)

1.3 UNIDO Project Development Objectives

To be instrumental in creating a viable and largely self-sufficient Industrial Research and Service System in the country.

1.4 UNIDO Project Immediate Objectives

- Contribute towards the successful establishment of the IRC in the new buildings and taking the new equipment into use and supplement stocks, accessories and spare parts
- Contribute to create self-reliant IRC capabilities
- Establish training facilities for IRC staff and other efforts which will result in a more self-reliant and efficient IRC
- Make a contribution towards an IRC which, in addition to doing specific projects, has a strong development effect on industry.

2.0 Inputs

2.1 Government Financial Inputs

US\$

- New premises, instruments and stocks, supplies, office equipment and furniture heating and cooling, research facilities
- Housing - 60 apartments 7.8
- Transportation and automobiles 0.67
- Salaries, estimated average over four years, per annum 5.0

2.2 Staff

The most critical Government input is qualified staff. Most of the staff has routine work and can be trained in one to five years time. But some jobs demand 10 years experience and/or a Master or Doctors' degree.

It may be good to have some people with industrial experience, but most IRSI's both in developed and developing countries, train most of their own staff. Doing industry projects exposes them sufficiently to industry to qualify them.

It is difficult to forecast the build up of staff, but a plan for this input, the most important input, must exist. The project document cannot go into detail. In summary, the IRC's plan is presented below. The staff is split up into three categories:

Professional:	83	of which 28 are expatriates on contract
Technicians:	30	
Support Staff:	56	
	<u>169</u>	

<u>Year</u>	<u>Planned Expansion</u>
1984	500 ^{1/}
1985	600
1986	700

^{1/} So fast an expansion is dangerous, it takes time to absorb new staff. If they cannot be put to work from the first day, they will deteriorate.
R. Westergaard. March 1983

2.3 IRC Base Line

In terms of institution building and for evaluation purposes, it is very useful to prepare a "base line". The institute has a staff including expatriates, consisting of:

- 1 General Director
- 3 Division Directors
- 9 Section Heads
- 83 Professionals, other than the leaders (22 are expatriates)
- 30 Technicians
- 56 Support Staff
- 169 Total number of staff (March 1983)

	% of IRC Activities
Its main activities have been:	
1. Geological surveys and mapping and analysis of rocks, minerals and ores (30 professionals, 7 others)	15
2. Building materials and miscellaneous investigations of minerals for buildings materials and as industrial raw materials e.g. sand for glass production. Also, some R+D related to building materials (5 professionals)	5
3. Food technology mainly quality control and R+D	10
4. Chemical analysis, testing and other laboratory services	5
5. Feasibility studies (3 professionals with help from others, 50% of the work is contracted from foreign companies)	12
6. Management Consultancy)
7. Technical trouble shooting and other services to existing industries	) 3
8. Advise to Government, other than economic studies	) 50
9. Services to private clients (very small))
	<hr/> 100

The percentages are only estimates and are related to man-years in each activity. A more detailed list of facilities and capabilities can be found in Part IB.

It is the impression that the IRC projects have had realistic goals and have been thoroughly conducted. The usual pitfall of costly pilot plants has luckily been avoided. Contact and relationships with industry and the Government is good.

3.0 UNIDO inputs

3.1 Financial inputs

The UNIDO inputs are limited to long and short-term experts, possibly fellowships. The inputs are mainly paid by Libya as cost-sharing. The UNDP financial support will (if not revised) be:

UNDP Financial (in US\$)

1983	1984	1985	1986
------	------	------	------

UNIDO Project Input
(including Government cost-sharing)
(in US\$)

1983	1984	1985	1986
1,524,000	2,055,600	2,257,200	1,889,800

It is to be understood that the UNDP contribution is fixed, but if the Government wants to increase or decrease the cost-sharing input it can be done. This will be reflected in budget or project amendment documents.

Including overhead and expert salaries, travelling etc., the present and expected expert man-year cost is tabulated below:

Estimated Expert Cost in US\$			
1982	1983	1984	1985
103,200	111,600	122,400	137,000

From this the approximate expert man-years can be calculated (there must be considerable flexibility)

	(March 1983)	End 1983	1984	1985
Number of Experts	(8.0)	13.7	16.8	13.8

It is not feasible to prepare a detailed schedule for fielding experts over the next four years. Needs, opportunities, commissioning of equipment, availability of expatriates and nationals being already capable, availability of counterparts for training, Government plans, industrial opportunities or problems; all these factors are more or less unforeseeable factors deciding which experts are needed and when. In addition comes the problems of recruitment and contract renewal and expert suitability. Short-term posts will be decided on as needs arise.

3.2 Short-term consultants should be used more

The medium term and short-term experts should be convertible. Short-term experts to be decided ad hoc, a forecast may be 20% short-term. A problem with short-term experts was mentioned by the IRC in that the recruitment takes too long. An alternative is to take them from an associated IRSI.

3.3 In March 1983 the experts on the project were as follows:

Name (Nationality)	Post Title	Arrived	Extension UNIDO	Extension Remarks Government
Mr. O.P. Misra (India)	Project Coordinator	7/77	30/6/83	31/12/83
Mr. Z.L. Halmos (Hungary)	Instrumental Chem. Analysis	10/75	- do -	- do -
Mr. K.P. Kacker (India)	Building Materials	2/75	- do -	- do -
Mr. R.T. Thampy (India)	Chemical Engineer	3/80	- do -	- do -
Mr. Balasubramanian (India)	Industrial Planner	3/80	- do -	- do -
Mr. M. Ferlan (Yugoslavia)	Petro-chemical Industries	11/81	28/6/83	28/10/83
Mr. F. Shah (Pakistan)	Techno-economic Feas. Studies	2/82	30/6/83	31/12/83
Mr. D.P. Gupta (India)	Techno-economic Feas. Studies	1/83	8/1/83-7/1/84	One year

NEW EXPERTS IN 1983

Quality Control
of Textile Materials

Food Science +
Technology

Production
Engineer

Economic
Geology

Mr. V. Vardjan
(Yugoslavia) Consultant 1/83
(Ind. Economics)

Mr. J. Isles
(U.K.) Consultant
(Textile Q.C.)

4.0 Outputs

4.1 IRC Outputs

The IRC outputs are reports to the Ministry and to industry, to a lesser extent oral advice and information and trained people. For details, see Part IB, "IRC Facilities, services and activities". The main outputs are expected to be:

- geological maps
- reported finds of geological resources
- feasibility studies
- developed processes and products in various fields (so far mainly building materials and food)
- advice given to industry on economic and managerial matters
- assistance given to industry related to processing conditions and process control and trouble shooting
- assistance given to industry related to maintenance
- assistance given to industry in establishing quality control
- diagnosis of industrial problems
- tests and chemical analysis
- information given to industry
- inputs for preparation of standards
- metrology outputs.

4.2 UNIDO Project Outputs

The UNIDO outputs will be:

- Direct support (staffing IRC)
- Trained counterparts
- Manuals and guidelines for IRC and its service units and equipment
- Improved IRC staff by group training
- Better instrument choice, routines and housekeeping.

For details relating to the various facilities, capabilities and activities, see Part IB.

5.0 Activities

5.1 IRC Activities

For details see Part IB.

5.2 UNIDO Project Activities

1. Give training to counterparts
2. Prepare manuals, guidelines and instructions which can help the counterparts.
3. Participate in IRC activities
4. Participate in establishing the new IRC laboratories
5. Give lectures or seminars for people from industry
6. Prepare equipment lists and gather pamphlets and quotations and recommend the most suitable equipment and assist in preparing IRC equipment budgets.
7. If a training school is established, teach in this school
8. Give IRSI building advice to the management of the IRC
9. When needed, because the IRC staff still lack competence, do IRC project work (Direct Support).
10. Recruit and extend experts in co-operation with UNIDO
11. Secure maximum use of UNIDO Headquarter services
12. Prepare all the required reports for UNIDO
13. Prepare project budget or document adjustments for the approval of the Government, IRC and UNIDO
14. Assist in project evaluation exercises.
15. Project co-ordination in co-operation with IRC managers.

From the IRC facility and activity schedule, Part IB, it can be seen which capabilities the expert will assist to create. The chapter on inputs indicates the immediate expert needs.

6.0 Development support communication

This question has little relevance. All which is needed is IRC - Project communication on the expert - counterpart level and project co-ordinator communication with IRC management. This has caused no problems and no problems are foreseen. The project should keep itself well-oriented about relevant institutions in the country.

7.0 Project Monitoring (Progress Reporting)

7.1 Introduction

As explained earlier, it is difficult for any extensive period to forecast how fast the IRC can expand quantitatively and qualitatively, the timing of UNIDO inputs will need to be ad hoc. Still, it is perfectly possible to manage and monitor the project if proper UNIDO project management is secured and progress reports are produced properly. The experts should, soon after arrival, assess how long it should take them to produce one or more capable counterparts (unless his task is mainly one of direct support). In his semi-annual status report, each expert should, in addition to the standard format, answer the following questions:

7.2 Experts mainly having a training mission

1. Has one (or more) counterpart (s) been assigned to him, if not, when can it be expected?
2. Suitability of counterpart(s) with respect to basic knowledge, skill and attitudes.
3. Training progress achieved in the period in terms of specific capabilities and skills.
4. Assess if it can be expected that the counterpart will be self-reliant and can become self-developing and how long it may take, so that his mission as trainer can be considered as completed.
5. Report direct support given and suggest the percentage of time used on direct support.
6. Manuals prepared, copies attached to the report.
7. Lectures given.
8. Main constraints.

7.3 Experts mainly giving direct support

1. Report what has been done: reports, projects etc.
2. Report what has been done in terms of training.
3. Manuals prepared.
4. Lectures given.
5. Main constraints.

7.4 Project Co-ordinator's Report

His main function in addition to the UNIDO administrative duties is to supervise the experts. For each expert he should answer the following questions:

1. Are his qualifications satisfactory?
2. His job performance?
3. Counterpart relations?
4. How does he cope with life in Libya?
5. Comments on his field status report. Does it reflect the full picture?

7.4.1 IRC Progress

He should also briefly assess IRC progress with respect to:

1. Recruitment of adequate staff
2. Improved capabilities, facilities and services
3. New capabilities (referring to the IRC schedule).

7.5 Concluding Remark

If this reporting programme is conscientiously carried out, it will be very easy for all parties involved to monitor the project.

PART II

ASSESSMENT OF THE ASSISTANCE PROJECT

ASSESSMENT OF THE PROJECT

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 - 2.1 The status of IRC
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 - 2.3 Training of national staff
 - 2.4 Is IRC cost effective?
 - 2.5 Constraints
- 3.0 IRC Modulization
- 4.0 Nature of the project assistance
- 5.0 Assistance to the various modules
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 - 11.4 IRC project realism
 - 11.5 IRC strategy
 - 11.6 IRC constraints
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1.0 Introduction

This assessment of the UNIDO project does not have the format of a formal evaluation. Such a document will be produced by the UNIDO representative and the UNDP Consultant. The present document is meant to be used as input for their evaluation.

Emphasis has been given to questions requiring IRSI knowledge rather than checking project document inputs and outputs against the actual inputs and outputs or adequacy of the project documents for Phase I, II and the preparatory Phase III. Three weeks is a short time for collecting all the information and producing a report. Priority had to be given to the efficient use of the UNIDO Consultant as a specialist in IRSI building and operation.

2.0 IRC's role in Libya

IRC is the only Industrial Research Institute in Libya. There are a few other institutions giving some related services, like NCB (an Architecture and Civil Engineering Bureau). The NCB has a soil mechanics unit with laboratories, it is being considered to move this to the new IRC. About a year ago, the geological survey institution was merged with the IRC.

It is the Government's policy to centralize under the IRC the following activities:

- Geological investigations
- Industrial Research
- All demanding laboratory services needed by industry
- Industrial feasibility studies
- Industrial Management consulting
- Technical information services.

2.1 The status of the IRC

The IRSI is formally a part of the Government, but with some degree of autonomy. It reports to the Government's Secretariat of Light Industry. Considering the Libyan strategy for rapid industrialization, centralizing the IRSI activities in IRC appears to have been a good choice.

2.2 Government and Industry relations

IRC's main service to the Government is feasibility studies. Some studies are requested by the Government, but it has been said that about 60% of the projects are proposed by the IRC, mainly based on industrial opportunities related to minerals identified by the geological surveys in co-operation with the building materials research section and as a result of visits to industry.

IRC can be called upon by national industrial enterprises or foreign contractors. But the IRC is also free as a Government agency to go to the factories and identify their problems and suggest solutions on the spot or propose a research programme or even police them. As far as can be judged, the IRC has excellent contact and relationships with both the Government and industry. It does not operate in isolation as is often the case for IRSI's.

2.3 Training of national staff

When the on-going industrialization started, Libya had very few people with good academic and/or industrial backgrounds. Most of the IRC staff came directly from the university. The problem has been partly overcome by:

1. Having to refrain from sophisticated activities
2. Hiring expatriates
3. Training of Libyans at the IRC or abroad
4. Purchasing external services from abroad
5. Use of UNIDO experts for direct support
6. Bilateral arrangements.

Training of Libyans to the point of full competence and continued self-development has been more difficult than foreseen and assistance will be needed for many years, but the situation will hopefully improve as the new generations take the step into the new world of technology. The problem of building up a fully competent and efficient national staff is formidable. After training abroad the skills and attitudes acquired tend to deteriorate when the person comes back to his old environment. One reason is the lack of delegated authority, and the other is that the administrative system tends to kill initiative with procedures which are felt to be intolerable for a person who is used to the system in developed countries.

2.4 Is the IRC cost effective?

It is not possible to assess the industrial cost/benefit of the services rendered. Since these services are not paid for, it can be suspected that not all of it would be done if the cost had been known and payment required. Without economic control, low work efficiency would be expected. The consultant has no evidence that the services are not cost effective, it is not possible to find out under the present system.

The IRC is in comparison with the IRSI facilities of industrialized countries very small. To have a national impact the IRC must be very selective in its approach. It should address itself to significant problems and give industry a type of assistance which helps them to become self-reliant as this is much more useful than doing for industry what industry ought to learn to do. As the IRC matures a better and more cost effective strategy should result.

2.5 Constraints

The main constraints have been:

1. Premises: Old, cramped and deteriorating buildings have allowed very little staff increase over the last three or four years.
2. Housing: Housing for expatriates and Libyans has been extremely difficult.

3. Lack of trained people

The first two constraints will be eliminated soon when the very adequate building is ready (estimated to be May 1983). Sixty apartments are earmarked for the IRC.

The lack of trained nationals will be a constraint for another five to ten years.

3.0 IRC Modulation

The IRC can be described as consisting of six main modules (an alternative would be to use the three departments and nine sections).

Proposed modules:

1. IRC administration and management
2. Laboratory services
3. Techno-economic studies
4. Industrial management services (just beginning)
5. Geological activities
6. Information services (at present almost non-existent)

The UNIDO project has mainly given assistance to modules 2, 3 and 4. The fact that module 1 has not received assistance shows that the project has not had institution building per se as an objective. The Swedish Consulting firm SWECO has had this responsibility. SWECO had carefully (during the year 1975) analysed the Libyan industry, made forecasts for its development and expansion and identified its expected need for IRC assistance. Based on this information they identified the services which IRC can be expected to give to the Government for decision making, mainly feasibility studies. Similarly, the services to be given to industry have also been identified by SWECO. Each type of service is broken down into discreet functions. Job descriptions for each function have been worked out and equipment specified. SWECO designed the new buildings and supervised the contractor building them. The project has contributed to the "new IRC" by working out details related to some of the equipment and has identified accessory needs, prepared lists of needed items and suggested sources of delivery.

4.0 Nature of the Project Assistance

The activities of the Project can be grouped under three headings:

A. Training

Building up counterpart capability related to the various IRC services of the modules which have been assisted.

B. Do demanding IRC work

Until the capabilities could be established, the experts have provided the services on behalf of the IRC.

C. Industrial Assistance

The IRC is not competent to do sophisticated feasibility studies on their own (no IRSI can do that). Senior UNIDO industrial experts have undertaken some such studies alone or jointly with foreign firms contracted to undertake feasibility studies. This has been done in co-operation with the IRC staff, with more or less a training effect.

Comments

A. is a discreet institution building activity. A target with respect to the time it will take can in principle be estimated.

B. is mainly direct support but with the objective of gradually phasing out as the IRC staff reach the state of proper know-how and self-development. Time needed cannot easily be forecasted.

C. is a supplement to the use of outside consultants. It has some training effect, but the goal is not to produce a counterpart industrialist. The service of senior industrialists is mainly direct support and will be needed continuously or from time to time for a long time to come.

5.0 Assistance to the various modules

5.1 Laboratory services

Many laboratory services do now function quite well in terms of routine tasks:

- Volumetric and gravimetric (classical) chemical analysis
- Quality testing, including bacteriological tests of food products and hygiene in the food industry, raw materials with emphasis on cereals, canned foods, bottled drinks and dairy products
- Testing of inorganic building materials
- Textile testing
- Analysis based on more sophisticated instruments is still very much dependent upon assistance

Relatively few of the IRC laboratory staff have reached a level of know-how much beyond that of a technician (by developed country standard). Self-development is difficult to achieve and there is a tendency to lean on the experts whenever trouble or new problems are met. For this reason continued assistance is wanted, but should perhaps not always be given, in order to force them to stand on their own feet. The training of counterparts for the laboratory functions has been somewhat disappointing. The reasons are believed to be (gained from impressions during interviews):

- Counterparts are often weak in basic science and not very keen on learning the theory behind the mechanical operation of the equipment
- In some cases lack of expert pedagogic ability has aggravated the situation described above
- Proper recruitment of counterparts has been under constraint.

It should not be forgotten that the fields of natural science and sophisticated technology have not yet become a part of Libyan culture. After all, this is the first generation of IRSI workers. In five to ten years the situation may change for the better as more graduates and post graduates are turned out from the university. A large number of Libyans study abroad, they will have been exposed to the technological culture of developed countries and will hopefully fill many of the gaps.

5.2 Techno-economic studies

As Libya establishes many new factories, there is a great need for feasibility studies. IRC has three professionals doing this, and at present three experts. 80% of the work is done by outside consultants (this is not unreasonable and reflects a rational approach). It has been very useful for these studies that the IRC staff and senior experts have provided input and a corrective to the external consultants. The UNIDO assistance appears to have been very useful for Libya and is highly appreciated. That the institution building effect is relatively small is not a relevant objection to this assistance.

The UNIDO consultant does not know how many of the studies with a positive recommendation have been implemented and if the judgement of the feasibility studies have proven to be correct. But, the consultant has good reason to believe that the feasibility studies are of high quality.

It is not expected that the need for feasibility studies will be expanded.

5.3 Industrial management services

In practically all developing countries management leaves much to be desired. SWECO has estimated that at least 70 professional management consultants are needed for the Libyan industry. The present activity at the IRC is, compared to this goal, negligible. A cost account expert is under recruitment. It is not obvious that UNIDO is the best agency to build up this capability. The ILO is assisting management projects in many countries. The best solution will most likely be to associate with a reputable management consulting firm (possibly contacted through UNIDO). This can give a more coordinated help than UNIDO experts recruited on an individual basis.

6.0 Should UNIDO also assist module 1,5 and 6?

6.1 IRC administration and management

IRSI's administration and management is considered difficult even in developed countries and it can be taken for granted that also the IRC needs assistance. The more difficult tasks are:

1. Staff development
2. Proper delegation of authority
3. Project management
4. Institute development plans
5. Budgeting and accounting and auditing
6. Staff assessment and salaries as incentive
7. Store keeping and delivery from the stores
8. Secure discipline and good house keeping
9. Filing and mail handling
10. Secretarial services
11. Procurement of requisite

The list could be made even longer. The IRC should consider if it should let a UNIDO short-term expert (say one to three months) come and see what he thinks should be done. If a need is identified, further assistance can be provided by UNIDO or others.

6.2 Geological investigations

Geological activities are well established in Libya. Certain services are provided by foreign contractors. As this module has only little UNIDO assistance and does not appear to need it, the consultant did not give much of his attention to geological activities. If new geophysical methods are introduced, experts may be needed.

6.3 Information services

The IRC has a library with books, the most important reference organs like chemical abstracts, Kirk Othmer and Ullman (the latter is incomplete). It keeps some 150 periodicals. In terms of information services the IRC staff can upon request use the library and other sources to retrieve written information and produce a report based on their findings, but the facilities for doing this are inadequate.

There is no computer service (on-line search of overseas data basis). A UNIDO expert has been at the IRC for two years, but nothing tangible in terms of information services has come out of his service. The library as such appears to have been properly organized by him, and he left an excellent report. When it was asked why his recommendations had not been carried out, the explanations were: librarians had been sent abroad for training and not returned, budgetary and political constraints prevented implementation.

7.0 UNIDO expert services in general

The UNIDO assistance has been extremely useful mainly in two ways:

- as an institution builder in helping to plan the various service modules of the IRC and in training counterparts.
- direct support in terms of UNIDO experts doing IRC project work for which the IRC did not have qualified staff.

7.1 Direct support versus training

Direct support will continue in Phase III. If this is spelt out in the Project Document and is what the Government finds most feasible and cost-effective, UNIDO will certainly provide it.

The UNIDO inputs have almost exclusively been to provide experts. The fellowship component has almost completely been converted to experts. UNIDO has not supplied equipment. The experts have to a lesser degree than desirable been able to produce capable counterparts. They have had to give direct support by executing and participating in the execution of IRC projects. Also, this has a training effect, when done in a team, but when UNIDO staff provides expert services without close counterpart contact, it has little training effect. The explanation given is mainly that proper counterparts were not assigned to the experts. The IRC project work was of great importance and had to be done, so the experts did it. Such direct support has been very useful. Unfortunately it has not always been reported as such. Also, in Phase III a substantial expert contribution will and ought to be direct support and the Project Document will say so! The short-coming with respect to

training of counterparts could and should be reduced in the future. One reason that experts fail in this respect is that their background usually is one of technical problem solving, they are not teachers. The briefing in this respect is inadequate. New experts should have a manual covering the training experts, they should be instructed in groups or with videotapes etc., a CTA should see it as one of his main duties to secure a good training effect. UNIDO has prepared a CTA's manual (procedures) of 485 pages, but not one page is devoted to procedures for reporting counterpart training.

7.2 Recruitment and expert quality

The project has had several very good and successful experts, but there are some who have not had the experience and skills expected. There have been some who did not like it in Libya and gave up after a short time.

Libya is a rather special country with respect to climate, housing, work hours (six short days), social life and culture, important signs etc. only in arabic. Some experts will like it in Libya, some will feel quite unhappy if they have to be there for a long time. Under these circumstances it will certainly be cost-effective to explain the situation carefully before an expert signs the contract so that he can opt out before it is too late. It seems to be an excellent idea to put them on a one to three month trial in Libya before giving them a contract for one year or more. This may appear to be a costly recruiting procedure, but the UNIDO consultant believes that it will pay off. The recruitment procedure was discussed with the IRC who think that this is a good procedure.

Practically 100% of the UNIDO assistance is delivered by experts in this project. From the project management point of view, recruitment is a very important activity!

7.3 Experts appear to have stayed too long

In the United Nations, it is not recommended to keep any expert more than five years in the same post. After five years an expert tends to identify too much with the country and pick up the bad habits there and step out of the role as an independent international civil

servants. Experts should, as a rule of thumb, not stay more than two and a half years with a project. After this time they are likely to run dry. If they mainly do IRC work (direct support) they may be wanted to stay indefinitely by the IRC, but this may not be so sound. Possibly some could be released and take expatriate status. The IRC will tend to become too dependent on a good expert staying very long and the counterparts will not always develop the desired self-reliance. It is bad for the experts' career to stay long, unless he wants to retire when finishing his assignment. If the experts are changed more frequently, there may be intervals without an expert, this may be unpleasant, but often also useful. The counterpart will be forced to rely on himself and gain self confidence and realize his shortcomings. When there is no expert to ask, they must find the solution, be forced to use the literature for instance.

A new expert has other views, other experience and know-how. They usually stimulate and contribute more (if they are good).

The project should use short-term experts (consultants) much more.

They can contribute by identifying equipment needs etc. so that the equipment is in place when the long-term expert comes. Often experts are not able to perform because they are waiting for the equipment. (United Nations parody: The expert comes and after some weeks orders equipment and sends his counterpart on fellowship. For one year he has little to do. When the equipment comes and the counterpart is back, he leaves!)

Short-term experts can break in new equipment; straighten up difficult IRC projects; help management etc. In feasibility studies they are often a must. An expert in the technique of making feasibility studies may be justified for a couple of years. When demanding studies shall be undertaken, experts with specific know-how may be needed for a short period or to conduct the study which should take no more than a year (the IRC appear to use a long time on their feasibility studies). Brief follow-up missions of a few weeks may be needed. Short-term missions by previous good experts is very cost-effective when applicable.

7.4 Who are the best experts?

They should have both high academic standards and IRSI or equivalent practice and/or industrial practice.

Experts from developed countries are in principle usually preferable, they tend to demand more from the counterparts and know better how a first-class IRSI operates.

Experts from other developing countries may understand the problems and attitudes better, demand less and be better liked. They are also more likely to cope with the living conditions. They often want very much to extend the assignment more than is the case for people from the rich countries. They may in this situation be tempted to make themselves indispensable (not produce so good counterparts so that the expert is no longer needed). Another temptation is to withhold criticism, not demand too much, stir up no fuss. If an expert knows he will leave next year, he will be much bolder and more aggressive.

8.0 Should UNIDO fellowships be used more?

The reasons for not using UNIDO fellowships are not clearly understood. The fellowship component was converted into experts. Fellowships without UNIDO assistance was organized by the Libyan Government. For Phase III it should be specifically clarified if UNIDO fellowships after all may be a better solution or at least should be used to a greater extent. A rational decision should be taken from case to case.

9.0 UNIDO can do more in terms of institution building per se

It is considered by the UNIDO consultant a short-coming that UNIDO has not been more directly involved in the IRC planning procedure. UNIDO has valuable know-how in headquarters. The UNDP/UNID/IRSI evaluation exercise produced a lot of valuable experience (Manuals on IRSI building ought to be produced and regularly upgraded, as experience in a systematic manner is accumulated. After the UNDP/UNIDO evaluation

exercise an effort in this direction was started but failed to convince the relevant UNIDO officers. But this idea has now started to move again). The IRC is now ready to move to a large and costly compound (US\$60 million, 31,000 m² of floor space). The various rooms are already earmarked for existing and new activities and some equipment has been installed. Despite the fact that the IRC has been UNIDO assisted for eleven years (the planning of the new IRC started in 1975), UNIDO has not been seriously involved in planning the expansion. Such a contribution has not been mentioned as an objective of the assistance! The UNIDO consultant has no reason to believe that the plans prepared by SWECO in Libya suffer from any short comings, but in principle UNIDO ought to have been able to give valuable assistance.

10.0 UNIDO Project Manager

In this project the project manager has for some reason been called "Project Co-ordinator", being so on a 25% part-time basis. The balance of his time he is supposed to work as an expert. In fact as the project has grown from having eight to fourteen experts, there has been very little time to do anything but project management. The present project co-ordinator is paid as a project manager (D-1) and to his best ability performs as such. He has seen it as his main duty always to find out what his IRC counterparts want in terms of UNIDO assistance, and as far as possible secure that the IRC gets what is wanted. This has been highly appreciated by the IRC. As an outsider with limited knowledge of the practice in Libya, the UNIDO consultant offers the following comments:

- Since the co-ordinator is doing 100% project management, this should be reflected in his title and job description and he should be relieved of producing a report of his work as an expert supposed to fill 75% of his time, when actually this activity is only ad hoc advice such as serving on project committees.
- The progress reports and terminal reports have not conveyed a clear picture of the IRC and this has made it difficult for the backstopping officers in Vienna to understand the situation the UNIDO project is facing. No feedback from UNIDO has suggested dissatisfaction with the reports, so the project co-ordinator cannot be blamed for having continued the reporting practice established by the project co-ordinator's before him.

- Progress and constraints related to the most important output which is competent counterparts has not been given enough attention in the reports
- The question of counterpart training versus direct support appears to have been properly handled, but not properly reported and reflected in work plans and reports
- When the IRC moves to the new premises and triples its scope, a new opportunity to supply institution building services will arise and should be offered for Phase III
- The project has not been devoted to the overall institution building task (Libya never seems to have asked UNIDO for that). The project has only assisted development of specific IRC capabilities. Perhaps more active promotion of the institution building aspect per se (dating back to 1975) could have resulted in a UNIDO institution building project also concerned with such things as: overall planning, management, policy and strategy.

Meeting with the Director of the IRC

Mr. Bishty

On 17 March, the UNIDO Consultant as well as the UNDP/UNIDO evaluation evaluation team had a very useful meeting with Director Bishty, where he very openly expressed his views on the project.

Phase I, in his opinion, was only marginally useful. Phase II has been highly successful, out of 22 experts, only 3 failed. This is no more than can be expected considering the many constraints in Libya. (In the future it will be much more attractive and also easier for the UNIDO experts, new Centre, better housing, canteen, recreation facilities).

Two of the key project personnel were discussed during the meeting. Mr. Misra was highly praised for his job as Project Co-ordinator and is by the IRC (and should be) given credit for the success of Phase II, also UNIDO, and UNDP should recognize this. He was contracted to use 25% of his time to do project co-ordination, and 75% as an expert in Management Consultancy. Mr. Bishty said that he had failed to perform as an expert, this was also the case with the other two co-ordinators before him, who had the same 25%-75% arrangement.

The consultant however finds this critique to be unfair, he has served on project committees for example. The IRC project is a very large project, requiring a full-time Project Manager. The IRC lacks understanding of the Project Managers' role and his many duties.

The Project Co-ordinator is serving three masters: IRC, UNIDO and UNDP. All three demand much and put constraints on him, also, some of the experts fail to understand this and blaming him often has the wrong effect.

Also, the role of Mr. Halmos was openly discussed. He has, in the Consultant's opinion, done the job of a superman as an institution builder, participating in planning the new IRC. He works extremely hard and has the guts to resist frustration. The Consultant has, in over 14 years with UNIDO, never met a better expert: highest academic standard combined with hard work,

good judgement and understanding and ability in practical matters. This is fully appreciated by the IRC. He has been, and still is, indispensable and has a big role to play in establishing the new IRC. But, Mr. Bishty was very bitter that he had failed to produce a counterpart, not even at a technician level. He rightly remarked: "You do not need to know electronics to operate a TV".

The Consultant strongly recommends that Mr. Halmos be immediately relieved of his training duty. The world is full of people who can operate all kinds of instruments. It is an abuse of this valuable expert to use him for that. An expatriate should immediately be recruited to take over the training job (under his supervision).

It must be admitted that the Project Co-ordinator should have seen this and corrected the situation.

PART III

SUGGESTIONS FOR IRC'S CONSIDERATION

SUGGESTIONS FOR IRC'S CONSIDERATION

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Foreword

This document has been prepared during the UNIDO Consultants' three week stay in Libya. The report is solely the Consultant's personal ideas. It has been called "suggestions for consideration" rather than recommendations, to produce firm recommendations requires much more time as well as expertise beyond the consultant's capabilities.

The suggestions have been produced for the purpose of helping the IRC and the UNIDO project. The sequence is arbitrary and the degree of detail varies.

Interviews with UNIDO staff, expatriates and national staff and the Consultant's own observations have inspired the ideas presented. If some of the suggestions are found to be relevant and realistic and are partly or fully implemented, this document has served its purpose.

In the progress reports from the Project Co-ordinator, reference to possible implementation of one or more of the suggestions should be reported. It is also possible to use short-term consultants to look into or implement some of these ideas.

1. Instrument Pool

It should be considered to establish an instrument pool for the IRC and also for loan to clients. If the client is not competent to use it, the IRC can provide people to operate the instruments. The pool could have responsibility also for instrument maintenance and repair and calibration and can also do this for clients. Instruments not in use should be kept by the pool.

2. Electronic and micro-computer applications

An electronics section should be considered, under it there can be a group for robotics, automation, process control and micro-computer applications.

3. The priority of geological mapping

Expansion of the geological division should be held back until its priority relative to other activities has been established. Mapping of the whole country 1:50,000 may perhaps wait.

4. More contact with related institutions

It is understood that the IRC has relatively good relations and contact with the university. It should also develop a relationship with the National Consulting Bureau which also has laboratories. The Department of Agriculture probably has related laboratories.

A huge computer centre is now being established. The IRC should work closely with them and avoid unnecessary duplication. All related institutions should be visited and opportunities for co-operation solicited.

5. Promotion of work for foreign contractors in Libya

To do work for them may be more challenging than working for the less mature Libyan enterprises. Such work will help to mature the IRC. The income could be earmarked for incentive use at IRC, such as going to conferences abroad.

The IRC is not well known enough to the many foreign contractors in Libya and a promotion programme is needed. Also in socialist countries IRSI promotion is necessary.

6. Strive for industry development effect, as more important than direct support

It is much more useful to establish internal quality control in a factory than to do such work at the IRC for industry. Development does not only mean to create facilities and capabilities, the goal is to create something which can continue to develop and expand, self-perpetuating. What the IRC can do directly for industry is very limited, it must aim at teaching industry to help itself.

7. Secure maximum national impact

Focus on producing results which have great national economic impact by addressing essential problems. Doing small things for small clients is of marginal use to the nation.

8. Cost-effective use of foreigners

Since Libya shares so much of the cost of UNIDO experts, they are more costly than hiring expatriates. Expatriates can be used for as long as they are wanted by the IRC, they can be fired if not satisfactory.

United Nations' funds should be used more often for short and intermediate term consultants. Good experts can be used several times for short follow-up assignments. This can be very cost effective. 1/

The IRC should carefully balance the use of various foreigners.

- expatriates hired for the IRC. It may sometimes be feasible to offer good UNIDO experts expatriate status when their term is up.
- services from foreign consulting firms.
- bilateral arrangements
- UNIDO short-term experts

1/ It is more attractive to work for the United Nations than as an expatriate; therefore United Nations experts which are expensive are expected to be more qualified and should accordingly be used for the most demanding jobs. United Nations experts should preferably only have senior counterparts. Training to use the various instruments can be given by qualified expatriates as such work is strictly the work of technicians.

- UNIDO intermediate-term experts
- UNIDO long-term experts
- Assistance from other Libyan institutions
e.g. the university
- Co-operation agreement with foreign IRSI's

10. More support staff

At the IRC the proportion of academically trained staff to technicians and other staff supporting the professional staff is too high compared with that in comparable IRSI's (as most of the work done in laboratories is of a routine nature). This indicates that many staff members with academic degrees do the work of technicians or even that of laboratory aids.

A plan should be developed to replace some of the professionals by technicians and prepare the professionals for more challenging work.

11. Better secretarial services

Secretarial functions should be improved to relieve the professional staff so that this scarce resource can be better utilized. There should, in addition to arabic typists, be English typists, as much contact outside the arab world is necessary.

Word processing, (typing and editing done on a computer terminal, printout on a line typer or similar fast typing automatic machine), should be installed in the new Centre. A computerized dictionary can even secure correct spelling!

12. Reduce the language barriers

Most foreigners serving in the IRC speak English. Most of the IRC staff know some English, but often not enough to have full advantage of their counterparts. Courses in technical English should be given.

Courses in Arabic should be offered to foreigners, preferably at the IRC training school.

If an Arabic-English and English-Arabic Technical Dictionary does not exist, have it produced, possibly jointly with other Arab countries.

A technical language laboratory could easily be installed in the new facilities, using self-teaching video methods at various levels, (languages could be English, French, Russian and German for instance as a start). Videotapes could be available by field (chemistry, building materials etc.) and by level (beginner, intermediate, technician, engineer etc.)

13. Five-day week

Five days a week, eight hours daily, half an hour lunch is quite normal in many countries. It could have many advantages. Savings on transportation (many will have a long journey) and it is assumed that a free bus service must be introduced to bring the staff to work and home again. The expatriate and United Nations personnel can get more out of the weekends. A break in the middle of the day is good for the work, a free lunch in the canteen will gather people for friendly and business conversations.

14. IRC project budgeting and cost accounting

In Libya cost accounting in industry has been lacking in the past, and still is in the older plants. It is one of the more important objectives of the IRC to introduce proper cost accounting in industry.

Within the IRC itself, cost accounting is not done. Projects done for the Government and its industry are not charged and the cost is not calculated. When the IRC gives its services to foreign companies having contracts in Libya, the service is paid for in full. The prices are fixed and realistic and detailed calculations of the cost have been worked out in the form of a price list.

It is the UNIDO Consultant's opinion that also Government projects and IRC initiated projects should be based on budgets and actual cost (man hours and supplies and expenses like travelling and overhead), the cost of using instruments should be covered by the overhead without specifications.

The propose of IRC project cost accounting is to assure that the amount of effort put into a project is in harmony with the expected benefit. The cost of a feasibility study for a plant which will be small may under the present system be excessive. The introduction of IRC cost accounting will require that the staff produce weekly time sheets on which they distribute the time spent on the various projects and on miscellaneous internal activities (administration, maintenance and repair of equipment etc.)

This will certainly upgrade the cost effectiveness of the IRC, at a time when it is demanded of everybody in Libya. A good time for introducing IRC cost accounting will be when the new premises are taken into use. It will require thorough preparation and "selling" of the idea to the staff. The handling of project budgets and time sheets can easily be done on a computer, this will be an opportunity to get computer experience.

15. Strategic research

The IRC is today strictly an applied IRSI, catering for immediate needs. It does not have advance research, it does not apply very advanced skills. (It routinely used some modern and sophisticated equipment, but only for practical purposes).

In more advanced countries (and countries with high ambitions) more basic and future-oriented research is carried out than at the IRC at present. The objectives may vary from case to case, but the most relevant objectives are:

- They prepare to meet future needs, by training people in new technologies and disciplines of relevance to future industry
- Such work can attract highly qualified staff. Post graduate students can often do the work, and after graduation they may become IRC staff members. This is a well-proven method of recruitment. With the modern facilities of the new IRC it should be possible to attract qualified people easily.
- In more advanced IRSI's such research occasionally results in inventions, which can be exploited. In Libya for some time to come, such results are unlikely, and should not have any weight as justification of strategic research, but in due course it should happen.

Selection of advanced activities must be based on a thorough analysis of technologies which can be expected to be introduced in Libya over the next five to ten years and may need IRC assistance. Also, the opportunity to have a very qualified man can give the push to start a new activity. Some advanced fields are suggested below:

- Micro-computer design and application
- Telecommunications
- Creation of computer software
- Bio engineering (other than fermentation)
- Cybernetics
- Composit materials based on carbon and other super fibres.

Some rich developing countries in South America have successfully ventured into advanced-strategic-research.

16. Delegation of authority

In modern developed countries, in industry and research, the power to decide is widely delegated. Only very important matters need the Director General's signature (see his job description in the SWECO report Organizational Manual, pages 1 to 4). Authority should be delegated to various people, for example, purchases within the budget, with purchases beyond a defined limit needing the approval of the Section Heads.

Governmental procedures are in most countries more conservative, bureaucratic and inefficient than in private industry. The most important progress in industry and government has been more delegation of authority. The advantages are:

- much time is saved by eliminating procedural steps and bottlenecks
- staff show more initiative
- each individual feels more important, is happier and more motivated to do his/her best
- people mature faster
- the system will be more effective

The IRC should consider gradually delegating more and more authority to its employees. If people have to go through a whole ordeal to get small things which they need, initiative will soon disappear, work output diminishes and frustration and passivity set in.

Another trend in modern administrations is to be less hierarchical - a flatter pyramid, direct access to managers beyond one's nearest supervisor. Various mechanisms to achieve this are in use. This access to the top also stimulates initiative and happiness and reduces the ill-effect of less adequate officers in the middle management. It gives the top management direct contact with the "grass roots" and better understanding of problems affecting efficiency and well-being.

17. Training School

Introduction

Most of the new staff are fresh graduates. Some of the experts claim that they are lacking in basic knowledge or practical skills (the UNIDO Consultant did not have enough time at his disposal to form a proper opinion). Certainly they cannot be expected to have the more specific knowledge and skills which the IRC needs without training. Counterpart training has proven to be not very efficient. Not all experts are good teachers. Experts can be used to more advantage teaching advanced skills rather than basic ones. A training school for IRC staff, possibly open for people from industry may be the answer.

Possible modes of operation

There would be class room teaching, lab sessions in the school and on the various IRC instruments. There would be home work, class quizzes, examinations and diplomas qualifying for promotion or fellowships. Some may fail and have to leave the IRC or take less demanding jobs. One or a couple of professional full-time teachers would prepare a compendium and teach basic science and technology. Experts, IRC staff and guest lecturers would also give lectures or special courses.

The staff attending the school should work at least 50% for the IRC according to their skills and qualifications. They may attend classes 2 hours a day or so, some times the whole day if that is desirable. Homework and perhaps one hour of class work should be after work hours to prove the sincerity of the students. There should be incentives for good progress like: salary rise, more prestige, more interesting work, promotion, study trips abroad or fellowships to take a Master degree abroad.

Students who are unfit or lazy should get a warning and if sufficient performance improvement does not come, they will be dismissed from the school, possibly from the IRC. All books and needed aids like calculators, paper etc., should be free and the property of the students who pass examinations successfully.

Preparatory work

An expert, a national person or a consulting firm should plan the school carefully in consultation with experts, national and expatriate IRC staff and the university in Tripoli. The subjects to be taught could be:

- Mathematics
- Chemistry
- Physical chemistry
- Industrial safety
- Measurements
- Use of Library
- Laboratory techniques
- Industrial economics
- English; technical language
- Arabic

Flexibility and human considerations must always be observed, undue strain on the students must be avoided. It should be an honour to be accepted as a student, and it should be perfectly voluntary. Personal ambition and the incentives offered should motivate the students. The scope of the school needs to be determined.

18. IRC's legal status

The IRC is now under Government regulations. It is beyond the Consultant's terms of reference as well as knowledge to have any opinion on government procedures for government offices, but he knows how important it is to limit "red tape" in an IRSI. In most developing countries it has been found that unless the IRSI is given a type of autonomy which allows action without having to follow complicated, time consuming and embracing procedures, the Institute cannot function properly. People trained abroad have become used to being able to take initiative and get things done. They will quickly become "de-trained" if their hands are tied or it is too troublesome to act.

In a library in a developed country, the staff will have a Xerox machine right there and can produce photocopies for the users without any red tape. They will order reprints, books etc. to satisfy needs and can do that on their own, limited only by the budget if the cost cannot be charged to a project. If more expensive books are wanted, it may have to be decided by a Library Committee. They can, of course, use telex, computer search or data bases abroad when needed. Similarly a need for certain chemicals, spare-parts or components, needs which cannot be foreseen arise more often in an IRC than in most other institutions. Unless the IRC had a method of direct import with a minimum of red tape, the performance will suffer. Without this facility, much foreign exchange must be wasted in buying excessively large stocks of things which may never be used. Exaggerated control of expenditures is highly counter-productive.

The UNIDO Consultant was only in Libya for three weeks, but strongly believes that the money invested in the IRC will only result in a corresponding benefit if the IRC can be allowed to have a modern management. The IRC shall give management advice to industry, but if IRC itself does not have modern management, how can it advise others?

It should sincerely be considered how IRC can best achieve the needed internal autonomy and streamlining of administrative procedures. A budget protected against sudden reductions is essential. When the IRC a few years ago partly lost its internal autonomy and had its budget reduced, it had a crippling effect. Considering the investment of US\$ sixty million in the new IRC, consistent follow-up is necessary, otherwise the expected benefit is in jeopardy.

19. IRC Information services

Article 3 of Law No. 25 of 1970 says in its first paragraph of IRC duties:

- 1) Provision of information, technical references, data and guide books, answering queries, publishing technical extracts which cover the references available and give a periodic summary of recent data.

The IRC has a reasonably good Library organized by a UNIDO expert. Literature services can be given ad hoc by IRC professionals in various fields. A United Nations Information Specialist was at the IRC for two years until May 1980. His terminal report reflects excellent knowledge and work. He has described what this service should be, prepared manuals etc. and recommended training of nationals, identified and recommended expatriates to fill the gaps. He has prepared lists of all needs. His recommendations have not been followed up by the IRC as yet.

He says: "However, a revision of financial and personnel policies, administrative procedures and office routines, will be necessary for continued progress". Such revisions have not been made. His recommendations have not been followed and his effort has, by and large, been of little use to the IRC. At present, there is no trained Librarian who can catalogue books. Two people were trained for this job and did not return, two are said to be in the USA on training, but, if and when, they come back to the IRC is not known.

It is highly recommended that Library and Technical Information (Documentation) is given the highest possible priority as an IRSI, in which these two functions are not up to par, cannot function. It will fail to give its clients one of the most important services of all. It is for very good reason that Technical Information tops the list of IRC activities. It is a basic IRSI need. If not taken proper care of, the IRC is in jeopardy. The reports of L.G. Lingqvist should be studied and his recommendations implemented.

20. More effective use of academic staff

Academically trained nationals are a scarce resource in Libya and should therefore be used in the most cost effective manner possible. This is not the case at present in the IRC, where the majority of the staff in the laboratories only do routine work, which can easily be done by technicians or even laboratory aids to be trained at the IRC having no formal training. Some university graduates can be expected to be fit only for routine work and should not be promoted, but the goal must be to develop all staff members, academics as well as non-academics to the limit of the ability. But, unless they reach a stage of continuous self-development, they are not suitable for IRSI work on a professional level.

The means of achieving this are the proposed staff development scheme and the training school and proper use of UNIDO experts to produce senior staff, not technicians.

In addition to giving the professionals technician support, their efficiency can also be increased by giving them better secretariat, typing, messenger, library and other services.

21. IRC Development Plan based on experts reports

The Consultant has studied some of the expert's reports, mainly terminal reports, containing reference to special reports and studies. As the IRC now moves into its new buildings and receives much better facilities and shall triple its staff, a development plan is needed. The reports of the various experts contain hundreds of excellent and relevant recommendations. The IRC Planning Committee, which might be established, should make plans for systematic implementation of these recommendations. It is now more important to implement the existing recommendations than to produce more reports.

22. Modern project management should be introduced

Project management requires certain forms to be produced for each project studies:

- project planning form: name of project, sponsor, resources needed, reporting schedule, cost, termination deadline etc.
- project termination forms
- report front page with key information such as abstract, keywords, sponsor contacts etc.
- project cost accounting based on manhours and other expenses
- progress reports

A project management system of the nature suggested secures cost-effective use of resources and good control and tidyness. If the IRC, as is the intention, has a co-operation/assistance contract with, for example, Battelle, they can assist in introducing the system.

23. Key words, instead of old-fashioned international decimal classification

Books are in larger libraries classified and catalogued according to international decimal classification. Classification of technical books and information according to this system is very demanding and few people learn how to use it. A much simpler and more useful system is based on Key Words. Each book or document or report is characterised by four or more key words typical of its content.

Keywords may be chosen by a librarian or a documentalist, but a better system is to let those who are familiar with the topic, research staff, do it. There should be catalogues with file cards or two or three kinds, for instance:

- Title and publisher, number of pages and key words
- Author, with reference to title
- Publication number given to each document, with reference to title.

The key word and catalogue information are stored in a computer. When a book on a subject is wanted, one or more keywords are fed into the computer on a terminal and information of existing documents come up on the computer screen. The same system is used for computer (on-line) literature and information searches.

Key words should preferably be picked from a thesaurus (a key word dictionary). The software can be purchased, for instance the Norwegian system POLIDOC. It automatically alphabetizes the keywords, authors and titles and can produce computer printouts.

24. Computers are a powerful management tool which the IRC should use

All modern IRSI's also in many developing countries make extensive use of computers in their management. The IRC needs to do the same, particularly as it expands and introduces better management procedures.

Computers can be used for such things as:

- staff salaries, leave and sick leave registration
- processing of timesheets
- project cost accounting
- inventory

The computers are reliable, inexpensive and their use is so simple that any clerk can learn to use it. The necessary software can be obtained from many sources such as other IRSI's like Battelle, TNO and are very cost-effective.

25. Staff Development Plan

A development plan for each staff member should be worked out in co-operation with the staff member. Once a year he should have a consultative conference with his superior. Progress and shortcomings should be recorded. His needs and wishes for future training should be specified and implemented. The proposed training school can provide much of the training needs identified. Further means of training are study trips, fellowship training, formal training in Libya and abroad to mention some possibilities which might give supplementary training to that given by experts and qualified expatriates.

An incentive will be a promotion scheme involving certain titles such as:

- Assistant (fresh graduates)
- Junior Scientists
- Senior Scientists
- Consultant 1,2,3 or similar

Such promotion should result in higher prestige, better salary and more authority.

Without such incentives and systematic training, few staff members will achieve satisfactory development. Under the present system people who have received training are quickly "detrained". Another shortcoming today is that people are sent on training for which they are not qualified or motivated and the fellowship is a waste.

27. Feedback and the Department of Light Industries

In too many cases, the IRC and the experts get no feedback from the Department and do not know if their recommendations have been properly received, studied and understood, and if they have or will be implemented. This is highly counter-productive. It has also been complained that the necessary information for proper execution has been a constraint.

The Consultant has had no opportunity to find out how the Department uses all the valuable information produced by the IRC. It is the Consultant's experience that all developing countries and also many developed countries, lack the machinery to use the IRSI results to the best advantage. UNIDO assistance to the Department may be a way to improve the situation.



