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# INDUSTRIAL RESEARCH CENTRE

DP/LIB/69/512

## LIBYAN ARAB REPUBLIC

TERMINAL REPORT

Prepared for the Government of the Libyan Arab Republic by the
United Nations Industrial Development Organization,
executing agency for the
United Nations Development Programme

United Nations Industrial Development Organization

id.77-169

United Nations Development Programme

# INDUSTRIAL RESEARCH CENTRE
# DP/LIB/69/512
# LIBYAN ARAB REPUBLIC

## Project findings and recommendations

Prepared for the Government of the Libyan Arab Republic
by the United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

Based on the work of T.G.H. Hillesley, Acting Project Co-ordinator

United Nations Industrial Development Organization

Vienna, 1977

## Explanatory notes

References to "dollars" ($) indicates United States dollars, unless otherwise stated.

The monetary unit in the Libyan Arab Republic is the Libyan dinar (LD). During the first year covered by this report (1972), the mean value of the unit in relation to the dollar was $1 = LD 0.326. During the remainder of the period covered, the value was constant at $1 = LD 0.296.

Besides the common abbreviations, symbols and terms the following have been used in this report:

| | |
|---|---|
| m/m | man-months |
| IRC | Industrial Research Centre |

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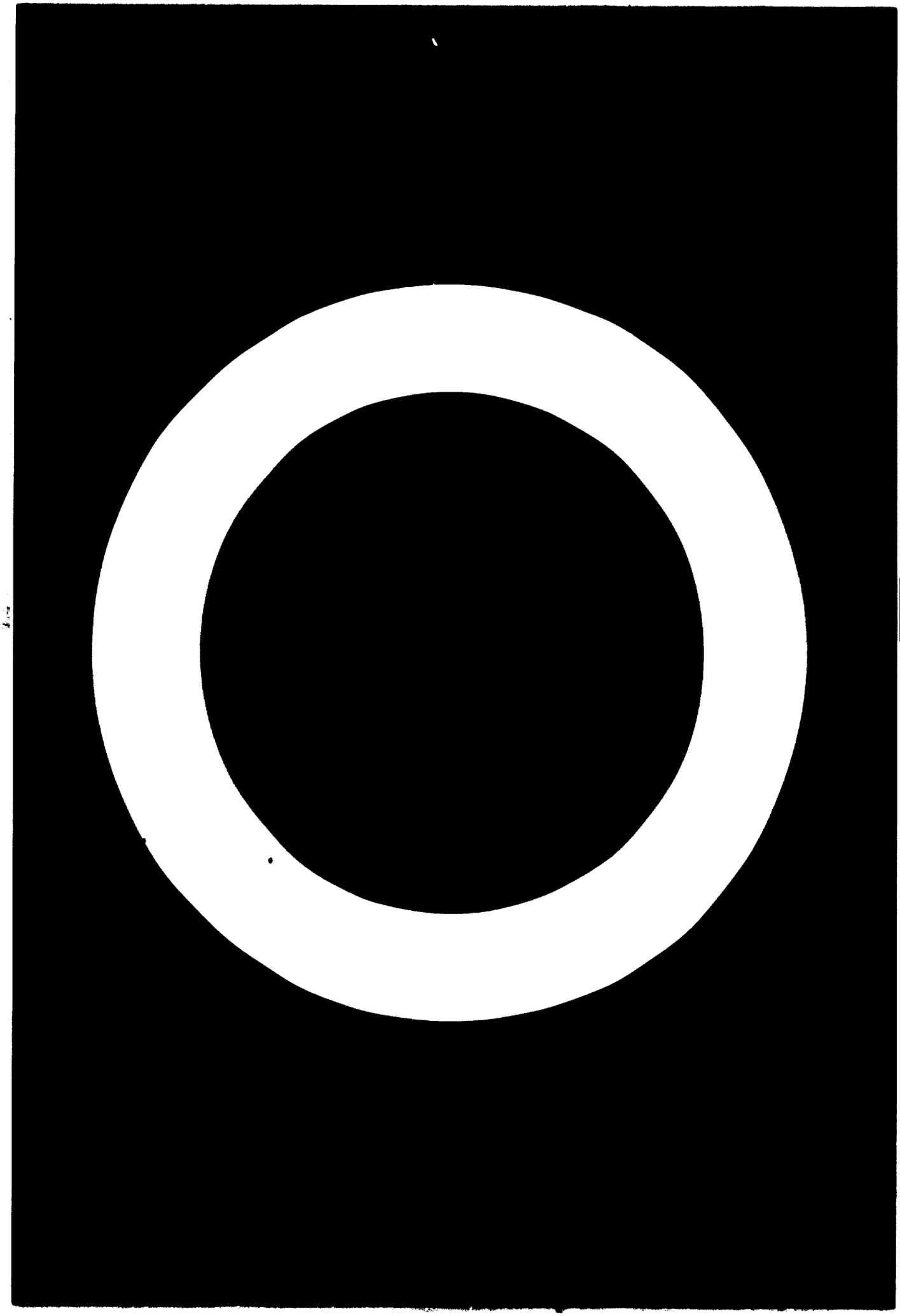
## ABSTRACT

The United Nations Development Programme (UNDP) project "Industrial Research Centre" (DP/LIB/69/512), was established in 1972, with the United Nations Industrial Development Organization (UNIDO) as executing agency, to give assistance to the Industrial Research Centre (IRC), a unit that had just been created within the Ministry of Industry of the Libyan Arab Republic to provide technical, economic and management consultancy services to Libyan industry. By the time the project came to an end at the end of 1976, UNDP had provided 226 man-months of experts' time and 72 man-months of fellowship training. The Government's contribution consisted of the land, buildings and equipment, the time of the IRC staff and 445 man-months of fellowship training.

During the project, the Economics Section of IRC carried out two comprehensive industrial development planning studies, many feasibility studies (including one on an iron and steel industry project that began to be carried out in 1976), and devised a programme for improving efficiency in the dairy industry. The Laboratory and Technical Studies Section made chemical analyses of geological samples and of samples of industrial raw materials and gave advice on quality control. The Building Materials Research Unit completed studies on cement, bricks and concrete and published literature on various building materials.

Because of financial problems, not all the objectives in the Plan of Operation were achieved. Moreover, although the quality of the work was high, the shortage of qualified staff limited, and will continue to limit, the quantity of work done. Therefore, it is recommended that the project be extended into a second phase so as to strengthen IRC as the main instrument of industrial development in the Libyan Arab Republic.



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# INTRODUCTION

## Background

During the 1950s and 1960s the Libyan Arab Republic passed from being one of the poorest countries in the world to an oil-rich country with one of the highest *per capita* incomes among the developing countries. There was, however, a necessity to broaden the base of the economy away from the almost complete dependence on oil. The 1970s have therefore foreseen large investments in all sectors of the economy, with a growing share being allocated to industrialization. In the 1976-1980 Development Plan, LD 1,100,000,000 was allocated to this sector, of which LD 14,150,000 was for industrial research alone.

As part of the preparation for these developments, three organizations were created in November 1970 within the Ministry of Industry:

(a) The Industrial Research Centre (IRC), to render technioal and economic services to industry, whether public or private, in the areas of investment, increasing the quality and quantity of production etc.;

(b) The General National Organization for Industry (GNOI), with prime responsibility for the implementation of industrial projects and operation of public enterprises;

(c) The Industrial and Real Estate Bank, to complement investment in public enterprises from the development budget by providing financial facilities for investment by the private sector and for joint ventures of the Government.

The Industrial Research Centre was charged with certain responsibilities for helping the country meet its industrialization targets:

(a) Industrial techno-economic feasibility and market studies and sectoral and subsectoral planning activities on behalf of the Ministry of Industry or other government organizations;

(b) Technological research and development and technologioal consultancy services to industry and government bodies;

(c) Administrative and management consultancy services to industry and at times also to government organizations.

The full objectives, as specified by the law of 1970 that created the Centre as a legal entity, are listed in annex I.

## Establishment of the projeot

In 1969, the Government, foreseeing the need for expert help in developing the Centre, requested the assistance of United Nations Development Programme (UNDP), which subsequently established the projeot "Industrial Researoh Center"

(DP/LIB/69/512). The United Nations Industrial Development Organization (UNIDO) was designated as the executing agency. The Plan of Operations, defining the objectives, obligations and inputs, was not signed until 31 January 1972, although the project manager had been at the project site since 4 September 1971.

## Project objectives

The purpose of the project was to assist the Government in the development of the Libyan economy through industrial research to be undertaken by the Industrial Research Centre in various fields.

The Centre will be the main instrument for the implementation of the Industrial Development Plan. It will provide technical know-how to all agencies concerned with public and private industry to increase the exploitation of the industrial potential of the country and improve the quality of locally manufactured products.

In the course of the project, the Centre will be strengthened to enable it to undertake inter alia the following activities:

(a) Provide technical services to industry, such as:

(i) Collection and dissemination of technical information, including technical inquiry services;

(ii) Organization and implementation of quality control programmes at the plant level;

(iii) Physical measurements and chemical and materials testing, as well as the analysis of industrial raw materials and products;

(iv) Socio-economic and techno-economic feasibility studies, including market surveys to identify feasible industrial projects and project evaluations;

(v) Engineering and management services for the organization and planning of production plants, including cost accounting systems;

(vi) Troubleshooting to identify various industrial problems at the factory level and prescription of remedies for them;

(b) Advise the Government and act as its technical arm on industrial standardization programmes, including preparation and implementation of national standards, quality control and all technical work related to it;

(c) Undertake applied research programmes related to industrial operations in the country. It is expected that such programmes will lead to the development of new products, the improvement of existing operations and the introduction of production methods that will optimize the utilization of local raw materials and mineral resources;

(d) Undertake geological research and exploration of the mineral resources of the country to determine whether new industries can be based on them;

(e) Training of local personnel in the above-mentioned fields through fellowships and on-the-job training.

## Project inputs

The Plan of Operation called for a total UNDP contribution of $880,200, mostly for 294 man-months (m/m) of experts' time and 144 m/m of fellowships. Actual spending fell considerably short of that amount, as will be explained in the next chapter.

The government input, on the other hand, was finally in excess of the plan, which was for 3,756 m/m of IRC staff time and $4.2 million in land, buildings, equipment, training and local costs.

# I. FINDINGS

## General

Progress was slower than expected at first because of delays in appointing the experts. Only one expert (the project manager) was at the site in the first year, and that for only eight months. However, once the problems were overcome, the project soon began to show its effectiveness in the undertaking of some major studies, as well as many minor ones.

The culminating year was supposed to have been 1976, during which 100 m/m of experts' time were planned. Unfortunately, a severe curtailment was made necessary because UNDP could not make its full planned contribution. The Government voluntarily agreed to pay the cost of all experts already on the project ($187,720 for 49.4 m/m), and the project was able to continue in reduced form. The UNDP contributions are summarized in table 1.

Table 1. Planned and actual UNDP contributions

| Expense | Planned | | Actual[a] | |
|---|---|---|---|---|
| | (m/m) | (US dollars) | (m/m) | (US dollars) |
| Experts | 294 | 678 650 | 176.5 | 495 950 |
| | | | (49.4)[b] | (187 720)[b] |
| Fellowships | 144 | 69 000 | 72 | 59 217 |
| Other | | 131 950[c] | | 110 080[d] |
| Total | | 880 200 | | 665 247 |

a/ Projected to end 1976.

b/ Voluntary contribution of Government. Not included in total.

c/ Including $87,000 for agency overhead.

d/ Excluding agency overhead.

The main reasons for the differences between the planned and actual expenditures were the UNDP financial crisis and inflation.

There were some changes in the distribution of the expert posts caused by changing requirements, but, apart from the cancellation of the post of standardization specialist changes were mainly in titles rather than functions (see table 2).

Table 2. Planned and actual expert post distribution
(Man-months)

| Job or specialty | Planned | Actual a/ |
|---|---|---|
| Project manager | 48 | 8.0 |
| Industrial cost accountant | 36 | 44.5 |
| Food processing | 36 | 36.0 |
| Materials testing | 18 | - |
| Laboratory research specialist | 36 | 12.0 |
| Instrumentation analyst | 18 | 12.0 |
| Standardization specialist | 24 | - |
| Industrial economist | 48 | 38.0 |
| Short-term consultant | 30 | 25.9 |
| Building materials | - | 22.7 |
| Laboratory and process research | - | 12.0 |
| Instrumental and chemical analysis | - | 14.8 |
| Total | 294 | 225.9 b/ |

a/ Projected to end 1976.

b/ Including 49.4 m/m paid for by the Government.

A later decision to retain a technical information and documentation expert was cancelled owing to lack of funds.

In all, UNIDO provided 16 experts and 6 fellowships. The names of the experts and fellows, their specialties and their times of service are in annexes II and III. A list of reports prepared by the experts is in annex IV.

Table 3 summarizes the planned and actual contributions of the Government.

Table 3. Planned and actual government contributions

| Item | Planned | Actual a/ |
|---|---|---|
| Professional counterpart staff (m/m) | 2 304 | 2 364 |
| Support staff (m/m) | 1 452 | 3 306 |
| Land, buildings and equipment | $3 718 000 | $3 846 000 |
| Training and local costs | $480 000 | $1 100 000 |

a/ Projected to end 1976.

All the government inputs were in excess of the plan. The actual figure for land, buildings and equipment does not include the new Centre buildings, which are in an advanced state of planning.

Annex V lists the 27 fellowships, amounting to 445 m/m, provided by the Government. Of the 106 Libyan staff members of IRC, 43 are professionals. Their names are listed in annex VI. The 31 foreign staff members employed at IRC are listed in annex VII.

## Physical facilities

### Buildings and equipment

The buildings and equipment were all supplied by the Government (with the exception of one motor car) and were in excess of that required by the Plan of Operation. Plans are well advanced for new buildings, and it is anticipated that by the end of 1976 requests for tenders for construction will have been issued. The present buildings, which offer office and laboratory space of approximately 1,700 $m^2$, have been adequate for all purposes, but will not permit sufficient expansion for the future. The new buildings, which will cover 29,000 $m^2$, will provide all foreseeable needs for expansion for at least 10 years. The estimated cost of the buildings alone will be in excess of $10 million.

The present buildings include laboratories for testing building materials, paints and textiles; for analysis of rocks and minerals and of food; and for instrumental, microbiological and general chemical analysis. It is hoped to establish in the near future a small workshop for servicing of electronic and other equipment.

The equipment is adequate for the work being carried out, but here again, space is a limiting factor for the installation of any additional major items. There is equipment for testing of engineering properties of materials, physical testing of raw materials and products, physical testing of fibres and ready-made materials (elongation, weather resistance) and microscopic examination. Analytical instruments include an atomic absorption spectrophotometer, flame photometer and infrared spectrophotometer; a refractometer and an ultraviolet spectrophotometer are on order. Electronic servicing equipment includes an oscilloscope, an oscillator, digital meters and power supplies, enabling all equipment to be maintained to the desired standards.

The library has 4,000 books covering a wide variety of technical subjects and subscribes to 150 periodicals. In addition, there are a collection of relevant government, UNIDO, Food and Agriculture Organization of the United Nations (FAO) and International Labour Organisation (ILO) publications; copies of studie carried out by IRC and other agencies; and sets of the American Scciety for Testing and Materials (ASTM), British and Egyptian standards. All the experts made recommendations for additions to the library. Space is allocated for reading and study, and all the facilities are available to the public.

## Fellowships and training

Five counterparts have completed UNIDO fellowships of 12 months each and a sixth will complete his in March 1977. The number of man-months completed (72) was only half that allowed for in the Plan of Operation (144), largely because of increased costs. On the other hand, the number of fellowships provided by the Government (27) was greater than planned.

Although some experts have given lectures, the concentration has been on on-the-job training through the multidisciplinary committees described in the next section.

## Methodology of work

A large proportion of work in IRC is conducted through the medium of multidisciplinary committees. Each committee consists of Libyan staff members (one of whom acts as chairman) and UNIDO and other experts. Different disciplines are represented depending on the nature of the project. As an example, projects for new industries usually, but not always, follow this procedure:

(a) A committee is appointed;

(b) A pre-feasibility study is carried out entirely by the IRC staff;

(c) The requirements and limits of a full feasibility study to be carried out by consultants are defined;

(d) The full feasibility study is carried out. (At first, participation of the Centre was limited to a stage-by-stage evaluation of the study as it progressed. Now counterparts are increasingly involved in the preparation of the study in conjunction with the consultants. Eventually, when it is thought that counterparts have acquired enough experience, the work of the consultants will be further limited to specialized technical aspects.);

(e) Recommendations are made, based on the final evaluation of the study;

(f) The project is implemented through the IRC sister organization, the General National Organization for Industry.

The system is an effective training medium, since it involves the counterpart at all stages.

## Activities

The activities of the project can be categorized under the three sections of the Techno-Economic Department, namely, the Economics Section, the Laboratory and Technical Studies Section, and the Building Materials Research Unit. It should be remembered, however, that because of the team-work approach members of all sections could be participating in one project.

It has been decided to divide the Laboratory and Technical Studies Section into two separate sections, the Laboratory Section, which will be responsible for all laboratory operations, and the Technical Studies Section, responsible for the technical aspects of feasibility studies, pilot plant and workshops and advice on technical problems to industry. However, for the purpose of analysis of past activities, the categorization by the three previously mentioned sections will be more convenient.

### Economics Section

Work in the Economics Section can be considered under three broad headings:

(a) Industrial development planning. It was clearly stated in the objectives that the Centre would be the main instrument for the implementation of the Industrial Development Plan. In this connexion, the Centre completed an industrially oriented economic survey of the country, covering macroaspects, subsectoral studies and development prospects to 1985. That was followed by a study of the industrial planning perspectives for the period 1976-1980. Preliminary studies are already in progress on regional industrial planning, a subject that will receive some emphasis in any subsequent project of assistance to IRC;

(b) Feasibility studies and project evaluations. A number of major studies and many minor ones have been carried out. Among the major studies completed and now in the implementation stage are an iron and steel industry initially for 500,000 tons of steel per year up to 5 million tons in the second stage, a foundry-forge project and a flat-glass factory;

(c) Services to industry. The Centre's activities in this field during the early life of the project tended to play a secondary role in view of the priorities placed on investment studies, but the contribution during 1976

expanded considerably. For example, accounting and costing systems for cement, lime building materials, and grain and fodder mills are in the process of design and installation. A large programme has been devised for improvement of efficiency in various subsectors of industry, beginning with the dairy industry, the study of which, covering all aspects, milking, collection, quality control, hygiene and delivery, has been completed.

Laboratory and Technical Studies Section

The activities of the Laboratory and Technical Studies Section have ranged widely, covering analysis of rocks and minerals for geological survey, analysis of raw materials for suitability for industry, co-operation with the Agriculture, Petroleum and University Research Centres on examination of samples and instructing their personnel in the selection, operation and maintenance of analytical instruments. Other activities include: repair of instruments at the factory level; monitoring of quality and condition of imported and locally manufactured goods; investigation of new products; advice on quality control; advice on use of waste products.

Building Materials Research Unit

The Building Materials Research Unit has been of considerable importance because of the large amount of construction taking place in the country and the rapid rate of development of the building materials subsector of industry. Studies have been completed in the use and potential production of types of cement other than normal Portland cement. Technical studies have been carried out on the possible production of sand-lime bricks and cellular concrete, and production of these materials is now at the pilot-plant stage. Further studies are in progress on lightweight aggregates, gypsum and gypsum products, and the uses of phospho-gypsum. Tests were carried out on cement for cement and cement-asbestos factories, and advice was given on the raw materials and processes of two clay-brick manufacturers. The section has also produced a series of booklets on various building materials.

Co-operation with the Geological and Mining Research Department

Although the Geological and Mining Research Department is an integral part of IRC, no experts for that department were requested or provided. However, there has been much valuable co-operation between it and the Techno-Economic Department, particularly in the evaluation of the Wadi Shatti iron ore deposit, the ore-carrying railway and the iron and steel complex mentioned above.

## General evaluation

Substantial progress has been made through the present project, and the Centre is now a viable enterprise. However, it cannot be said that all the objectives laid down by the Plan of Operation have been fully achieved. The reasons are:

(a) Rising costs for both experts and fellowships have meant that the number of man-months orginally planned could not be delivered;

(b) The financial crisis at UNDP resulted in a loss of man-months of experts' time.

(c) Reorientation of objectives in the light of prevailing circumstances resulted in certain of them, e.g., services to industry, not achieving the emphasis envisaged.

The quality of the work was very high compared with that of similar institutions in other developing countries. However, in common with those countries, the Libyan Arab Republic has a shortage of qualified and experienced staff that will limit the quantity of output for some time to come.

## II. RECOMMENDATIONS

To consolidate the progress made, expand the services to industry, and give the Centre a balanced approach to techno-economic services, goals considered essential in view of the extensive industrial plans of the Government for the present plan period (1976-1980), amounting to approximately LD 1.1 billion for industry as a whole and LD 14,150,000 for industrial research alone, it is recommended that the project be extended into a second phase as a logical continuation of the first.

A serious problem of the Government at the present time in realizing its development plans and in carrying out all the associated and required administrative and substantive work is the shortage of qualified staff available to its institutions; IRC is no exception. To enable IRC to carry out its functions, further strengthen it and improve the skills of its staff will require the assistance of experts. The second-phase project should provide that assistance, with the general goal of strengthening and broadening the capabilities of IRC in the following areas:

Techno-economic studies
Feasibility studies
Sectoral and subsectoral industrial planning
Techno-economic planning services
Technological research and development
Technical consultancy services
Industrial administration and management consultancy services

During the life of the project, the Libyan Arab Republic was engaged in a vast investment programme covering all sections of the economy. The rapid rate of increase in investment in industry meant that projects under study, being planned and in course of execution represented investments many times greater than that of existing industry. IRC therefore naturally directed its limited resources towards projects of greater magnitude and applied more emphasis to studies of investment rather than of existing industries. As the new projects come into operation, the emphasis will shift as the needs of industry become apparent. (In fact, it is already shifting.) Nevertheless, the pace of investment continues to increase and a constant watch should be kept to ensure that progress already made in this field is consolidated.

## Annex I

## EXTRACT FROM LAW NO. 25 OF 1970 ESTABLISHING THE INDUSTRIAL RESEARCH CENTRE

Article 3

The Centre shall be concerned with promoting the national economy of the Libyan Arab Republic with respect to all the industrial research aspects, and it shall be regarded the key organ as to the implementation of the Development Plan in this field through rendering the technical and economic services to the agencies engaged in industry whether these be governmental or private ones in the areas of investment, raising of production quantitatively as well as qualitatively, raising production sufficiency and provision of expertise and advice to the effect of aohieving the Industrial Development objectives.

The Centre shall particularly undertake the following functions:

First: To carry out the technical and economic studies, the most significant of which are:

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

2) Studies pertaining to marketing and which include the technological, economic and social aspects.

3) Feasibility studies related to the industrial enterprises whether such studies are required for the public or for the private sector.

4) Studies related to organization and planning, such as the organizational structure, the employment procedures, selection of site, factory design, laying down the production plan and handling the raw materials and cost account.

5) Studies connected with the raising of the production sufficiency whether they be technological, economic, social or physiological.

6) Drawing up the specifications and standards in respect of the raw materials and the industrial products in preparation for their being approved and legally issued by the appropriate agencies.

7) Studies related to means and methods of the product quality control, organization of equipment and oonduct of the comparative tests thereon, solving problems and overcoming the bottle-necks.

**Seoond:** To carry out analysis and tests whether these be ordinary or specific ones which cannot be carried out by the laboratories of the producing units, the application of the provisions related to the production quality, and its conformity to specifications whether such measure is adopted upon a special request or as arbitration to be conducted between disputing parties.

**Third:** To carry out the applied researches and the industrial tests connneoted with the new products or with the development of the existing ones or adapt the processes and methods of production to the local conditions or to utilize the local raw materials or to reduoe the production costs.

**Fourth:** To undertake the geological research work as well as the exploration for the mineral and petrological materials so as to determine their nature, sites, the paths leading thereto as well as the economies of their extraction, transport and utilization.

**Fifth:** To take over the training of its human elements in the field of the studies and researohes relevant to its objeotives.

## Annex II

### UNIDO EXPERTS

| Name | Job or specialty | Nationality | From | To |
|---|---|---|---|---|
| A. Alic | Project manager | Yugoslavia | Aug. 1971 | Mar. 1972 |
| T.G.H. Hillesley | Industrial cost accountant | United Kingdom | Apr. 1973 | Dec. 1976 |
| W.F. Kohl | Food processing | United States | Sept. 1972 | Sept. 1974 |
| H.A.L. Morris | Food processing | New Zealand | Feb. 1975 | Feb. 1976 |
| S. Wilska | Laboratory research | Finland | Oct. 1972 | Oct. 1973 |
| R.R. Vierhout | Instrumentation analyst | Netherlands | Oct. 1972 | Oct. 1973 |
| V. Vardjan | Industrial economist | Yugoslavia | Jan. 1972 | Mar. 1976 |
| K.P. Kacker | Building materials | India | Feb. 1975 | Dec. 1976 |
| B.C. Sinka | Laboratory and process research | India | Sept. 1975 | Sept. 1976 |
| Z.L. Halmos | Instrumental and chemical analysis | Hungary | Oct. 1975 | Dec. 1976 |
| P.L. Brandt | Pesticides | United States | Apr. 1973 | Sept. 1973 |
| C.H. Maltby | Pesticides marketing | United Kingdom | Aug. 1974 | Oct. 1974 |
| S.A. Qureshi | Pesticides manufacturing | Pakistan | Oct. 1974 | Jan. 1975 |
| N.V.R. Iyengar | Packaging | India | Sept. 1974 | Jan. 1975 |
| M.V. Divatia | Industrial surveys | India | Sept. 1974 | Mar. 1975 |
| S.A. Hjerdin | Iron and steel | Sweden | Oct. 1974 | Jan. 1975 |

## Annex III

## FELLOWSHIPS AWARDED BY UNIDO

| Name of fellow | Field of study | Place of study | From | To |
|---|---|---|---|---|
| Abdulsalam Kashem | Food processing | United Kingdom | Sept. 1973 | Sept. 1974 |
| Abdulrazag Ben Youssef | Food bacteriology | United Kingdom | Aug. 1974 | Aug. 1975 |
| Mohammed Zindah | Chemical analysis | United Kingdom | Sept. 1974 | Sept. 1975 |
| Hamsa Mabruk | Mining and prospecting | United States | Mar. 1975 | Mar. 1976 |
| Shoib Idris El Shalwi | Industrial economics | United States | July 1975 | July 1976 |
| Izzeldin El Hakemi | Economics | United States | Mar. 1976 | Mar. 1977 |

## Annex IV

LIST OF REPORTS PREPARED BY EXPERTS

Alic, V. Report for the period from 1 September 1971 - 12 April 1972.

Divatia, M. V. Industrial survey. Feoruary 1975.

Iyengar, N. V. R. Technical report: packaging. United Nations Industrial Development Organization. 12 May 1975. (DP/ID/SER.A/1)

Kacker, K. P. Studies of bricks at the Industrial National Company (ZANZOUR). July 1975.

Keshem, A. and W. F. Kohl. Utilization of date syrup in biscuits. February 1973.

Kohl, W. F. Food processing. July 1974.

Maltby, C. and S. A. Qureshi. Technical report: I. Domestic market analysis; II. Export potentials; III. Pesticide manufacture. United Nations Industrial Development Organization. 3 June 1975. (DP/ID/SER.A/7)

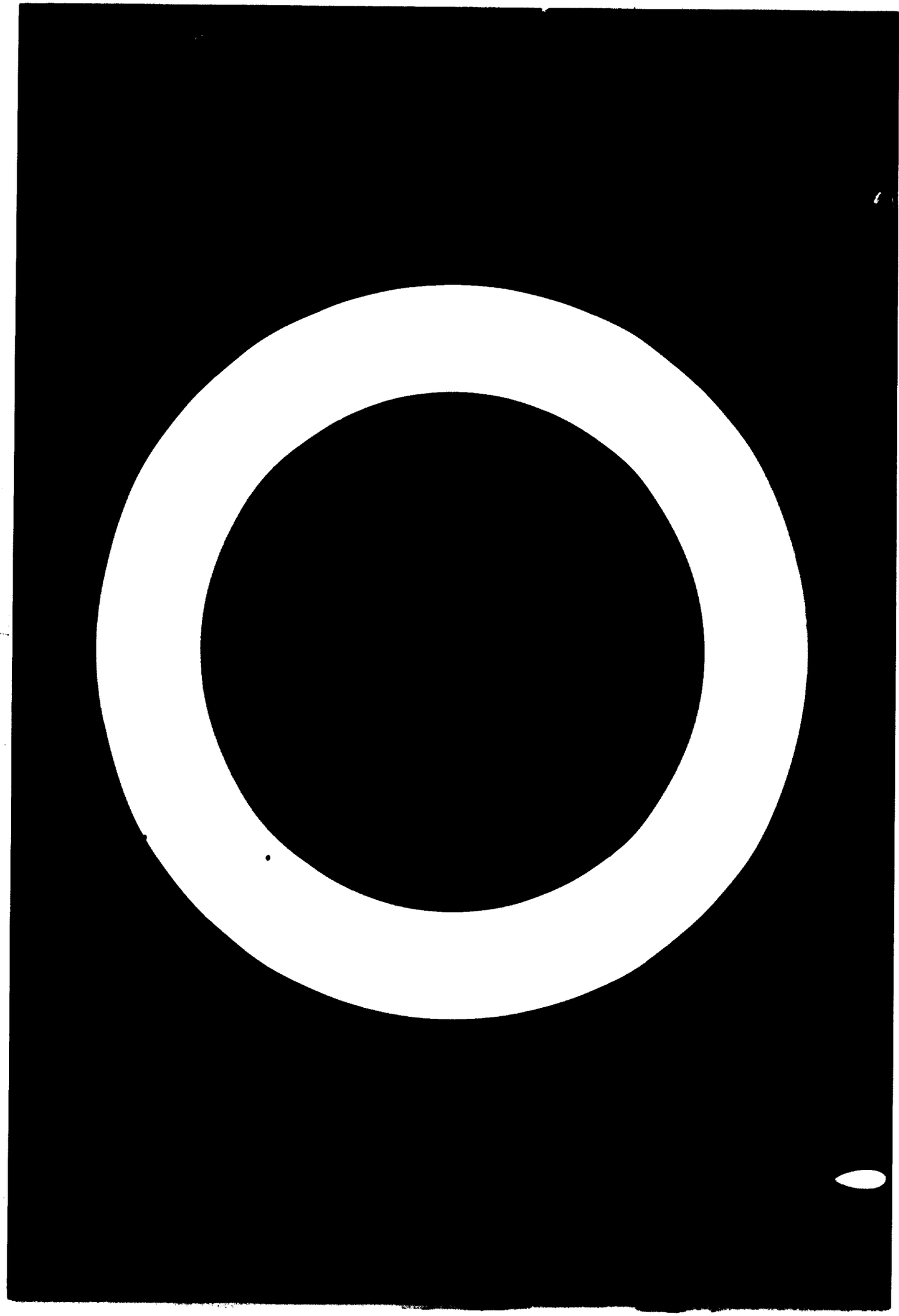
Morris, H. A. L. Food processing. March 1976.

Sinka, B. C. Laboratory and process research. August 1976.

Vardjan, V. Industrial economist. March 1976.

Vierhout, R. R. Laboratory instrumentation. August 1973.

Wilska, S. Material testing. August 1973.



Annex VI

LIBYAN PROFESSIONAL STAFF EMPLOYED BY THE INDUSTRIAL RESEARCH CENTRE

| Name | Post title |
|---|---|
| F. Zaied | Director General |
| T. Bishti | Director, Technical and Economics Department |
| I. Maghrabi | Director, Geological and Mining Research Department |
| A. Khuwaildi | Director, Administration and Financial Department |
| L. Hawisa | Head, Laboratory Section |
| A. Elhabishi | Head, Technical Studies Section |
| M. Burkais | Head, Geophysics Section |
| E. Zindah | Acting Head, Building Materials Research Unit |
| M. Huwej | Acting Head, Economics Section |
| N. Bsebsu | Instrumental Analyst |
| K.S. Nasr | Chemist |
| M. Gadi | Chemist |
| B. Obeidi | Food Analyst |
| A. Keshem | Food Processing Specialist |
| A. Ben Ypusef | Food Processing Specialist |
| M. Aghel | Food Processing Specialist |
| M. Baruni | Food Processing Specialist |
| A. Agreb | Food Technologist |
| S. Idris | Economist |
| E. Hakim | Economist |
| A. Breki | Chemical Analyst |
| E. Elbardan | Economist |
| A. Hamadi | Statistician |
| E. Nayi | Economist |
| A. Showehdi | Economist |
| A. Muwafac | Economist |
| A. Krekshi | Librarian |
| A. Ghuma | Librarian |
| F. Bannani | Librarian |
| J. Baruni | Librarian |

| Name | Post title |
|---|---|
| B. Feneish | Public Relations Offioer |
| M. Hudairy | Public Relations Officer |
| B. Mahdi | Geologist |
| B. Yushaa | Geologist |
| T. Shakruni | Geologist |
| B. Ghuma | Geologist |
| M. Mahdi | Surveyor |
| A. Ashour | Surveyor |
| A. Magtuf | Geologist |
| S. Hagar | Geologist |
| A. Shwayar | Surveyor |
| F. Jamalli | Surveyor |
| M. Mukhtar | Surveyor |

## Annex VII

## FOREIGN STAFF EMPLOYED BY THE INDUSTRIAL RESEARCH CENTRE

| Number | Post title description | Nationality |
|---|---|---|
| 3 | Industrial Economist | Egypt |
| 1 | Industrial Economist | India |
| 1 | Cost Accountant | India |
| 1 | Chemical Engineer | Poland |
| 1 | Chemical Engineer | Egypt |
| 1 | Chemist | Egypt |
| 1 | Chemist | Pakistan |
| 4 | Geologist | Egypt |
| 3 | Geologist | Palestine |
| 1 | Geologist | Pakistan |
| 4 | Geologist | India |
| 2 | Draftsman | Egypt |
| 1 | Draftsman | Palestine |
| 1 | Driller | Pakistan |
| 1 | Librarian | Egypt |
| 2 | Typist | Egypt |
| 1 | Typist | Palestine |
| 1 | Cost Accountant | Egypt |
| 1 | Legal Adviser | Egypt |
| 31 | | |

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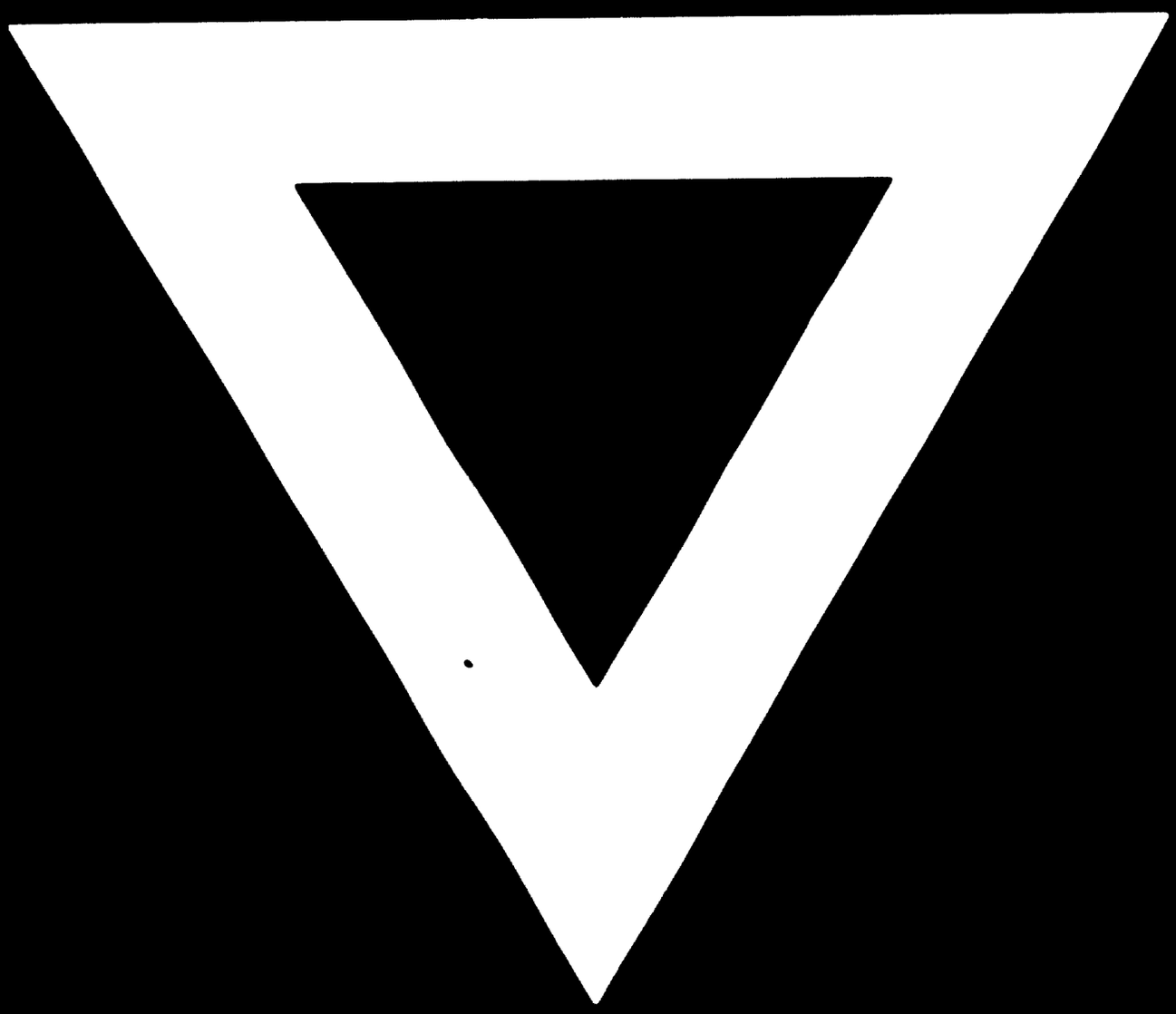

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