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ASSISTANCE IN STANDARDIZATION AND QUALITY CONTROL

DP/JOR/78/005

JORDAN ,

TERMINAL REPORT ,

Prepared for the Government of Jordan by the
United Nations Industrial Development Organization,
executing agency for the
United Nations Development Programme



United Nations Industrial Development Organization

United Nations Development Programme

ASSISTANCE IN
STANDARDIZATION AND QUALITY CONTROL
JOR/73/005

Project findings and recommendations

Prepared for the Government of Jordan
by the United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

Based on the work of A. Gensidy, project manager

United Nations Industrial Development Organization
Vienna, 1977

Explanatory notes

References to dollars (\$) are to United States dollars, unless otherwise stated.

The monetary unit in Jordan is the dinar (JD). 100 piastres or 1,000 fils is one dinar. During the period covered by the report, the mean value of the dinar in relation to the United States dollar was \$US 1 = JD 0.33.

The use of a hyphen between dates (e.g. 1970-1972) indicates the full period involved, including the beginning and end years.

References to "tons" are to metric tons.

The following abbreviations of organizations are used in this publication:

AFNOR	Association française de normalisation
ASMO	Arab Organization for Standardization and Metrology
ASTM	American Society for Testing and Materials
BSI	British Standards Institution
CAC	Codex Alimentarius Commission
DIN	Deutsche Industrie-Norm
EOQC	European Organization for Quality Control
IEC	International Electrotechnical Commission
ISI	Indian Standards Institution
ISO	International Organization for Standardization
ISONET	Information network
ITQCL	Industrial Testing and Quality Control Laboratories
NBS	National Bureau of Standards
OIML	Organisation internationale de métrologie légale
SIS	Standards Information Service of the National Bureau of Standards
TAPPI	Technical Association of the Pulp and Paper Industry
PD	Project Document

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ABSTRACT

Since the mid 1950s, the industrial sector in Jordan has been increasing rapidly and the need for standardization was recognized by the Government who decided to create a Directorate of Standards within the Ministry of National Economy.

The project "Assistance in Standardization and Quality Control" (DP/JOR/73/005) was authorized by the United Nations Development Programme (UNDP) on 29 January 1974. The United Nations Industrial Development Organization (UNIDO) was designated the executing agency and the Ministry of National Economy (now the Ministry of Industry and Trade) of Jordan, was designated the governmental co-operating agency. The total contribution by the UNDP amounts to \$476,824; the total contribution by the Government of Jordan is estimated at \$1,500,000.

The project became operational on 4 July 1973 when the project manager started his assignment; it terminated on 3 July 1977. International and counterpart staff are given in annexes I and II.

The objective of the project was to improve the national economy by strengthening activities in standardization in Jordan, namely: specifications, testing, quality control, certification marking and standard weights and measures. This project also included the setting-up of Industrial Testing and Quality Control Laboratories (ITQCL) to provide the necessary facilities for analysis and testing of industrial products as well as for the standardization of the measuring instruments used in trade and commerce. Such testing and quality control will help to improve the quality of locally produced goods, to make the use of local raw materials more efficient and to reduce production costs. This will, in turn, help to ensure fairness in trade and commerce, control of imports, and promotion of exports.

The main recommendations of the project were that:

- (a) Two new laws be issued on the basis of draft laws elaborated by the project, entitled: the "Jordan Organization of Standards and Quality" and "Legal Metrology";
- (b) A standards plan be adopted by the Government;
- (c) In-plant standardization should constitute the basis of national activities in this field;

- (d) All required staff be recruited and trained immediately;
- (e) A site adjacent to the present one be procured to allow for expansion of the laboratories;
- (f) A policy of decentralized instrument maintenance be carried out;
- (g) An extensive two-year instrumentation programme be planned and executed;
- (h) A scheme for certification marking be put into operation;
- (i) A plan for the organization of the Metrological Services Section be adopted;
- (j) A public relations officer be engaged.

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INTRODUCTION

1. Project background

Jordan is an agricultural country, industrialization being a recent feature of the economy. Only a few industries existed in the late 1940s and early 1950s, and their role in national economic and social life was limited. However, this sector has developed impressively since the mid 1950s; old industries have been modernized and new ones established along modern lines.

Since 1954, a large cement factory, a petroleum refinery, a paper factory, a pharmaceutical plant, some foundries, a tannery, several marble factories, and an expanded phosphate mining plant have come into operation. New industrial products include: oil, soap and detergents, textiles (cotton and wool), blankets, bottling and brewing, tobacco products, footwear, metal products (nails, pipes and furniture), wooden furniture, food products (flour, bakery products, biscuits, sweets and chocolate, dairy products, table salt, soft drinks), dry and acid batteries, glass, and plastics.

As a result, the value of industrial production increased more than seven-fold in the years 1954-1966 rising from about JD 6.0 million in 1954 to over JD 42.3 million in 1966 (and to JD 54.1 million in 1969). In the same period, income from this sector rose by 358%, from about JD 3.7 million to JD 13.8 million in 1966 (to JD 19.4 million in 1971^{1/}). Similarly, the corresponding share of industry in the gross domestic product (GDP) increased from less than 3% to about 12%. In 1966, more than 37,250 persons were engaged in industry compared to 43,820 persons in the three sectors of trade, banking and services. Industry has thus not only diversified, but is a rapidly-growing sector of increasing importance in the national economy.^{2/}

A sector of such importance should be safeguarded by providing the means for its healthy development. In this connection, the important role played by standardization cannot be overlooked. The adoption of in-plant and national standardization and quality control through proper machinery and procedures would improve national economy through:

^{1/} The three-year development plan (1973-1975) aims at increasing the income from the industrial sector from JD 20.4 million in 1971 to JD 36 million in 1975 and at creating not less than 8,000 job opportunities during the years of the plan.

^{2/} The five-year development plan (1976-1980) was formulated on the basis that the industrial and mining sector would occupy the first place among all sectors of national economy with an estimated contribution to GDP of 19.9% in 1976 and as high as 28.3% in 1980.

- Elimination of waste
- Better and more efficient use of local raw materials
- Increased productivity of manpower and equipment
- Reduction of production and distribution costs
- Internal organization of enterprises
- Improvement of the quality of goods and services
- Building-up public confidence in national production
- Protection of consumers
- Fairness in commercial transactions
- Development of import substitution industries
- Control of imports
- Promotion of exports

The importance of standardization as an efficient tool for industrialization was not overlooked by the authorities in Jordan. In assessing the status of industry in the country as a prerequisite for the elaboration of the three-year plan for economic development, the Government noted^{3/}:

Some domestic industrial products are inferior in quality to similar imported products. This is because the majority of industrial enterprises have no laboratories or technical apparatus to help them cope with quality control requirements.

The absence of a competent body responsible for quality inspection and the setting up of standards and specifications aimed at consumer protection has encouraged local producers to neglect the improvement of their products.

To remedy this, the Government decided to carry out the policy measure of:

"Setting up and enforcing internationally recognized standard specifications aimed at ensuring the good quality of local products in order to protect the consumer and earn a good reputation in foreign markets."

by creating, in 1971, the Directorate of Standards within the then Ministry of National Economy to be the competent national body on standardization and quality control. The following year, Standardization Law No. 24/1972 was promulgated.

^{3/} Jordan Development Plan, p. 5-9 and 5-10.

In an effort to promote standardization activities and to ensure the efficient operation of the Directorate of Standards, the Government executed a large-scale project aimed at strengthening activities in the relevant fields of standardization, namely: specifications, testing, quality control, certification marking, and standard weights and measures. This project also included the setting-up of Industrial Testing and Quality Control Laboratories (ITQCL) to provide the necessary facilities for analysis and testing of industrial products as well as for the standardization of the measuring instruments used in trade and commerce.

B. Official arrangements

The project was authorized by the United Nations Development Programme (UNDP) on 29 January 1974; United Nations Industrial Development Organization (UNIDO) was designated the executing agency and the Ministry of National Economy (now the Ministry of Industry and Trade) of Jordan the governmental co-operating agency.

The total contribution by the UNDP amounts to \$476,824; the total contribution by the Government of Jordan is estimated at \$1,500,000.

The project became operational on 4 July 1973 when the project manager started his assignment; it terminated on 3 July 1977. International and counterpart staff are given in annexes I and II.

C. Objectives of the project

Long-term

The long-term objective of the project is to improve national economy by strengthening standardization and quality control at the in-plant and national levels which will help to improve the quality of locally-produced goods, make the use of local raw materials more efficient and reduce production costs. This, in turn, will help to ensure fairness in trade and commerce, control of imports, and promotion of exports.

Short-term

The short-term objectives of the project are as follows:

Standard specifications:

- (a) To organize and strengthen the operation of the Directorate of Standards related to national standards;
- (b) To elaborate and carry out a national programme of standardization;
- (c) To bring about the application of national standards and to assist in the establishment, organization and operation of standards departments in industrial enterprises;

Testing:

- (d) To set up, organize and operate the Industrial Testing and Quality Control Laboratories (ITQCL);
- (e) To co-ordinate the facilities of the ITQCL with other testing facilities in Jordan;

Quality control:

- (f) To develop a national quality control scheme with a view to improving the quality of goods and products in the domestic and export markets, thereby protecting consumers and promoting the export trade of Jordan;
- (g) To develop quality consciousness in the public and industrial establishments;
- (h) To organize and operate a national quality certification scheme whereby the standards and quality marks would be granted to products conforming to national standards;

Legal metrology:

- (i) To establish, organize and operate a central standards laboratory in Amman and district weights and measures offices in the main governorates of Jordan to accommodate reference standards;
- (j) To plan, organize and implement national metrological services;
- (k) To effect the smooth transfer to the metric system;

General:

- (l) To set up an information centre for the dissemination of technical information relating to standard specifications, testing, quality control, certification marking and legal metrology;
- (m) To train national personnel in standard specifications, testing, quality control, and legal metrology;
- (n) To increase the participation of Jordan in regional (ASMO^{5/}) and international (Codex Alimentarius Commission, EOQC, IEC, ISO, OIML, ASTM^{5/}) organizations in the fields of standardization, testing, quality control and legal metrology.

^{5/} See explanatory notes.

D. Amendments to the project document

A final project document (PD) (JOR/73/005/B) was submitted by the Government of Jordan on 14 August 1973, signed by UNIDO on 2 September 1973, approved by UNDP on 29 January 1974 and signed by the UNDP Resident Representative in Amman on 25 February 1974.

A first revision of the PD (JOR/73/005/C) was signed by the Government, UNDP and UNIDO on 30 June, 22 July and 19 August 1974 respectively. The main objectives of this amendment were:

- (a) To reflect the rephrasing of the activities of the experts in testing laboratories (post 11-02) and legal metrology (post 11-03) from 1974 to 1975 and from 1974 to 1976 owing to lack of laboratory premises, planned for completion by April 1975. Also, the former post was reduced from 15 to 12 man-months;
- (b) To reflect the rephrasing of the expert in quality control and certification marking (post 11-04) from January 1975 to October 1974;
- (c) To extend the project manager (post 11-01) by six months in 1976 because a substantial part of project activities were rephased for 1975 and 1976;
- (d) To include \$11,000 to provide for a local driver and a secretary;
- (e) To delete the fellowship (post 31-02) for standardization because Jordanians had already undertaken a training programme in standardization on a UNIDO group fellowship training programme in the Union of Soviet Socialist Republics and the United States of America.

The second revision of the D (JOR/73/005/D) was signed by the Government, UNIDO and UNDP on 22 January, 20 March and 5 April 1975 respectively. The main objectives of this amendment were:

- (a) To reflect the rephrasing of the activities of the experts in testing laboratories (post 11-02) and legal metrology (post 11-03) from 1975 to 1976 owing to non-completion of the laboratory building;
- (b) To rephrase the short-term consultant component to one month in 1974, two months in 1975 and three months in 1976;
- (c) To rephrase the associate expert component (instrumental methods of chemical analysis, mechanical testing and legal metrology) to 1976;
- (d) To extend the project manager (post 11-01) by six months (second half of 1976) because a substantial part of project activities had been rephased to 1976;

(e) To split the eight-month fellowship (post 31-02) in instrumental methods of chemical analysis into two posts;

(f) To split the eight-month fellowship (post 31-03) in mechanical testing into two posts: one for mechanical testing for four months and the other for physical testing for four months;

(g) To increase the amount allocated for the administrative and support personnel from \$11,000 to \$16,000 to cover appointments to the end of the project.

Project revision E was signed by UNIDO and UNDP on 3 April and 14 April 1975 to reflect the assistance given in 1974 and prior years.

Project revision F was signed by UNIDO and UNDP on 21 May and 14 June 1975 to reflect the assistance given in 1974, and anticipated 1975 and 1976 expenditures.

Project revision G was signed by the Government, UNIDO and UNDP on 15 September, 29 October and 17 November 1975 to extend the assignment of the expert in quality control and certification marking for an additional 2.5 months.

Project revision H was signed by the Government, UNIDO and UNDP on 22 March, 4 May and 8 May 1977. The main objectives of this amendment were:

(a) To extend the assignment of the project manager for six months through June 1977, to enable him to phase out project activities in accordance with the revised work plan;

(b) To extend the assignment of the expert in metrology for one month in 1977;

(c) To re-allocate the amount of \$39,000 for equipment, originally earmarked for the project but excluded from the 1976 expenditure ceiling owing to the financial constraints and over-commitment of the indicative planning figure;

(d) To allocate the amount of \$10,890 for the remaining fellowships;

(e) To allocate the amount of \$4,000 for administrative support personnel and \$2,560 for miscellaneous.

I. FINDINGS

To provide a sound basis for the proper planning and execution of project activities, the following studies were carried out:

- (a) A general study of the educational and social structure of Jordan;
- (b) A detailed study of the economic structure with emphasis on the industrial sector: its history, growth and prospects;
- (c) A study of the functions of the Directorate of Standards of the Ministry of Industry and Trade;
- (d) A detailed study of all legislation on specifications and measures, namely:
 - (i) The Standards and Measures Law No. 24/1972;
 - (ii) The Legal Metrology Act No. 58/1972;
 - (iii) The draft law on Precious Metals Hallmarking (issued later as Act No. 10/1975);
- (e) Field studies of the standardization, quality control and metrological activities of representative industrial establishments;
- (f) Field studies of the functions of testing laboratories in Jordan.

Annex III lists the field visits and studies carried out during the project.

To complement and support the above studies, a survey was conducted in the form of questionnaires sent by the Ministry of Industry and Trade to 90 ministries, governmental departments, institutions, testing laboratories, industrial establishments etc. The questionnaire aimed at collecting data on the present status and future needs in standardization, quality control and metrology. The questionnaire sent to industrial establishments is given in annex IV.

The response to the questionnaire was as follows:

Ministries and governmental departments	16 replies from 26	61.5
Testing laboratories	6 replies from 9	66.7
Industrial establishments	<u>28</u> replies from <u>55</u>	<u>50.9</u>
Total	50	90

A. Standardization

The main objectives in this field were to strengthen the standardization activities of the Directorate of Standards, to elaborate a national plan for standardization and to assist in setting up standards departments in industrial enterprises.

The project's findings in this field were:

(a) There exists a strong legal basis for standardization in Jordan in the form of Law No 24/1972; however, there is a need for amendments;

(b) The staff of the Directorate of Standards, working in standardization, amounts to four graduates, all of them well qualified and, for the most part, knowledgeable;

(c) Very few national standards have been elaborated and the procedure which has been followed should be modified to conform with approved practices;

(d) There is no plan or programme for the elaboration of national standards;

(e) The administrative and clerical activities of the Standardization Section need to be organized and rationalized;

(f) The industrial sector in Jordan consists of a few relatively large plants and a lot of small plants;

(g) There is little consciousness of the benefits and importance of industrial standardization. Few plants adopt recognized standards in their production and these are relatively large enterprises.

Three-year standards plan

The survey provided one of the main sources from which a three-year plan should be drawn. Tabulation of the results of this survey indicated that the 90 bodies contacted have showed their interest in having 335 items standardized by the Directorate of Standards. This should not be considered an exhaustive list for standardization as it is likely that other items, important to the national economy, have been overlooked.

Consequently, it was necessary to consider, in addition to the above, the following items:

(a) Export goods (figures obtained from export statistics during the period 1970-1974);

(b) Import goods (figures obtained from import statistics, 1970-1974);

- (c) Domestic goods, produced exclusively for the local market;
- (d) Future production: goods which are included in the five-year plan for economic development;
- (e) International (ISO and IEC) standards that should be adopted immediately.

The total number of items from all of the above sources amounted to 1,000, from which it was necessary to choose not more than 90 items to be standardized over a span of three years by the available six standards engineers. The selection was based on established priorities, namely:

- (a) Export goods, which have to be of good quality to promote exports and hence improve the balance of payments;
- (b) Consumer goods, especially food products, since one of the main objectives of standardization is consumer protection;
- (c) Construction materials, because of their importance to national economy. (Among the various service sectors, the housing sector ranked second with regard to total investment in the three-year plan (1973-1975), and first in the five-year plan (1976-1980) with investments of about \$260,000,000);
- (d) Basic standards which should be urgently adopted.

In addition to these priorities, it was considered that the plan should be diverse on the following points:

- (a) Whether standardization is for imported, exported or domestic products. Thus, of the industrial products included in the plan 63% are exports, 27.4% are domestic goods and the remaining 9.6% are imports;
- (b) The subjects of standardization since the plan includes standards for food industries, building industries, chemical industries, electrical industries, mechanical industries etc. The place these industries occupy in the plan corresponds to their relative importance and value in the country's economy. Thus, the plan included the standardization of 47 items from agricultural and food industries (52.2%), 19 items from building industries (21.1%) and 15 items from chemical industries (16.7%), an order which corresponds to the relative values of these industries;
- (c) The aspect of standardization since the plan includes standards for units of measurements, sizes, materials and products, test methods, calibration methods etc.

Within each branch of the industrial sector, integration was considered as far as possible. This is well-illustrated in the building industries which included formulation of standards for dimensions and sizes, for materials (cement, lime, aggregates, reinforcing steel bars, bricks, tiles, paints and sanitary-ware) and for test methods.

The procedure followed in working out the three-year standards plan has been stated in a 154-page report, sufficiently detailed to serve as a guide for the Directorate of Standards to work out similar plans in the future.

The Directorate of Standards started to execute the plan in the second half of 1975; the standards are being elaborated and the standards engineers in the Directorate have become quite familiar with it and well trained.

Standards departments

In a developing country such as Jordan, it would be difficult to establish separate standards departments in industries; it is easier to combine such departments with quality control departments.

Standardization consciousness

In an effort to develop standardization consciousness among industries and the public, publicity has been carried out. The Standards and Measures Law was published in an attractive form and distributed, together with a descriptive memorandum, to industries to familiarize them with standardization structure and facilities in Jordan. Also, the Directorate of Standards celebrated the World Standards Day. A message from the Minister of National Economy was broadcast and published in the local press, and articles on standardization appeared in the leading daily newspaper.

Legislation

Law No. 24/1972 provides the legal basis for standardization in Jordan. However, this Law could be improved. The main arguments are as follows:

(a) This Law established the Directorate of Standards as the national standards body in Jordan; the Directorate is one of the administrative divisions of the Ministry of Industry and Trade. However, experience has shown that the proper discharge of the duties of national standards bodies often requires flexibility in administrative and financial matters. It is, therefore, preferable to have the national standards body as a public establishment (as an autonomous organization or department) with a separate budget, but still attached to the Ministry of Industry and Trade;

(b) Such an autonomous status of the national standards body would allow for a separate service system for its employees. It is significant that 11 employees left the Directorate of Standards for better pay either in the private sector in Jordan or in the Gulf area. Two of these had been awarded project fellowships. During the project there were three directors (co-managers). Needless to say, such a turnover of staff does not allow for

development and improvement of the activities of the Directorate. Emphasis should thus be given to improving service conditions even if this calls for the adoption of a new special service system for the staff;

(c) This Law establishes the Advisory Committee of the Directorate of Standards headed by the Minister of Industry and Trade. As the name implies, and as the provisions of the Law clearly state, the nature of this Committee is merely consultative. There are two objections to this, namely:

- (i) The Minister should not preside over a Committee which advises one of his directorates;
- (ii) The Advisory Committee should not be a consultative body but a policy-making one. This practice is the most appropriate for running national standardization activities and has been exclusively followed in other countries;

(d) The bodies to be represented on the Advisory Committee should not be specified in the Law otherwise the Law will need amending every time there is a change of name (as when the Ministry of National Economy was changed to the Ministry of Industry and Trade), when a new body emerges (as in the case of the newly-established Ministry of Supply) or if it is desired to represent an existing body on the Committee (such as the Chamber of Commerce). Provisions in the Law should be so phrased to allow for such cases to be taken care of without the need for amendment;

(e) The Law lacks provisions for:

- (i) Restriction of the use of the word standard;
- (ii) Registration affairs of the standard mark;
- (iii) Control of fitness for exports;
- (iv) Dealing with offences committed by persons exercising power under the Law;
- (v) Liability of employers;

(f) Mandatory and voluntary standards are determined by the Council of Ministers which makes no distinction between them. If mandatory standards are determined by a resolution from that Council, then voluntary ones should be issued by a lower-level body;

(g) Many provisions run into details which should be incorporated in by-laws rather than laws.

Conclusion

With the support of the proposed legislation (annex V), a well-prepared standards plan and qualified standards engineers properly trained on their jobs, the Directorate of Standards could get standardization off to a good start.

B. Testing

Adequate facilities for testing are essential to the proper operation of any national standards body. They are badly needed for:

- (a) Carrying out tests necessary for the elaboration and amendment of national standards;
- (b) Investigating the degree of adoption of national standards;
- (c) Assisting industries to control the quality of their products;
- (d) Verifying the conformance of products to mandatory standards;
- (e) Operating certification-marking schemes;
- (f) Carrying out research work to improve the quality of locally-produced goods.

The main objectives of the project in testing are to set up and operate Industrial Testing and Quality Control Laboratories (ITQCL) and to establish the proper relationship between these laboratories and existing testing facilities in Jordan.

Existing testing facilities

The main functions of the existing laboratories are as follows:

- (a) The Ministry of Public Works - testing construction materials;
- (b) The Municipality of Amman - testing food products;
- (c) The Royal Scientific Society - materials testing with some related chemical analysis;
- (d) The Ministry of Public Health - testing food products;
- (e) The Ministry of Agriculture - testing soils, plants and fertilizers;
- (f) The National Resources Authority - testing minerals, rocks and water;
- (g) The Faculty of Science, University of Jordan - educational and research purposes.
- (h) The Ministry of Finance in Aqaba - identifying materials for customs purposes;
- (i) The Ministry of Defence - testing articles of interest to the Ministry.

Site

A suitable site of 1,100 m² was selected for the ITQCL. This land belonged to the then Ministry of National Economy to which it is adjacent.

According to present regulations, the floor area should be limited to about 500 m² only, which will give, in a building of five storeys, a total floor area of about 2,500 m². This area will have to accommodate the ITQCL as well as the other divisions of the Directorate of Standards. It has been pointed out to the authorities that such an area cannot satisfy the needs of the ITQCL which will, inevitably, require future extension and an adjacent empty site of about 600 m² should be obtained as soon as possible.

Layout and plans

In preparing the layout and plans for the ITQCL, the following factors were considered:

- (a) Plans should be based on a realistic evaluation of the need to establish the ITQCL;
- (b) Owing to the limited area and resources available, testing facilities for only the most important types of products should be secured at the present stage leaving other types to following stages;
- (c) Flexibility in use and extensibility should be safeguarded;
- (d) Capacity should allow for the minimum space and equipment necessary to ensure that any relevant test on the selected products could be carried out to the requirements of international standards;
- (e) Unnecessary overlapping and duplication of existing laboratories should be avoided.

The ITQCL should be composed of the following laboratories and facilities:

- Organic chemical laboratory
- Inorganic chemical laboratory
- Bacteriological laboratory
- Leather testing laboratory
- Metallographic testing laboratory
- Mechanical testing laboratory
- Paints and varnishes testing laboratory
- Paper and board testing laboratory

Central standards laboratory

Amman district weights and measures laboratory

Precious metals testing laboratory

Ancillary and complementary facilities such as offices, library, bookstore, stores (for equipment, spare parts, chemicals, glassware, inflammable solvents, stationery etc.), sample reception and preparation, conference and meeting rooms, lecture room, maintenance workshop, glass-blowing shop etc.

On the basis of the above, the general layout and plans for the five-storey building were prepared by project personnel and the executive drawings were prepared by the Ministry of Public Works.

A sixth floor, at an estimated cost of \$157,000, was added in the second half of 1976. It is assumed that it will accommodate the second stage of the project, as stipulated in the five-year development plan. This step reflects the Government's increased interest in the project.

Building

As the establishment of testing laboratories posed specific problems with which the Ministry of Public Works was unfamiliar, the project personnel prepared a detailed report entitled "Notes on the Design and Planning of the Industrial Testing Laboratories" which was intended to help the architect, the civil engineer, the mechanical engineer, the electrical engineer and executing bodies to design and implement the ITQCL in the most appropriate manner. These notes were grouped under the following titles:

Laboratory planning

Laboratory fittings

Laboratory services

Fire and safety protection

The notes were officially submitted to the Ministry of Public Works through the Ministry of Industry and Trade and were taken as the basis for subsequent work.

The contractor began the civil work for the ITQCL in February 1975 and was to hand it over to the Government in 10 months, i.e. by the end of 1975. Unfortunately, the completion of the building was delayed for not less than 18 months. The contractor was completely responsible for this delay, which had an adverse effect on the realization of the project's objectives.

Due to this delay, the arrival of the expert in testing laboratories was postponed, and ultimately cancelled.

Equipment

For each of the laboratories listed above, the products to be tested (whether for local consumption or export) and the relevant test methods were defined. Detailed technical specifications were then prepared for the equipment of each laboratory. It was taken into consideration that the equipment ordered should be of a high standard and capable of performing tests in compliance with standard methods recommended by the International Organization for Standardization (ISO). In case such recommendations do not exist, standard methods of internationally recognized professional associations of societies (such as the International Union of Leather Technologists and Chemists' Societies, the Technical Association of Pulp and Paper Industries (TAPPI), the American Society for Testing and Materials (ASTM), or national standards (such as AFNOR, BSI, DIN^{6/}) were adopted.

In order to get the latest achievements in the design and performance of testing equipment, the project manager contacted about 400 manufacturers and suppliers in Austria, Belgium, Czechoslovakia, Denmark, France, German Democratic Republic, Federal Republic of Germany, Italy, Japan, Netherlands, Sweden, Switzerland, Union of Soviet Socialist Republics, United Kingdom and the United States of America.

Project equipment was ordered together with the spare parts necessary for a normal two-year operation.

Annex VI lists the main items of equipment provided by UNDP. The project had difficulty in finding adequate storage facilities for this equipment, a problem that was solved by using rooms in the basement of the new premises.

Non-expendable equipment (laboratory glassware and chemicals) for the ITQCL was procured with government funds and with the technical assistance of project personnel.

Instrumentation

The reliability of product testing depends on the quality of the instruments used in the tests and on the operator: poorly maintained instruments are bound to give unreliable test results. A similar conclusion could

^{6/} See explanatory notes.

be drawn with regard to the competence and reliability of operators. Apart from technical reasons, there is also a strong economic justification for good maintenance.

Instrument repairs are generally considerably cheaper than early replacement of equipment. Good maintenance keeps repair costs down and reduces the requests for equipment replacement. This will be particularly important if, as seems to be the trend, foreign assistance becomes more difficult to obtain.

For these reasons, the project undertook a comprehensive study to establish the maintenance status of quality and other testing laboratories in Jordan; to advise on improvements, policies, spare part acquisition and stocking, servicing procedures, the future role of the Directorate of Standards in relation to national instrumentation maintenance and on ways and means of instrumentation technology training.

The following facts were revealed:

- (a) Instrumentation maintenance management, in spite of many difficulties, shows a healthy trend of individual initiative. It only remains to strengthen this trend by a national policy specifying that management is the principle responsibility of directors of laboratories;
- (b) Many professional, committed people are available;
- (c) Capable mechanics are attached to some laboratories and efficient shops and people are available in the private sector as is a limited amount of factory help. The proper tapping of these sources will require the establishment of a national policy;
- (d) Of most concern is the limited amount of polytechnical training available or planned;
- (e) Jordanian currency is freely exchangeable, thus enabling spare parts to be acquired;
- (f) Authorized dealers are reluctant to stock spares, except for instrument brands and types which sell frequently;
- (g) Only one of the equipment sales offices has a good workshop with several technicians;
- (h) Testing laboratories which have skilled labour (mechanics, electricians) on their payroll, or easily available, have the fewest maintenance problems and give an impression of good housekeeping;
- (i) Most equipment donors combine start-up assistance with training fellowships for operators. Laboratories established with such assistance are found to be well-managed and maintained, particularly when spare parts for a two-year operation were supplied with the equipment.

An improvement in instrumentation maintenance and repair could be effected if the recommendations made in this report are carried out.

Furniture and fittings

Laboratory furniture and fittings were provided through government funds. However, project personnel provided the design and technical specifications of all laboratory furniture (benches, bench tops, reagent shelves etc.), fittings and service installations (sinks, drip cups, taps, power outlets and installations for water, gas and electricity) and other facilities (library furniture and storage facilities for chemicals, glassware, spare parts, inflammable solvents etc.).

Accordingly three local bids were prepared for:

- Woodworking and joinery
- Water installation
- Electrical installation

The total cost of laboratory furniture and fittings amounted to about \$160,000.

Conclusion

All activities for the realization of the project's objectives in testing have been completely fulfilled except for the completion of laboratory premises and the subsequent delay in recruiting the testing staff.

The delay in completing the building constitutes the major drawback encountered by the project. Although the project duration was extended three times for 18 months to allow for completion of the premises, and extensive efforts were made by the Ministry of Industry and Trade and the Ministry of Public Works, the building was not completed by the end of the project. The delay in completing the building has greatly curtailed the realization of the project's objectives in testing and, to a lesser extent, in legal metrology.

C. Quality control

The main objectives of the project in this field are to develop national quality control and quality consciousness and to operate a national certification marking scheme.

Forty-five companies were nominated for evaluation; of these, 20 were selected for detailed and comprehensive study taking two factors into consideration: (a) the companies should represent a cross-section of Jordanian industry; and (b) they should produce important items for the domestic and export markets. The study was carried out through a quality control survey and assessment in the form of a questionnaire. The responses were used as a basis for assessing the quality level.

The evaluation revealed that in the selected 20 plants 2 (10%) had satisfactory quality control; 7 (35%) had limited inspection rather than quality control; and 11 (55%) had no quality control.

From the first group, two companies were selected as models: the Jordanian Cement Factories Company, as having a reasonably satisfactory quality organization; and the Jordanian Petroleum Refinery Company, as having satisfactory training facilities.

From the second group, four companies were selected for more intensive quality implementation and improvement work: the Jordanian Tanning Company; the Jordanian Paper and Cardboard Company; the Industrial, Commercial and Agricultural Company's Biscuit Factory; and the Aluminium Company (typical of a small local enterprise that urgently requested assistance from the project with a quality problem).

The structure and operations of the first three companies were studied intensively and analysed. Three separate reports including substantial recommendations were issued by the project. These were translated into Arabic and submitted and discussed with top management. The management of the Jordanian Tanning Company has promised to carry out 75% of the relevant recommendations in the near future.

Through technical assistance to the fourth company, the Aluminium Company, it was possible to overcome a major quality problem whereby the rejects of cast aluminium products were initially reduced from 50% to 20% and possibly to 8% by further operational control and improved techniques.

Evaluation of quality potential in the remaining companies was left to the counterparts as a training exercise. The results will be used for quality analysis when greater emphasis on, and appreciation of, the quality mark become apparent.

Finally, a Quality Control Manual and Guide for Industry was prepared to guide and assist industry in: (a) the basic implementation of quality control; (b) the adoption of the most appropriate quality control methods and techniques; and (c) compliance, through basic principles, with the Law to reach a stage where companies can more easily obtain the quality mark, to their own benefit.

In conducting consciousness activities, emphasis was directed towards the public considering that this is a more practical and useful approach.

Publicity measures taken were:

(a) Preparation of quality posters in Arabic. These posters were displayed in plants in which project activities have been carried out;

(b) A film on quality control entitled Right First Time was obtained on loan from the International Labour Organisation (ILO), Geneva. It was shown to the Directorate's staff and the technical staff of industrial enterprises;

(c) A lecture on quality was given at the ILO Vocational Training Centre of the Ministry of Education;

(d) The quality mark was used extensively on the publications of the Directorate of Standards.

Certification marking

A national contest was conducted for the design of a quality mark and a suitable design, after modifications, was selected from among 50 different designs. The standard sizes adopted for the mark are 20, 10, 5, 2, 1 and 0.5 cm (annex VII).

A Quality Certificate and Licence has also been formulated together with a manual on the Procedures and Methods for Certification Marking. This has been translated into Arabic, published in the local press and widely circulated for study and comments to interested governmental departments, institutes and industrial establishments as a prior step to finalization and submission to competent authorities for approval.

A Jordanian national standard on cement has been elaborated as a necessary step towards granting the quality mark to the Jordanian Cement Company, whose production was found worthy of this award.

Conclusions

Project activities in quality control revealed the following:

(a) The Directorate staff responsible for quality control suffers from a shortage in numbers and a lack of industrial experience. However, the staff was enabled, through the project's activities, to acquire a better understanding and appreciation of the principles and benefits of quality control as well as of the proper methodology of evaluating and performing quality control techniques;

(b) No company in Jordan has ever evaluated its quality costs. In consequence, there is no reliable information on what the real losses are to the Jordanian economy in terms of lost industrial production costs;

(c) Although quality control is considered an efficient and helpful management tool, management lacks understanding of the requirements and techniques of quality control. This must be changed if quality is to be one to the major objectives in local and export markets.

The most important fact that emerged from the project's activities in this field, is that it has been possible, for the first time, to initiate systematic quality control methods that have never before been carried out in Jordan. A sound base has thus been laid down though there still remains a lot to be done. Success will depend on the support of management and the vigour, enthusiasm and initiative of the Directorate staff.

D. Legal metrology

The project's activities in this field are aimed at establishing and operating a central standards laboratory and district weights and measures offices to implement national metrological services and to effect the smooth transfer to the metric system. Studies revealed the following commendable achievements by the Government:

(a) The smooth, almost completed change-over to the metric system in commerce, industry and agriculture: except in minor, relatively unimportant, areas of commerce the metric system is used;

(b) The successful scheme whereby the former Ministry of National Economy imported sets of metric weights in bulk for sale through the trade.

On the other hand, there were the following deficiencies:

(a) Proper premises to maintain standards and to carry out metrological activities;

- (b) Any internationally authenticated physical standards for Jordan;
- (c) Adequate legal machinery to correct the above-mentioned defect;
- (d) Adequate facilities for maintaining physical standards as well as for carrying out metrological services;
- (e) The lack of formal training in metrology of the legal metrology staff, consisting of a university graduate chief and four inspectors, none of whom has any knowledge of mathematics, physics or English;
- (f) Essential transport for the inspectorate;
- (g) A proper recording and registration system for inspection and standards validation work.

Solutions to the above problems were sought during the project.

Premises

The new premises of ITQCL were so planned that most of the ground-floor area (nine rooms) was allotted to the Legal Metrology Section of the Directorate of Standards. Also, a large room and another smaller one in the basement were allotted for the custody of primary standards.

Equipment

The equipment in the Government's possession consisted of:

- (a) A first-class invar metre bar of "H" section;
- (b) Several first-class sets (20 kg to 1 mg) of stainless steel standard weights of German origin;
- (c) A 200-g precision balance;
- (d) An excellent standard for capacity measures of tinned-iron.

In spite of the fact that the above-mentioned equipment is of good quality and in perfect condition, it cannot be used because of the lack of either essential auxiliary equipment or traceability to internationally recognized standards in the form of validation certificates. For example, the "H" metre bar lacks a two-microscope transverse comparator. Even if this comparator were available, the metre should not be used for the direct verification of working standards; there should be an intermediate standard for this purpose.

For the foregoing reasons, it was necessary to procure working and verification standards for length, mass and volume. As was the case with testing equipment, it was taken into consideration, when ordering equipment, that the legal standards should conform to specifications recommended by the Organisation internationale de metrologie legale (OIML). In cases where no such specifications exist, other recognized national specifications were adopted such as those issued by the Standards, Weights and Measures Division in the United Kingdom.

Legislation

A thorough study of metrological legislation in Jordan revealed the necessity of effecting certain amendments.

The outstanding defect in the metrology provisions of Law No. 24/1972 no physical representations of the approved metric units are legalized. For a country's metrology administration to be internationally approved, it must possess physical standards which are given legal status in the metrology law. No such physical standards or legal provision exist in Jordan, so the country is in an extremely weak position should the matter be raised in any international dealings. Internationally authenticated standards have been ordered by the project and these should be legalized by appropriate provisions in the Law.

In addition, it is always advisable that legal metrological provisions be stipulated in an independent law rather than in by-laws or regulations subsidiary to a general law on standardization. Standards and Measures Law No. 24/1972 is a hybrid piece of legislation. The Standards part of this law applies to specifications and standards of quality of goods and makes provision for the use of a mark indicating compliance with a Jordanian standard. The adoption of standards is basically voluntary, with possible mandatory standards restricted to health and safety.

On the other hand, the parts of the Law relating to Measures are of universal application in commerce, industry, agriculture, mining, foreign relations, jurisdiction, accountancy, contracts etc., and the provisions of the Law are mandatory in all these fields. Wide powers of entry, seizure and confiscation are given to inspectors and police officers authorized to

enforce the Law. These mandatory provisions should be separated from the general Standards and Quality Control parts. It is not appropriate that the wide-sweeping and fundamental legal provisions included in the Measures part of the Law, should be an appendage to an enabling law for largely voluntary standardization and quality control.

The separation of the above parts would avoid some of the dangers inherent in the present structure. For example, the power to make regulations under Section 26 is seemingly unlimited, and those already made are of far-reaching application and so fundamental as to require more checks and scrutiny than are normally afforded subsidiary legislation. A separate law for metrology would require that the power to make regulations be more closely defined and limited to such details as specifications for approved types of instruments, methods of testing, labelling requirements, instructions to inspectors etc.

Therefore, a separate composite Legal Metrology Law should be submitted to competent authorities for approval and issuance. The proposed law has been drafted (annex VIII) based on OIML recommendations.

Metrological activities

Pending completion of laboratory premises, a room in the headquarters of the Ministry of Industry and Trade has been prepared as a nucleus weights and measures laboratory where preliminary metrological activities are carried out. All existing equipment capable of being revalidated has been put into useful working order and calibrated with the help of project standards.

This office was also used as a centre for training the counterparts in metrological activities. It should be emphasized that maximum benefit from training has not accrued owing to the fact that only four inspectors were available.

A continuous programme of inspection of weights was instigated; ring weights, non-metric weights and other objectionable weights were seized.

All measures of length in use in cloth shops were tested and stamped, non-metric measures were seized. Stocks of new measures held by dealers were called into the office for testing and stamping, if correct.

A programme of calibration and sealing of gasoline pumps was carried out in co-operation with the Jordanian Petroleum Refinery Company (JPRC). Surprise

inspections were carried out, from time to time, on heating oil vendors, gasoline pumps etc. The measures used by kerosene sellers were checked on a random basis and stocks of new kerosene measures, submitted by sellers, were tested and stamped.

Draft outline specifications were made for weights, counter machines, platform machines, weighbridges, length measures, gas pumps and bulk liquid fuel meters.

The counterpart became sufficiently knowledgeable to install the equipment and proceed with a full-scale validation programme. Notes setting out all the procedures in detail were prepared for his use.

In addition to the duties set out in the work plan, project personnel were requested to assist in the preparations being made for the enforcement of the Precious Metals Act as well as with a new activity, namely, the calibration, testing and sealing of taxi-meters.

Concerning the hallmarking of precious metals, a comprehensive study of the trade in such metals was carried out in Amman, Zarqa, Irbid and Aqaba and the findings transmitted to the Government. Also, stamps for gold, silver and platinum marking have been designed and potential suppliers contacted.

As regards taxi-meters, a system for verification was established, and the inspectorate thoroughly trained for this job so that they were capable of calibrating, testing and sealing the first batch of 600 meters to be installed in taxis in the Amman District.

Administration

A plan for the organization and operation of the Metrological Services Section of the Directorate of Standards has been prepared and is to be implemented in three phases (annex IX).

Also, a set of metrology notes was compiled for the guidance of the counterparts in the post-project period. In addition, record systems to be used in inspection visits and test and record sheets for standards, balances etc., have been devised and translated into Arabic.

A new series of inspectors' stamps for marking and sealing measuring instruments have been designed and ordered.

Conclusion

Provided that the recommendations given in this report are taken, the project will have been successful in making a contribution to the overall metrological services and to the economy of Jordan.

E. Information

It is impossible to carry out standardization activities in developing countries without having ready and rapid access to standardization documents which are the basis of any national, or even international, standardization. That is why one of the objectives of the project was to set up an information centre for the dissemination of technical information relating to standard specifications, testing, quality control, certification marking and legal metrology.

Activities

Counterpart national standards bodies have been contacted to supply the Directorate of Standards with their standards and other publications. Favourable replies have been received and accordingly, the Directorate of Standards has been put on the mailing lists of a large number of these bodies. In this way, complete sets of some overseas standards have been obtained.

Books and references worth \$4,000 have been procured directly by the project from societies, associations and institutes as well as from regular publishers. The project also subscribed to all available periodicals published in English dealing with standardization, quality and legal metrology (see annex X).

Through the project, the Directorate of Standards became a member of the Information Network (ISONET) set up by the International Organization for Standardization (ISO). Contact has also been established with the Standards Information Service (SIS) of the National Bureau of Standards (NBS) of the United States.

Conclusion

The non-completion of laboratory premises has delayed the setting up and operation of a standards information centre. However, project activities

have resulted in the formation of a good nucleus containing the most comprehensive collection of books and periodicals in the fields of standardization, quality control and legal metrology in the Arab world. After completion of the premises, this nucleus should be developed by the Directorate of Standards.

F. Training

Training of the staff of a national standards body is vitally important and is governed by the following factors:

- (a) Standardization is not normally taught as a separate branch of science and technology;
- (b) The shortage in standards engineers;
- (c) In developed countries, the role of the standards engineers in the actual standardizing processes is not dominant. This is not the case in developing countries where standards engineers often have to prepare the draft standards. In some cases, it may be necessary for the standards engineers to educate the members of the technical committees.

One of the main objectives of the project is to train national personnel in the fields of standard specifications, testing, quality control and legal metrology. In attaining this objective, the project adopted the following means:

- (a) Direct association with international staff;
- (b) Conducting training courses;
- (c) Issuing training manuals and acquiring training aids;
- (d) Awarding fellowships;
- (e) Securing fellowships from other sources.

On-the-job training

Throughout the duration of the project emphasis was placed on practical training through the continuous close association of the counterpart staff with international experts and consultants.

Training courses

The following four courses were included in the Work Plan:

Standardization

Quality control

Legal metrology

Testing

The first three courses have been conducted. The fourth course, however, has been cancelled owing to the incompleteness of laboratory premises and the subsequent unavailability of testing staff to be trained. Instead, another course on standardization was conducted in 1977. In carrying out the above courses consideration was given to the fact that they should be interspersed, as far as possible, with practical demonstrations.

Training manuals and aids

As permanent guides for the Directorate of Standards to conduct training courses in the future, the project issued training manuals on standardization, practical quality control, and legal metrology.

In addition, useful training manuals on statistical quality control were obtained from the National Productivity Council, India; the Swedish Society for Quality Control; the Iowa University, United States; and the Westinghouse Corporation, United States.

Also, the project procured the following visual aids which were handed over to the Directorate of Standards:

"Successful Standardization Stories" a set of 57 coloured slides obtained from the National Association of Purchasing Management, United States

"An Introduction to Quality Control" a set of 55 coloured slides obtained from the Asian Productivity Organization, Tokyo, Japan

"Simplex Random Sampling Box" a training package obtained from Technical Prototypes (Sales) Ltd., United Kingdom

Project fellowships

The nine fellowships given by the project (annex XI) were executed in the last three years (1975-1977). They consist of individual as well as group training; the individual training being carefully tailored by the project personnel to realize its objectives. Unfortunately, a lack of English was a

main obstacle in implementing some of the fellowships. Two of the counterpart staff who were awarded fellowships have left the Directorate of Standards.

Outside fellowships:

The NBS awarded three fellowships (two in standardization and one in testing equipment) which were granted to two engineers: (one engineer took two fellowships) in the Directorate of Standards. A fourth fellowship was obtained from the Indian Standards Institution (ISI) but could not be granted owing to the unavailability of a suitable candidate.

Conclusion

The project's activities in training have been very successful not only in arousing the keen interest of the counterpart staff in standardization and related domains, but also in upgrading their skills in performing their duties in the most appropriate and efficient manner.

G. Regional and international activities

It is essential for national standards bodies to participate in regional and international activities. Apart from having useful contacts and co-operating with other national bodies, participation in regional and international activities will ensure that the views and particular local circumstances of the national body will be taken into consideration when elaborating regional and international standards.

One of the objectives of the project is to develop the participation of Jordan in regional and international organizations in standardization, testing, quality control and legal metrology.

Regional activities

Jordan has always been a member of the Arab Organization for Standardization and Metrology (ASMO). To strengthen the participation of Jordan in regional activities, the working papers of ASMO meetings were thoroughly studied with the Jordanian representatives to those meetings and matters to be raised for discussion in the meetings were formulated. An effort was made to render the participation of Jordan in the technical activities of ASMO more effective.

International activities

Project personnel attempted to secure the membership of Jordan in the most important international organizations, as follows:

Jordan became a correspondent member in the ISO as from 1 January 1975

The Directorate of Standards was recognized as the representative of Jordan in the OIML

The Directorate of Standards was recognized as the contact point for the Codex Alimentarius Commission (CAC)

In addition, project personnel made useful contacts with the following organizations:

The International Federation for the Application of Standards, West Berlin

The International Academy of Quality, United States

The European Organization for Quality Control, the Netherlands.

Conclusion

The project's activities have been successful in strengthening the participation of Jordan in regional and international activities in standardization, quality control and legal metrology.

II. RECOMMENDATIONS

A. Standardization

1. To strengthen the status of the national standards body from the technical, legal, financial and administrative viewpoints and enable it to contribute to the national economy, measures should be taken, as soon as possible, to issue a new law on the Jordanian Organization of Standards and Quality on the basis of the draft law elaborated by project personnel (annex V).

2. In order to cope with the ever-increasing need for national standards with the limited available technical staff, the Directorate of Standards should carry out its activities based on established priorities; the plan drawn up by the project could be used as a guide. It is strongly recommended that standards plans should be realizable, should fit the social and economic context of Jordan and should leave room for the periodic revision of national standards in order to keep pace with advances in science and technology.

3. Considering that the adoption of industrial standardization is the sole responsibility of industry and that in-plant standardization should constitute the basis of national activities in this field, the standards engineers of the Directorate of Standards should orient part of their activities to strengthening in-plant standardization in relatively large industrial enterprises. Close co-operation between the Directorate and industry and the organization of seminars for management and training courses for engineers would greatly help in achieving this objective.

B. Testing

4. The Directorate of Standards lacks the minimum number of technical staff to put the laboratories into operation. Therefore, it is very strongly recommended that the required number of chemists, analysts, engineers, laboratory assistants and other ancillary staff should be recruited immediately.

5. Owing to the need to establish facilities for testing other industrial products, the sixth floor of the new premises should be allotted to accommodate textile testing, plastics and rubber testing, petroleum testing and non-destructive testing laboratories.

6. As the site of the ITQCL does not allow for any further extension of the built-up area, whether vertically or horizontally, the adjacent un-built site should be procured and reserved for future extension of the laboratories.

7. Consideration should be given to the close co-operation with or amalgamation of existing laboratories, such as those of the Ministry of Public Works, that seem to be in urgent need of the renewal of testing facilities and that might benefit from ITQCL facilities.

8. As a product is not improved by testing but only by the intelligent evaluation and use of the test results by the manufacturer, the Directorate of Standards should aim at offering technological services to industry.

9. Considering the importance of adopting an instrumentation policy, the idea of a government-operated national instrument service centre might sound appealing. However, such a centre would have to have well-trained specialists, equipment and parts-stock to take care of practically all instrument maintenance problems in the country. The establishment of such a centre would thus be very difficult, take a long time and it would be expensive to train the required specialists and to properly equip the centre. Consequently, in view of existing conditions and the drawbacks and dangers of centralization, it is recommended to adopt a policy of decentralized instrument maintenance for the main government laboratories in Jordan. Such a policy should be based on the following principles:

(a) The laboratory directors should be responsible for overall supervision;

(b) The supervisor should be encouraged to have a tradesman, technician or suitable laboratory assistant on his payroll. He should also be free to use any of his other staff, or the staff of other governmental or private laboratories, ministerial shops, agent shops, manufacturers' technicians and engineers etc.;

(c) Although the execution of instrument services and repair is a technical problem to be solved by the laboratories, awareness of the need for such services should originate at the top and be manifested by proper budget provisions and the encouragement of good housekeeping;

(d) Minimum provisions should be about 1-2% of current equipment replacement values per year, and higher if the laboratory has few or no spare parts;

(e) The maintenance budget should be given preference over new instruments;

(f) The gradual build-up of a spare-parts stock of from 5% to a maximum of 10% of current investment value is the responsibility of the individual laboratory director. Advice on parts to be stocked should be sought from the spare-parts lists of manufacturers, directly from factories or from their agents;

(g) Portions of the maintenance budget not utilized towards the end of the fiscal year should be used for the purchase of additional spare parts.

10. The ITQCL should have its own workshop, as should all main laboratories. The workshop should start small and its duty and manpower should be gradually enlarged as it proves itself by gaining a good reputation. Annex XII lists the necessary equipment for such a workshop.

11. An extensive two-year instrumentation programme should be planned and executed as soon as possible by the Ministry of Education who should seek further international assistance.

12. Because of the fast industrial development in Jordan, training should be for a lifetime rather than to fulfil some present task.

C. Quality control

13. The technical staff of the Quality Section of the Directorate of Standards should be augmented and should receive further intensive training, especially the newcomers.

14. In view of the role played by certification marking in persuading manufacturers to adopt national voluntary standards and thus obtain the benefits that accrue from standardization, the Directorate of Standards should take immediate steps to put the scheme for certification marking into operation once the ITQCL starts its activities.

15. In the domain of industrial quality control, the Quality Section of the Directorate of Standards should concentrate on getting the various recommendations of the project personnel carried out in the three enterprises in which there have been extensive activities. The aim, at this stage should be to demonstrate to management that the adoption of modern quality control techniques in industrial enterprises will result in increased profits. Success

in this direction will undoubtedly make other companies follow the lead with the result of raising the quality, and hence the reputation, of Jordanian products in both local and export markets, which is one of the main targets of industrial standardization and quality control.

16. As the Quality Section of the Directorate of Standards becomes more firmly established, it should expand and develop its activities by investigating and assisting more companies and by introducing and implementing more sophisticated methods.

D. Legal metrology

17. In order to provide a sound internationally-based metrological service in Jordan, measures should be taken, as soon as possible, to issue a new law on legal metrology, the draft of which was elaborated by the project (annex VIII). The law as drafted provides for the services to be revenue-earning and for the revenue collected to be applicable to the improvement of the service. Ancillary legislation, i.e., ministerial regulations and departmental specifications, can be prepared using this report and the relevant appendices for guidance.

18. Though an extremely useful body, performing its duties to the utmost of its capability, the present inspectorate is inadequate both in number and expertise to mount even the most rudimentary programme of regular metrological inspection and testing. Also, additional responsibilities are always arising. Therefore, the necessary staff of a higher educational level (annex IX) should be recruited as soon as possible.

19. To up-grade the technical level of inspectors, the present inspectorate and the inspectors to be recruited must have further practical training, preferably overseas. In this connection, arrangements should be sought with the Egyptian Weights and Measures Department for the attachment of Jordanian inspectors for on-the-job practical training for at least two-months.

20. To prepare for the enforcement of the Precious Metals Act, arrangements should be made for the practical training of the staff at the Goldsmiths Hall, London and/or the Egyptian Weights and Measures Department.

21. In order to strengthen metrological activities in Jordan, which are so badly needed, consideration should be given to the adoption of the Plan

for the Organization of the Metrological Services Section (annex IX), and in particular to the following steps:

(a) The establishment of a district weights and measures office in Irbid to serve the Governorates of Irbid and Balqa, because:

- (i) The two governorates have an approximate population of 650,000;
- (ii) The agricultural produce of the Jordan Valley which is of vital importance to the economy of Jordan requires readily available metrological services;
- (iii) Of the presence of an industrial estate;
- (iv) Irbid is a university town;

(b) The provision of means for testing and calibrating high capacity weighing machines, such as truck weighbridges, since they have an important role in the industrial, agricultural and mining operations of Jordan but are not subject to control;

(c) The provision of facilities for testing bulk liquid fuel meters since heating oil is an item of everyday consumption in Jordan.

22. In order that the high precision and costly H-Section metre bar, at present in possession of the Government, may be put into use, a 2-microscope transverse comparator bed should be procured. It would then be possible to up-grade the Jordan National Standard Metre by the substitution of this high precision metre for the Indian Mint Metre now considered as the National Standard.

E. Information

23. In view of the important role played by standards information in promoting standardization activities, the Directorate of Standards should, in the post-project period, continue the development of the nucleus already established. It should recruit a qualified librarian who must be trained on standards information in one, or both, courses organized by ASMO and the ISO. The Directorate's annual budget should always contain sufficient funds to procure the necessary equipment.

F. Training

24. To carry out their assignments most efficiently, standards and quality engineers of the Directorate of Standards should be given

special technical and administrative training. It should be emphasized that this training is essential not only to give them the necessary skill to properly perform their duties at the Directorate, but also to enable them to guide, direct, supervise and, at a later stage, train the technical staff of industrial enterprises. Fortunately, there are available at present a large variety of good training courses that do not involve any costs on the part of the participants. Consequently, the Directorate of Standards should not miss any opportunity offered by overseas bodies to train its staff in standardization, quality control and metrology.

G. International activities

25. The Directorate of Standards, within the next few years, should arrange to convert its membership in the ISO and the OIML to active membership and it should participate in the technical work of these two organizations.

H. General

26. The technical staff is the pivot of any national standards body since it is the machinery responsible for carrying out its functions. However, the Directorate of Standards suffers from a severe shortage of technical staff. There is great difficulty in recruiting recent graduates and even greater difficulty in keeping the recruited personnel for long periods within the staff of the Directorate. During the project 11 employees left the Directorate, a trend which, if allowed to continue, will hamper, to a great extent, the stability and functions of the Directorate. Although a remedy for this cannot be suggested, an improved salary structure is of great importance. Consequently, it is strongly recommended that no effort should be spared in securing the required staff for the Directorate of Standards and that serious consideration should be given to approving a special service scheme for its staff involving improvement in service conditions.

27. Many activities of the Directorate of Standards have to be carried on outside its premises. Standards engineers have to visit industrial enterprises to study their processes and specifications before elaborating national standards. Quality engineers have to make frequent surprise visits to mark licensees to inspect their control systems and to ensure that they abide by

the terms of licences to use the quality mark. Quality inspectors have to take samples from licensees' plants, and from markets as well, to be tested in the ITQCL to check their conformance with the relevant standards. They also have to take samples of products covered by mandatory standards to be tested to verify their compliance with these standards. Finally, weights and measures inspectors are mainly field officers. They carry out the majority of their activities outside the premises of the Directorate of Standards. In addition, they have to carry around on all their duties bulky testing equipment. For lack of transport, many of the important activities of the Directorate of Standards had to be cancelled and few of the projects's working standards were used in field verification duties. It is therefore strongly recommended that at least two station-wagon type vehicles should be made available on a full-time basis, to the staff of the Directorate of Standards: one for standards and quality engineers and inspectors, and the other, with suitable fittings for the proper transport of standards equipment, for the exclusive use of the Legal Metrology Section.

28. None of the activities of any national standards body can be carried out without having direct contacts in many circles, such as governmental departments, technical and scientific societies and institutes, industry, trade, and the public. For these activities to be successful, the national standards body will have to be made known through public relations especially in developing countries where standardization is a new, and unknown, part of the society. By helping to present the national standards body actively, the public relations department makes a major contribution to the implementation of standards. It is for such reasons that public relations has become an established, vital and even respectable part of the national standards body in many countries. Therefore, the Directorate of Standards should have on its payroll a highly qualified and energetic public relations officer.

Annex I

INTERNATIONAL STAFF

Name	Function	Period of service	
		Starting	Concluding
A. Geneidy	Project manager	July 1973	July 1977
K. Nielsen	Consultant	Sept. 1974	Oct. 1974
G. E. Knight	Expert, quality control	Oct. 1974	Dec. 1975
L. Theobald	Expert, legal metrology	Jan. 1976	Feb. 1977
H. D. Meley	Consultant	May 1976	June 1976

Annex II

COUNTERPART STAFF

Post	Name	Fulltime	Assumed duty		Remarks
			Scheduled	Actual	
Project co-manager	Habaybeh, A.	F	July 1973	July 1973	Left in June 1975
	Lala, D.	F		July 1975	Left in June 1976
	Taha, S.	F		Oct. 1976	
Testing laboratory	Kakish, I.	F	Jan. 1974	July 1973	Left in Oct. 1975
Legal metrology	Roussan, A.	F	Jan. 1974	Aug. 1974	Left in Aug. 1975
	Kilany, A.	F		Sept. 1974	Recruited June 1974 as chemist
Quality control	Halteh, R.	F	Jan. 1974	July 1973	
Standards engineer	Khassawnah, M.	F	July 1973	July 1973	
Standards engineer	Mehyar, M.	F	July 1973	Oct. 1973	
Standards engineer	Katarnah, S.	F	July 1973	Apr. 1975	
Standards engineer	El-Meany, F.	F	July 1973	Apr. 1975	Left in Nov. 1975
" "	Shamleh, A.	F		Nov. 1975	Left in Nov. 1976
" "	Ansouka, R.	F		Dec. 1976	
Standards engineer	Nobani, S.	F	July 1973	Nov. 1975	Left in May 1976
" "	Abu-Touqa, H	F		July 1976	
Standards engineer	Hiyari, A.	F	July 1973	Nov. 1975	Left in June 1976
" "	El-Sherif, F.	F		Oct. 1976	
Analyst/chemist/ chemical engineer	Qeheiw, S.	F	Jan. 1974	Oct. 1975	
Analyst/chemist/ chemical engineer	Idris, N. M.	F	Jan. 1974	Nov. 1975	
Analyst/chemist/ chemical engineer	El-Ashi, M.	F	Jan. 1974	July 1976	
Analyst/chemist/ chemical engineer	Issa, F.	F	Jan. 1974	July 1976	
Analyst/chemist/ chemical engineer		F	Jan. 1974		

Post	Name	Fulltime	Assumed duty		Remarks
			Scheduled	Actual	
Analyst/chemist/ chemical/engineer		F	Jan. 1975		
Analyst/chemist/ chemical/engineer		F	Jan. 1975		
Analyst/chemist/ chemical/engineer		F	Jan. 1975		
Mechanical testing	Hasser, H.	F	Jan. 1974	July 1973	Left in July 1974
Mechanical testing	Dawahir, B.	F		July 1974	Recruited Oct 1973 Standards engineer
Quality control		F	Jan. 1974		
Librarian	El-Mallah	F	Jan. 1974	June 1976	
Certification marking	Saudi, H.	F	Jan. 1974	June 1974	
Chief inspector	El-Nazer, J.	F	July 1973	July 1973	Loaned to Yemen, May 1974. Resumed duty Oct. 1976
Inspector	Nosour, A.	F	July 1973	July 1973	
Inspector	El-Azzab, A.	F	July 1973	July 1973	
Inspector	El-Abbadi, H.	F	July 1973	July 1973	
Inspector	Abu-Shousheh, I.	F	July 1973	July 1973	Left in July 1974
Inspector	Abu-Khalid, I.	F	July 1973	July 1973	Left in July 1974
Inspector	El-Moasher, S.	F	July 1973	Apr. 1975	
Inspector	El-Zoibi, F.	F	Jan. 1974	Mar. 1976	
Inspector	El-Sabaa, H.	F	Jan. 1974	Mar. 1976	
Inspector		F	Jan. 1975		
Inspector		F	Jan. 1975		
Inspector		F	Jan. 1975		
Inspector		F	Jan. 1975		
Inspector		F	Jan. 1975		
Inspector		F	Jan. 1975		
Laboratory assistant a/		F	Jan. 1974		

Post	Name	Fulltime	Assumed duty		Remarks
			Scheduled	Actual	
Laboratory assistant <u>a/</u>		F	Jan. 1974		
Laboratory assistant <u>a/</u>		F	Jan. 1974		
Laboratory assistant <u>a/</u>		F	Jan. 1974		
Laboratory assistant <u>a/</u>		F	Jan. 1974		
Laboratory assistant <u>a/</u>		F	Jan. 1974		
Laboratory assistant <u>a/</u>		F	Jan. 1974		
Laboratory assistant <u>a/</u>		F	Jan. 1974		
Draftsman		F	Jan. 1975		

a/ These posts have not been recruited owing to the unfinished laboratory premises.

Annex III

FIELD VISITS AND STUDIES BY INTERNATIONAL STAFF

Government departments

Directorate of Industry, Ministry of Industry and Trade
Department of Statistics
Government Central Purchase Department
Aqaba Municipality
Aqaba Port Authority

Testing laboratories

Laboratory of the Department of Agricultural Research and Extension,
Ministry of Agriculture
Directorate of Laboratories, Ministry of Public Works
Mining and Water Laboratories, National Resources Authority
Chemical and Bacteriological Laboratories of the Municipality of Amman
Customs Laboratory, Ministry of Finance, Aqaba
Mechanical and Electronic Laboratories, Royal Scientific Society
Laboratories of the Ministry of Public Health
Industrial Laboratory, Ministry of Defence
Laboratories of the Chemistry and Physics Departments, University of Jordan

Industrial establishments

Agricultural Processing Company
Al-Amal Industrial Company
Aluminium El-Haris Company
Arab Pharmaceuticals Manufacturing Company
Arab Plastic Products Company
Ayoubi Metal Furniture Company
The Foundry and Mechanical Works Company
The Industrial, Commercial and Agricultural Company (ICA):
 Biscuit factory
 Can Making Factory
 Ice Cream Factory
 Pharmaceutical Preparation Factory
 Soap Factory

Industrial Development Co., Ltd.
Jordan - Bata Co. Ltd
Jordanian Aluminium and Copper Manufacturing Company
Jordanian Aluminium Manufacturing Company
Jordanian Brewery Co., Ltd.
Jordanian Cement Factories
Jordanian Ceramics Factories Company
Jordanian Confectionery and Chocolate Co., Ltd.
Jordanian Dairy Products
Jordanian Imperial Knitting Co., Ltd.
Jordanian Iron and Steel Industries
Jordanian Nails and Barbed Wire Manufacturing Company
Jordanian Paper and Cardboard Factories Company, Ltd.
Jordanian Petroleum Refinery Co., Ltd.
Jordanian Phosphate Mines Co., Ltd.
Jordanian Tanning Co., Ltd.
Jordanian Tobacco and Cigarette Co., Ltd.
Jordanian Worsted Mills Co., Ltd.
Kerosene Stoves Factory
Manara Shoe Factory
Modern Flour Mills and Macaroni Factories Company
National Foam Rubber Factory
Nugul Brother Paper Products Factory
Petra Plastic Products Company
Sesame Pressing Factory
Steel Yard Factory
United Industries Company
United Textile Mills Company
Woolen Industries Co., Ltd.

Other bodies

Amman Chamber of Commerce
Amman Chamber of Industry
Association of Engineers
ILO Vocational Training Centre
Goldsmiths and Jewellers Association
Mouasher Cousins Company
Munir Sukhtien Co., Ltd.
Tareq Scientific Bureau

Annex IV

**QUESTIONNAIRE
ON THE STATUS OF STANDARDIZATION, QUALITY CONTROL AND METROLOGY
IN INDUSTRIAL ESTABLISHMENTS**

1. General information

1.1 Name of Establishment:
1.2 Type of establishment:

1.3 Address:
1.4 Tel No.:
1.5 Capital:

1.6 No. of Employees :
1.7 Name of President:
1.8 Name of Technical Director :

2. Products

Products	Capacity ^{a/}	Production				Exports		Standards adopted	Measure-ment system used	Is product tested? and where?	% of conformity	Method of disposal of sub-standard product	Remarks
		1972		1973		1972	1973						
		Quan-tity	JD	Quan-tity	JD	Quan-tity	JD						
Main products													
a.													
b.													
c.													
d.													
e.													
f.													
g.													
By-products													
a.													
b.													
c.													

^{a/} Capacity should be based on an eight-hour operation daily for 300 days per year. Please mention production units.

3. Raw and intermediate materials

Material	Annual consumption ^{b/}		Country of origin ^{c/}	Measurement system for procurement	Standards for procurement	Is material tested? and where?	% Conformity	Method of disposal of sub-standard material	Remarks
	1973								
	Quantity	JD							
a.									
b.									
c.									
d.									
e.									
f.									
g.									
h.									
i.									
j.									
k.									
l.									
m.									

b/ Please mention units of measurement.

c/ Please put "Local" if material is produced in Jordan.

3.1 Is there any difficulty in obtaining materials conforming to certain specifications? Yes/No
In the affirmative, please mention:

3.2 Place and method of storing materials:

4. Production

4.1 Method of production: batch/continuous

4.2 Number of daily shifts:

4.3 Brief description of process:

- 4.4 Method of packaging:
- 4.5 Place and method of storing products:
- 4.6 Technical staff working in production:

<u>Name</u>	<u>Qualifications</u>	<u>Date of graduation</u>	<u>Past experience</u>	<u>Date of present employment</u>	<u>Present post</u>	<u>Remarks</u>
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- a.
- b.
- c.

5. Quality control

- 5.1 Is there any specific section for quality control?
- 5.2 In the affirmative, what is its name?
- 5.3 Is the section responsible for inspecting finished products?
- 5.4 Name and qualifications of chief of section:
- 5.5 To which division or department does this section belong?
- 5.6 Is there any quality control manual?
- 5.7 What are the control points?
- 5.8 Is there any testing laboratory for quality control?
- 5.9 Tests carried out:

<u>Material or product</u>	<u>Properties tested</u>	<u>Standard test methods adopted</u>	<u>Remarks</u>
		ISO, ASTM, BS, DIN etc.	

- a.
- b.
- c.
- d.
- e.

5.10 Laboratory equipment

Apparatus Maker Date of purchase Tests carried by apparatus Remarks

- a.
- b.
- c.
- d.

5.11 Technical staff working in quality control and/or laboratory

Name Qualification Date of graduation Past experience Date of present employment Present post Remarks

- a.
- b.
- c.
- d.

- 5.12 Where are test results recorded?
- 5.13 Are test results submitted in periodic reports? Yes/No
- 5.14 In the affirmative, mention the periodicity of the report: every day/week/month/year
- 5.15 To whom or to which division is this report submitted?

- 6. Metrology
- 6.1 Are there standards for calibrating measuring instruments used in production or quality control?
- 6.2 What is the section responsible for measurement and calibration?
- 6.3 Name and qualifications of chief of section:
- 6.4 To which division or department does this section belong?
- 6.5 Equipment:

Apparatus Maker Date of purchase Date of latest calibration Types of measurement performed Remarks

- a.
- b.
- c.

6.6 Technical staff working in metrology:

Name Qualifications Date of graduation Past experience Date of present employment Present post Remarks

- a.
- b.
- c.
- d.
- e.

7. Future projects

Project	Capital JD	Scheduled date of production	Main products	Annual a/ capacity	Standards to be adopted	Measuring system to be used	Remarks
a.							
b.							
c.							
d.							
e.							
f.							
g.							

8. Present and future needs for national standards

In each of the following fields, what are the subjects you wish to be standardized?

- a. Terminology
 - 1.
 - 2.
 - 3.

b. Raw materials, intermediates and finished products

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

c. Methods of sampling, testing and inspection

- 1.
- 2.
- 3.

d. Measuring instruments

- 1.
- 2.
- 3.

e. Methods of calibration

- 1.
- 2.
- 3.

f. Codes of practice

- 1.
- 2.
- 3.

9. Miscellaneous

9.1 Do you wish to have some of your technical staff be trained in:

Standardization?	Yes/No
Quality control?	Yes/No
Testing?	Yes/No
Measurements?	Yes/No

9.2 What are the technical and/or sanitary regulations you have to follow?
9.2 Any other comment?

<u>Date</u>	<u>Name of person who has filled in this questionnaire</u>	<u>Post</u>	<u>Signature</u>
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Annex V

RECOMMENDED DRAFT LAW FOR THE ESTABLISHMENT OF
THE JORDANIAN ORGANIZATION FOR STANDARDS AND QUALITY

I. CITATION AND INTERPRETATION

Article 1. Citation and Date of Coming into Effect

This Law shall be cited as the "Jordanian Organization for Standards and Quality Law of 197 ..." and it shall come into effect as of the date of its publication in the Official Gazette.

Article 2. Interpretation

The following words and phrases used in this Law shall have the meanings hereby assigned to them unless the context otherwise requires:

Kingdom	the Hashemite Kingdom of Jordan.
Government	the Government of the Hashemite Kingdom of Jordan.
Council	the Council of Ministers.
Ministry	the Ministry of Industry and Trade.
Minister	the Minister of Industry and Trade.
Organization	the Jordanian Organization for Standards and Quality created under the provisions of this Law.
Board	the Board of Directors of the Jordanian Organization for Standards and Quality composed under the provisions of this Law.
Director General	the Director General of the Jordanian Organization for Standards and Quality duly appointed and authorized as such under Article 17 by whatever name called.
Officer	a person who is duly appointed and authorized as such under Article 20 by whatever name called.
Inspector	a person who is duly appointed and authorized as such under Article 20 by whatever name called.
Person	includes any governmental department or office or any company, partnership, association, society, authority, organization, institution or body of persons, corporated or unincorporated.

Standard	includes: (a) The specification or description of a commodity including one or more of the following matters: the name of the commodity, its classification, grading, composition, weight, quantity, dimensions, properties, performance or characteristics of the commodity or of its parts; (b) The specification of methods of test or measure of a commodity or its parts and or the procedures for sampling and inspection during production as regards the matters in (a) above; (c) The specification of the packaging of a commodity or commodities or the labelling thereof; (d) The specification (which is called code of practice) of recommended methods for the production, use, maintenance or method of installation or arrangement of any commodity or assembly of commodities; (e) The specification of the nature and method for the marking of a commodity; (f) The specification of unified systems or methods for greater efficiency in industry and trade.
Standard mark	a mark which in terms of Article 12 (a) has been declared to be a standard mark for the commodity in respect of the manufacture, production, treatment or processing of that commodity.
Licence	a permit issued in respect of the application of a standard or a standard mark, or a system provided for in a standard.
Commodity	any article, goods, product, material or substance of trade, industry or agriculture.
Premises	includes: (a) A place where any business, industry, production or trade is carried on by a person, whether by himself or through an agent, by whatever name called; (b) A warehouse, godown or other place where any commodity is stored or exhibited;

(c) A place where any books of account or other documents pertaining to any trade or transaction are kept;

(d) A dwelling house, if any part thereof is used for the purpose of carrying on of any business, industry, production or trade.

II. ESTABLISHMENT OF THE ORGANIZATION

Article 3. Creation of the Organization

An organization is hereby established to be known as the "Jordanian Organization for Standards and Quality" with the abbreviation of JOSQ.

Article 4. Status of the Organization

The Organization shall be a body corporate with financial and administrative autonomy. It shall be attached to the Ministry and shall be represented by the Minister who is its president.

Article 5. Head Office and Branches

The Head Office of the Organization shall be at the capital, but it shall have the right to establish branches within the Kingdom, as the Board may determine.

III. OBJECTIVES, FUNCTIONS AND OPERATION

Article 6. Objective

The objective of the Organization is to promote the wide application of standardization principles and techniques in all sectors of national activities, with a view to attaining optimum overall economy through the efficient utilization of indigenous raw materials, savings in materials, machinery, resources, energy, time, effort, reduction of costs, improvement of quality, interchangeability, reliability, durability, dependability and maintainability of industrial goods, thus ensuring fairness in commercial transactions and safeguarding the health, interests and safety of consumers, the control of imports and the promotion of exports.

Article 7. Functions

The Organization shall, with a view to attaining its objective, make use of all possible means and, in particular, it shall:

(a) Prepare and promote the general adoption of standards on a national, regional and international basis, relating to structure, commodities, materials, practices, operations, processes, matters and things;

(b) Promote standardization, quality control and simplification in industry, commerce and services and issue national standards with a view to improving product quality, industrial efficiency and productivity and the promotion of trade so as to achieve optimum benefits for the community, including the health, safety and welfare of the public and the protection of the consumer;

(c) Prepare, frame, revise, alter, modify, amend, publish and sell standard specifications and codes of practice, subject to full consultation with the responsible authority on any standards which may be related to an existing law;

(d) Specify standard certification marks of conformity to standards and issue and control licences for the use or affixing of these marks to commodities, goods or materials or in other ways control the use of such marks or other distinctive marks related to specification requirements and institute such quality control service as is required for this work as well as take steps to increase quality consciousness and quality control knowledge in the various levels of production personnel;

(e) Encourage or undertake promotional work through educational and other means in connection with standardization in all its aspects, including establishment of a library or documentation centre for standards and standards matters;

(f) Make arrangements or provide laboratories and other facilities for the examination, testing and quality control of commodities and any material or substance from or with which commodities may be manufactured, produced, processed or treated;

(g) Maintain primary, secondary and other standards of measurement;

(h) Make arrangements or provide facilities for the testing and calibration of measuring instruments, gauges and other measuring apparatus, for the determination of their degree of accuracy by comparison with standards approved by the Minister on the recommendation of the Organization, issue certificates of verification and calibration for such instruments or measuring systems and support and encourage the development of measuring techniques;

(i) Provide standard reference materials as may be needed;

- (j) Perform such functions and tasks in connection with the introduction of the SI units of measurements in the Kingdom as the Minister may from time to time assign to the Organization;
- (k) Co-ordinate the efforts of producers and users for the improvement of materials, products, appliances, processes and methods;
- (l) Procure the recognition of the Organization in any foreign country or place or regional or international organization;
- (m) Represent the Kingdom in regional and international discussions on standardization and further regional and international co-operation in the field of standards;
- (n) Co-ordinate all activities relative to its objects throughout the Kingdom and co-operate accordingly with other departments and organizations that may be engaged in such fields of activity so as to achieve a unified approach to standards work and representation, and the unification of standard specifications;
- (o) Do all such other lawful things as the Organization may think expedient or conducive to the attainment of any or all of the objectives of the Organization mentioned above.

Article 8. Operation

- (a) The Organization for Standards and Quality shall be the sole authority for the representation of the Kingdom in negotiations with other countries on standards matters and in the regional and international standards organizations and a representative of the Kingdom at regional and international standards meetings shall derive his authority as a delegate from the Organization;
- (b) The Organization shall have the exclusive authority to designate a specification as a standard. The Organization shall publish the standard and provide for its indexing and availability for public reference;
- (c) The Organization may endorse any regional, international or other overseas standard specification as an adopted standard;
- (d) The Organization may become a member of or affiliate to any regional or international body concerned with standardization or any related matter.

IV. MANAGEMENT AND STAFF

Article 9. Administrative Structure

The Organization shall be managed and operated by:

- (a) A Board of Directors;
- (b) A Director General;
- (c) A staff of officers, specialists, inspectors and employees.

Article 10. Composition of the Board

The board shall be composed as follows:

- (a) The Minister of Industry and Trade; President
 - (b) Not less than seven and not more than ten representatives of ministries and public authorities;
 - (c) Not less than five and not more than eight representatives of major interests affected by the operation of the Organization;
 - (d) Not more than three members of distinction in the community of Jordan in their personal capacity appearing to the Minister to be of interest and capable of contributing substantially to the realization of the objectives of the Organization;
 - (e) The Director General. Secretary
- } Members

Article 11. Appointment of the Board

The Board shall be appointed by the Council for a period of three years on the recommendation of the Ministers.

Article 12. Powers of the Board

The Board is the supreme authority of the Organization. It shall exercise all the powers necessary to administer and control its operations. It shall determine the general policy of the Organization, draw up its plans and programmes, follow up its activities and supervise its technical, administrative and financial affairs.

In attaining the objectives of the Organization and protecting its aims, the Board can take whatever measure or decision it deems necessary and, in particular, it shall:

- (a) Prepare and propose general regulations which shall be followed in the preparation and review of standards;

- (b) Formulate standards programmes and keep them up-to-date;
- (c) Ensure or arrange for the application of regional and international agreements concluded by the Kingdom in regard to standards;
- (d) Receive recommendations for investigations and research in relation to the objective of this Law and make provision, as found desirable, for such work to be carried out;
- (e) Arrange for the publication of standard certifications, codes, reports, bulletins and other documents;
- (f) Set up the councils and committees required for the preparation or adoption of standards and be responsible for the documentation, operation and co-ordination of these councils and committees including provision for representation of governmental departments and other bodies of standing in relation to this work;
- (g) Prepare and propose regulations for the operation of standard mark schemes including quality control arrangements;
- (h) Organize facilities or establish laboratories or take other desirable measures to advance the objectives of the Organization, including those concerned with quality control, such as testing, examination evaluation and rating of goods, and other matters associated with the implementation of standards such as in-plant assistance and research or inquiry into consumer needs;
- (i) Arrange facilities or provide laboratories and other desirable services to aid measurements and the development of measuring techniques, the calibration of instruments and other measuring systems and provide for other general needs of metrology service;
- (j) Nominate candidates for fellowships, study leaves and missions;
- (k) Nominate the Organization's representatives in local, regional and international meetings, seminars and conferences;
- (l) Set out the internal regulations and rules for the conduct of the activities of the Organization;
- (m) Determine the fees due to the Organization for services rendered by it;

- (n) Sanction the Organization's annual budget and approve its final account before it is submitted to the competent authorities;
- (o) As soon as possible after the end of each year, prepare and publish a report on the activities of the Organization during the preceding year;
- (p) Provide a seal and also provide for its safe custody. The seal of the Organization shall not be affixed to any instrument except under the authority of the Organization and in the presence of two members of the Board or such other persons as the Board shall appoint for the purpose; and those two members or other persons as aforesaid shall sign every instrument to which the seal of the Organization is so affixed in their presence;
- (q) Do all such other lawful acts as would be conducive to the objectives and interests of the Organization;
- (r) In pursuing the objectives of the Organization and exercising its power under this Article, the Board shall, to the greatest extent practicable, operate through the services and facilities of existing governmental organizations engaged in standards preparation and testing and shall promote co-operation and co-ordination between all such bodies so as to achieve maximum compatibility of standards, codes, and testing practices through standards and an aligned viewpoint for the Kingdom in the regional and international standards fora.

Article 13. Meetings of the Board

The Board shall hold its meetings on the written summons of the President or on a request of at least one third of its members issued not less than 10 days before the date fixed for holding such meetings. The Board shall hold at least one meeting every four months.

Article 14. Quorum of the Board

The presence of the absolute majority of members shall constitute a quorum and, in case the Minister is absent, he shall nominate a chairman who shall preside over the meeting.

Article 15. Decisions of the Board

The Board shall determine its own proceedings. The decisions of the Board shall be adopted by the absolute majority of the members present. In the event of a tie, the chairman of the meeting shall have a casting vote.

Article 16. Delegation of Power

The Board may delegate, at its discretion, part of its powers to a committee formed from among its members or to an individual member. It may also charge one of its members or one of the Organization's employees to perform a definite duty or task.

Article 17. Appointment of the Director General

(a) The Director General shall be appointed by a resolution made by the Council on the recommendation of the Minister;

(b) The salary of the Director General shall be determined in the resolution of appointment, as stated in Sub-Article (a) above;

(c) If the Director General is absent, an officer or employee delegated by the Minister shall act for him.

Article 18. Duties of the Director General

The Director General shall, subject to the direction of the Board, be responsible for the conduct of the activities of the Organization. He may at his discretion delegate authority in these matters to officers of the staff.

Article 19. Recruitment of the Organization's Staff

(a) The Organization shall have its own staff of officers and employees. The selection and appointment of such staff, determination of their terms of service, salaries and jurisdiction, termination of their services, and all other matters relating thereto shall be made under a special service system;

(b) The provisions of the Civil Pensions Law in force shall apply to the officers of the Organization.

Article 20. Delegation and Secondment of Officers and Employees to the Organization

Any officer or employee of the Government or of any public institution may be delegated or seconded to the Organization to hold full or part time employment therein and such employment shall be considered as a continuation of his former service.

Article 21. Remuneration of Members of the Board, Councils and Committees

The remuneration of members of the Board, councils, committees and working groups shall be determined in a resolution taken by the Council on the basis of the number of meetings attended.

V. FINANCIAL AFFAIRS

Article 22. Financial Year

(a) The financial year of the Organization shall commence on 1 January of each year and end 31 December of the same year;

(b) The first financial year of the Organization shall commence from the date this Law comes into effect and end on 31 December of the same year.

Article 23. Preparation of the Budget

The Director General shall prepare the budget not later than 31 December of each year and submit the same to the Board for approval.

Article 24. Organization's Budget

The Organization's budget consists of the following resources:

(a) The amount allotted to the Organization in the Government Budget;

(b) Fees and charges paid to the Organization for services rendered by it;

(c) All money derived by the Organization for the sale of its publications and those of similar organizations overseas;

(d) All money paid to the Organization by way of grants, subsidies, donations, gifts and wills, if accepted by the Board.

Article 25. Auditing of Accounts

The accounts of the Organization shall be audited by the Audit Bureau of the Government.

VI. STANDARDS

Article 26. Preparation of Draft Standards

Drafts of Jordanian Standards shall be prepared by technical committees which shall be formed, as far as possible, from representatives of producers, dealers, consumers, specialists and concerned authorities. The drafts shall be given wide distribution to interested parties and authorities for consideration and comments.

Article 27. Issuance of Standards

The Director General shall submit the final draft standards to the Board for consideration and approval if deemed fit. The approval of Jordanian Standards shall be announced in the Official Gazette. The date of announcement shall be considered as the date of issuance of the Jordanian Standards.

- Article 28. Provisional Standards
Notwithstanding the provisions of Article 27, the Board may, on recommendation of the Director General, issue provisional standards with a view to testing their practical feasibility before approval as Jordanian Standards.
- Article 29. Voluntary Nature of Jordanian Standards
The adoption of Jordanian Standards shall be voluntary.
- Article 30. Government and Public Purchasing
Notwithstanding the provision of Article 29 of this Law, all ministries, governmental departments, agencies, organizations, and public establishments, and all municipal, local and rural councils shall, with respect to all their purchases, be bound to the relevant Jordanian Standards.
- Article 31. Mandatory Standards
Notwithstanding the provisions of Article 29 of this Law, the Council, on recommendation of the Minister, when necessary in the public interest or for the more effective development of the economy or in relation to a regional or international agreement or for any other reason considered to be sufficient, may by order to be published in the official Gazette of the Kingdom designate specified Jordanian or other standards as standards to be applied without exception throughout the kingdom and no person shall manufacture, import, sell or otherwise trade in any commodity or material covered by such mandatory standards unless the commodity is in accordance with the provisions of the standards except in so far as the Council may so declare in the order designating these standards.
- Article 32. Control of Fitness of Exports
Notwithstanding any other law existing in the Kingdom, the Council, on recommendation of the Minister, in the interests of the reputation of the Kingdom in export markets or an export market, may declare by order to be published in the Official Gazette that a specified commodity may only be exported if it conforms to the relevant standard for that commodity or for the packaging of that commodity or both and no person shall sell for export from Jordan such commodity unless that commodity so conforms to the specified standard or standards except in so far as the Council may authorize otherwise in specific cases.
- Article 33. Supervision of Implementation of Mandatory Standards
The Organization shall be responsible for supervising the implementation of mandatory standards. It may delegate this power to any other governmental authority.
- Article 34. Restriction on the Use of the Word Standard
Any person who:
- (a) Carries on activities under a name which contains the word "Standard" or registers under such a name, with the exception of all those persons

already registered under such a name before the commencement of this Law;

(b) Registers under any law of the Kingdom a trade mark which contains the word standard, with the exception of all those trade marks already registered before the commencement of this Law;

Shall be guilty of an offence under this Law.

VII. CERTIFICATION MARKING

Article 35. Standard Mark

(a) The Organization may, by public notice, declare any mark adopted by it in respect of a standard for the manufacture, production or processing of any commodity to be a standard mark for that commodity and in like manner may abolish or amend any such mark;

(b) No mark which is identical with any trade mark already registered under any other law of the Kingdom or so nearly resembles any such mark as to be likely to be mistaken for it shall be declared to be a standard mark;

(c) No mark identical with any mark which has been duly declared to be a standard mark or so nearly resembles such a mark as to be likely to be mistaken for it, shall be registered as a trade mark under any other law of the Kingdom.

Article 36. Standard Mark Overseas

The Organization may register the standard mark overseas through a resolution taken by the Board. The Organization may also conclude agreements with overseas bodies to use the standard mark on conditions approved by the Board.

Article 37. Application of the Standard Mark

No person shall apply a standard mark to any commodity except under a licence issued by the Organization for Standards and Quality and unless that commodity conforms to the relevant standard. For the purpose of this Sub-Article, a person shall also be deemed to have applied a standard mark if he applies it to any receptacle, covering or label for that commodity or makes any reference in connection with the sale of that commodity which could be expected to convey the impression that the commodity complies with the standard to which that standard relates.

Article 38. Licence

The Board or any person acting under its authority may, at its discretion, issue or refuse to issue a licence under Article 37 and any licence may be issued for such period and such conditions as the Board or such person may specify.

Article 39. Fees

A licence for the use of a standard mark or for its renewal shall be subject to such fee as the Board may prescribe.

Article 40. Protection

The fact that any commodity, process or practice conforms or is alleged to conform to a standard specification or the fact that a standard mark is used in connection with any commodity or material shall not give rise to any claim against the Board or the Organization or the Minister or the Ministry.

Article 41. Power of Director, Officers and Inspectors

(a) For the purpose of performing the duties imposed on him by or under this Law, the Director, an Officer or an Inspector may:

(i) At any time during business hours enter upon any premises in which any commodity, practice, or process in respect of which a licence has been granted is manufactured or employed by a licensee with a view to ascertaining that the standard mark is being used in accordance with the terms and conditions specified by the Organization and that the scheme of routine inspection, examination, testing and quality control specified by the Organization is being correctly followed;

(ii) Inspect and take samples from such premises of any such commodity or material used or intended to be used in the manufacture of such commodity which is marked with a standard mark;

(iii) Inspect any process on such premises in respect of which the licensee has been given the authority to use the standard mark;

(iv) Examine the records kept by a licensee relating to the use of the standard mark;

(v) At any time during the usual business hours enter the premises of any person who is not licensed and in respect of whom the Organization has reasons to believe that a standard mark prescribed for any commodity or process is being used or affixed by such person on any commodity manufactured, produced, processed or treated by him in contravention of the provisions of this Law and these regulations and inspect any operation carried out in or upon such premises and take samples of any such commodity or material used or believed to be used in the manufacture, production, processing or treatment of such commodity or open any package or container which contains or is believed to contain any quantity of any such commodity, material or substance;

(b) The Director, every Officer and every Inspector shall, when required to enter into any premises for the purpose of this Law, be provided with a certificate of his appointment or any other document or identity card certifying such appointment, as may be specified, which he shall produce if required to do so.

VIII. LEGAL AFFAIRS

Article 42. Offences Committed by Persons Exercising Powers under this Law

Any person exercising powers under this Law or any regulation made thereunder who:

(a) Wilfully discloses, except in the performance of his duties, to any person any information obtained by him with regard to any trade secret or any secret in relation to any formula, process or practice;

(b) Knowing that there are no reasonable grounds for so doing, searches any premises, means of conveyance or place, or seizes any commodity or any movable property;

(c) Causes the doing of any such act as referred to above;

Shall be guilty of an offence under this Law and shall be liable to imprisonment not exceeding twelve months or to a fine not exceeding one hundred dinars or to both such penalties.

Article 43. Obstruction of Director or Officer or Inspector

Whomever:

(a) Shall obstruct the entry of the Director, Officer or Inspector to any premises in which a practice or process is carried on under licence for the purpose of:

(i) Ascertaining that the standard mark is being used in accordance with the terms and conditions imposed by the Organization and that the scheme of routine inspection, examination, testing and quality control specified by the Organization is being correctly followed;

(ii) Inspecting and taking samples of any such commodity or any material used or intended to be used in the manufacture of such commodity which is marked with a standard mark;

(iii) Inspecting any process or practice of such premises in respect of which the licence has been given the authority to use the standard mark;

(iv) Examining the records kept by a licence relating to the use of the standard mark;

(b) Shall in any way obstruct the Director, Officer or Inspector in the exercise of his duties under this Law or under any regulation made thereunder;

Shall be guilty of an offence under this Law.

Article 44. Offences and Penalties
Any person who:

(a) Counterfeits any seal or any certification mark specified by or under this Law;

(b) Refuses to recognize a designated standard as a standard to be applied without exception throughout the Kingdom as specified under Article 31 of this Law;

(c) Refuses to recognize a specified commodity which may only be exported if it conforms to the relevant standard for that commodity or for the packaging of that commodity or both and sells or exports such commodity without that commodity so conforming to the standard or standards specified under Article 32 of this Law;

(d) Uses or registers or affixes etc., a mark which is identical with any mark which has been duly declared to be a standard mark or so nearly resembles such a mark as to be likely to be mistaken for it;

(e) Applies a standard mark to any commodity without a licence issued by the Organization under Article 35 of this Law;

(f) Gives information to the Board or the Director or any Officer or Inspector of the Organization which they may require or ask in the exercise of their duties and which such person either knows or has reason to believe is false;

(g) Sells, offers or exposes for sale or otherwise disposes of any commodity which he knows or has reason to believe bears thereon a counterfeit certification mark;

(h) Alters or otherwise tampers with any licence issued or renewed under this Law or any regulation made thereunder, otherwise than in accordance with any authorization given by the Board or any person acting under its authority;

Shall be guilty of an offence and shall be liable to a fine not exceeding two hundred dinars or to imprisonment for a term not exceeding six months, or to both such penalties, and, in the event of a second or subsequent conviction to a fine not exceeding five hundred dinars or to imprisonment for a term not exceeding two years, or to both such penalties.

Article 45. Liability of Employer

(a) An employer who knows or has reason to believe that any person employed by him has, in the course of such employment, contravened any provision of this Law or any regulation made thereunder, shall be deemed to have abetted the contravention of such provision. However, no such abetment shall be deemed to have taken place if such employer has, before the expiry of seven days from the date

(i) On which he has knowledge of the contravention; or

(ii) Has reason to believe that a contravention has taken place;

notified the Organization of the name of the person by whom such contravention was made and the date and other particulars of such contravention;

(b) Any person who is deemed by virtue of Sub-Article (a) to have abetted the commission of an offence in contravention of this Law shall be liable to the same penalties as if he had contravened the relevant provision.

Article 46. Offences by Companies and Liability of Officers

(a) Where the person committing an offence under this Law is a company, every person, who, at the time the offence was committed, was in charge of, and was responsible to, the company for the conduct of the business of the company, shall be deemed to be guilty of the offence and shall be liable to be proceeded against and punished accordingly;

However, nothing contained in this Sub-Article shall render any person liable to punishment if he proves that the offence was committed without his knowledge or that he exercised all due diligence to prevent the commission of such offence;

(b) Notwithstanding anything contained in Sub-Article (a), where an offence under this Law has been committed by a company and it is proved that the offence has been committed with the consent or connivance of, or is attributable to, any neglect on the part of any director, secretary or other officer of such company, he shall also be deemed to be guilty of that offence and shall be liable to be proceeded against and punished accordingly.

For the purpose of this Article:

- (i) "Company" means any body corporate or unincorporated and includes a firm, or other association of individuals; and
- (ii) "Director", in relating to a firm, includes a partner in the firm.

Article 47. Penalties for Contravention not Separately Provided for
Any person who contravenes or fails to comply with any of the provisions of this Law or any regulation made thereunder for which no penalty is specially provided shall be guilty of an offence and shall be liable to a fine not exceeding two hundred dinars or to imprisonment for a term not exceeding six months, or to both such penalties, and, in the event of a second or subsequent conviction, to a fine not exceeding five hundred dinars or to imprisonment for a term not exceeding two years, or to both such penalties.

IX. GENERAL PROVISIONS

Article 48. The Supply of Information to the Organization
The various ministries, departments, public institutions and municipal and rural councils shall supply the Organization with all the reports, studies, statistics, statements and information related to their activities and shall co-operate with it in attaining its objectives under the provisions of this Law.

Article 49. The Issuance of Regulations
The Council shall, on the recommendation of the Board, issue the regulations necessary for the enforcement of the provisions of this Law.

Article 50. Repeal
This Law shall repeal the Standards and Measures Law of 1972 and any other legislation to the extent that such legislation conflicts with its provisions.

Article 51. Enforcement
The Prime Minister and the Ministers shall enforce the provisions of this Law.

Annex VI

MAIN ITEMS OF EQUIPMENT PROVIDED BY THE UNDP

Bacteriological laboratory

Autoclave
Colony counter
Incubator

Chemical laboratory

Abbé refractometer
Balances and weights: precision and analytical
Centrifuge
Constant-temperature circulating bath
Deionizer
Distillation water still
Distilled-water purity meter
Drying cabinet for glassware
Drying oven
Extraction apparatus
Gas chromatograph
Karl Fischer apparatus
Kjeldahl distilling and digestion apparatus
Muffle furnace
Oil bath
Polarimeter
Refrigerator
Rotating film evaporator
Shaking machine
Spectrophotometer: atomic absorption/flame emission
Spectrophotometer: uv/visible
Ultrasonic cleaner
Vacuum oven
Vacuum pump
Water bath

Leather testing laboratory

Cutter mill
Dome plasticity apparatus
Finish heat resistance tester
Flexometer
Grain cracking apparatus
Impact scuff tester
Lastometer
Rub fastness tester
Shrinkage temperature apparatus
Stiffness tester
Tensometer
Viewing box
Waterproofness tester
Water-vapour permeability tester

Mechanical testing laboratory

Universal pendulum impact testing machine
Universal testing machine

Metallographic testing laboratory

Automatic polishing mover
Cut-off machine
Grinding machine
Hydraulic mounting press
Metallograph
Universal grinding/polishing machine

Paints and varnishes testing laboratory

Bend test apparatus
Cross-cut test apparatus
Cupping test apparatus
Damping test apparatus, pendulum
Film applicator, motorized
Fineness-of-grind apparatus
Gloss meter, multi-angle
Indentation apparatus, Buchholz
Scratch tester

Paper and board testing laboratory

Air and water permeability tester

Cobb absorbency tester

Creasing tester

Dial micrometer, precision

Folding endurance tester

Bursting strength tester

Puncture and stiffness tester

Smoothness and porosity tester

Stiffness tester

Tearing tester

Standards laboratory

Anti-vibration tables

Rigid measures

Standard automatic capacity measures

Standard balances

Standard capacity measures

Standard measuring tapes

Standard weights

Miscellaneous

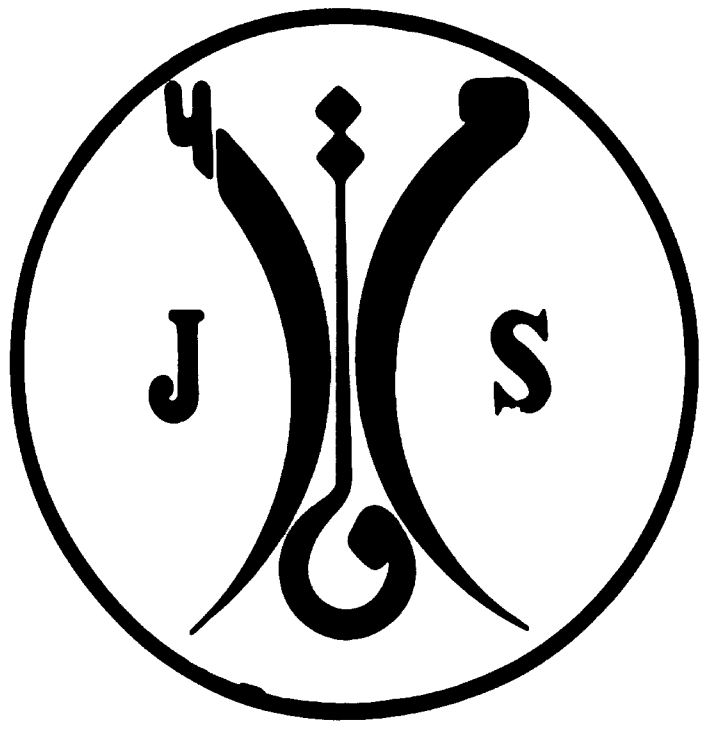
Electric typewriter, Arabic

Electric typewriter, English

Photocopying machine

Vehicle

Annex VII
THE JORDANIAN QUALITY MARK



Annex VIII

RECOMMENDED DRAFT LAW FOR LEGAL METROLOGY

I. CITATION AND INTERPRETATION

Article 1. This law shall be cited as the "Legal Metrology Law of 197. . ." and it shall come into effect as of the date of its publication in the Official Gazette.

Article 2. The following words and phrases used in this Law shall have the meanings hereby respectively assigned to them unless the context otherwise requires:

Kingdom	the Hashmite Kingdom of Jordan.
Government	the Government of the Hashmite Kingdom of Jordan.
Council	the Council of Ministers.
Ministry	the Ministry of Industry and Trade.
Minister	the Minister of Industry and Trade.
Organization	the Jordanian Organization for Standards and Quality created under the provisions of Law No...../197.....
Officer	any person duly appointed and authorized as such under Article 20 by whatever name called.
Inspector	any person duly appointed and authorized as such under Article 20 by whatever name called.
Measuring	any instrument or article for measuring.
Instrument	in terms of weight, mass, volume, capacity, area, length or number, and the Minister may extend this definition by regulation to include any of the following: measurement of time, electrical energy, temperature or light intensity.
Stamp	a mark of the form described in Schedule III. However, applied and cognate expressions shall be construed accordingly.
Measure	assessment by any means quantity, size, gauge, dimension or number, and cognate expressions shall be construed accordingly.

II. UNITS OF MEASUREMENT

Article 3. (a) Subject to the provisions of Article 5, the only legal basic units of measurement for use in the Kingdom in connection with any of the matters set out in Article 4 shall be:

- For linear measurements, the metre
- For mass or weight measurements, the kilogram
- For time measurements, the second
- For electrical measurements, the ampere
- For temperature measurements, the kelvin
- For light intensity measurements, the candela

and these units shall have the meanings and values assigned to them in the definitions adopted by the General Conference of Weights and Measures and recommended by the International Organization of Legal Metrology;

(b) The Organization shall issue specifications on those multiples, subdivisions, derivations and abbreviations of the basic units set out in Article 3(a) which shall be for use for the purposes aforesaid;

(c) Notwithstanding the forgoing Article 3(a), measurements of quantity by number shall always be legal unless specifically prohibited in connection with any matter prescribed by regulation or specification under this Law.

Article 4. Subject to the provisions of Article 5, Article 3(a) shall apply to the following matters:

- (a) All commercial dealings in goods involving measurements directly or indirectly;
- (b) Registration of measurements in jurisdiction, documentation, accountancy, tenders, and contracts;
- (c) All matters relating to prices, advertisements, public information and education;
- (d) All matters relating to the collection of rents, tolls, duties, taxes, carriage of goods and postal charges;
- (e) All matters relating to the payment of wages, or bonuses;
- (f) All foreign matters except as specified in Article 5(d).

Article 5. Article 3 shall not apply to the following matters:

- (a) Jordanian products exported in accordance with special agreements;
- (b) Jordanian agricultural produce specified in writing by the Organization;
- (c) Instruments and goods specified in writing by the Organization;

- (d) Dealings with a foreign country adopting systems of units of measurement other than the International Metric System.

Article 6. It shall be an offence to use a unit of measurement in contravention of the provisions of Articles 3, 4 and 5.

III. REPRESENTATIONS OF THE UNITS OF MEASUREMENT

- Article 7. (a) The kilogram weight and the metre bar more particularly described in Schedule I to this Law shall be the "national standard kilogram" and the "national standard metre" for the Kingdom and shall be deemed to be the physical representations of the appropriate legal basic units described in Article 3;
- (b) The various weights more particularly described in Schedule II(a) to this Law shall be deemed to have been derived from the national standard kilogram and the subdivisions marked upon the national standard metre shall be deemed to have been derived therefrom;
 - (c) The various measures of volume and capacity more particularly described in Schedule II(b) to this Law shall be deemed to have been derived from the national standard kilogram or metre in the appropriate manner approved by the General Conference of Weights and Measures and shall be the legal physical representations of the units of volume and capacity for the Kingdom;
 - (d) The national standard kilogram and derived weights and the national standard metre shall be held in the custody of the Organization which shall be responsible to the Minister for their safekeeping;
 - (e) The Minister may from time to time cause the value of the national standard kilogram, or any weight derived therefrom, or the national standard metre, to be re-determined with reference to standards held, issued or approved by the International Bureau of Weights and Measures, but before any primary standard weight or measure or any derived weight is sent out of the Kingdom for this purpose, or where there has been loss or damage, an appropriate other weight or measure in replacement shall be declared in writing to be the primary standard or derived weight, as the case may be, for the time being;
 - (f) If, by reason of loss or damage, it appears to the Minister on the recommendation of the Organization, that the national standard kilogram or national standard metre should be replaced, he shall cause to be procured an appropriate replacement which before being declared by regulation to be a national standard, shall be certified by a recognized organization holding appropriate standards issued or approved by the International Bureau of Weights and Measures;

(g) The Minister, on the advice of the Organization, may cause to be provided standard instruments, certified by an appropriate organization, by means of which the units of the second, the ampere, the candela and the kelvin may be represented and such representations shall be deemed to be the primary standard representations of these units for the Kingdom;

- Article 8. (a) The Minister, on the advice of the Organization, may cause to be provided such copies of the standard weights and measures described in Article 7 and such copies of the standard instruments described therein as he thinks fit and such copies shall be known as "secondary standard weights and measures" and "secondary standard instruments" respectively. Such secondary standards shall be compared with the appropriate national standard or standard derived therefrom described in Article 7 at least once every five years;
- (b) The Minister, on the advice of the Organization, may cause to be provided for the use of Inspectors, working standards being copies of such of the standard weights and measures described in Article 7 as are considered necessary for the proper performance of their duties under this Law. Each such working standard shall be compared with an appropriate secondary standard at least once every six months, and if necessary adjusted to agree;
- (c) Secondary standard weights and measures, secondary standard instruments and working standards shall be such forms and materials as are approved by the Organization.

IV. MEASURING INSTRUMENTS

Article 9. Subject to the provisions of Article 5 of this Law, it shall be an offence to use in connection with any of the matters set out in Article 4, any measuring instrument which gives indications, information, readings, or results in or based on units other than the units described in Article 3.

Article 10. The Organization may issue specifications on the material and form of construction, standards of accuracy and methods of test of any class of measuring instrument to be used in connection with any of the matters set out in Article 4; such power to issue specifications shall include the power to prohibit the use of any class of measuring instrument in connection with any of the matters set out in Article 4. Such specifications issued by the Organization may also restrict, control or prohibit the importation or manufacture of any type or class of measuring instrument.

- Article 11. (a) It shall be the duty of an Inspector to examine and test measuring instruments submitted to him for that purpose and the Inspector shall, if an instrument complies with the appropriate specification issued by the Organization under Article 10, stamp it with a stamp of the form described in Schedule III and issue a Certificate of Accuracy in the form described in Schedule IV. In the event that a measuring instrument of a class for which no specification has been issued is submitted to the Inspector he shall refer the matter to the Organization which may issue instructions to the Inspector as to the conditions to be satisfied before his stamp is applied and a Certificate of Accuracy issued;
- (b) If in the opinion of the Inspector a measuring instrument is too small or too delicate to be stamped, he shall issue a Certificate of Accuracy endorsed to that effect;
- (c) For the service of examining, stamping and issuance of Certificates of Accuracy, the Inspector shall collect from the person submitting the measuring instruments for those purposes the appropriate fee as set out in Schedule V and such fee shall be paid whether or not the measuring instrument concerned is found to comply with the specifications. The Minister may by regulations vary the scale of fees set out in Schedule V after consultation with the Minister of Finance;
- (d) Notwithstanding any other law, such fees as aforesaid collected by Inspectors shall be paid into a special fund maintained by the Minister called the Metrology Advancement Fund and shall be expended for such purposes as the Minister considers to be for the advancement of the Metrological Services in the Kingdom, after consultation with the Minister of Finance;
- (e) It shall be an offence for an Inspector knowingly to stamp or issue a Certificate of Accuracy in respect of a measuring instrument unless it has been tested by him in accordance with the appropriate specification or other directions issued by the Organization and he is satisfied that it complies with such specifications.
- Article 12. It shall be an offence to use, sell or possess a measuring instrument in connection with any of the matters set out in Article 4(a),(d) or (e) unless a clear unobliterated stamp and current Certificate of Accuracy in respect of the instrument are available for production to an Inspector. Provided that where a current Certificate of Accuracy endorsed in pursuance of Article 11(b) is available or where the clear, unobliterated stamp is unavailable only by reason of fair wear and tear, no offence under this Article is committed.

Article 13. The Organization may provide metrological gauging, calibration and certification services other than those connected with the duties of an Inspector under Article 11 and the Organization may issue Specifications on the fees to be paid for these services, such fees shall be treated and disposed of in a similar manner to that set out in Article 11(d).

Article 14. It shall be an offence knowingly to use, sell or possess a measuring instrument in connection with any of the matters set out in Article 4(a),(d) or (e) that is deceptive or fraudulent or that is inaccurate to a material degree having regard to its use or intended use.

Article 15. It shall be an offence to manufacture, repair, export, import or sell measuring instruments except in accordance with the terms of a licence issued by the Organization. The terms of licences shall be fixed by the Organization only after consultation with the parties concerned.

V. COMMERCIAL DEALINGS IN GOODS AND SERVICES

Article 16. The Organization may issue specifications governing commercial dealings in any particular goods or services, in connection with:

Goods

- (a) The quantities of the goods and the methods of measurement of those quantities;
- (b) The units in which those quantities are to be expressed;
- (c) The methods of statement of those quantities;
- (d) The form of the labels or other documents concerning quantities to be used;
- (e) The tolerances to be allowed with respect to quantities and the methods of checking and sampling;
- (f) The composition and description of goods.

Services

- (g) Where the dealings call for payment for services on the basis of quantity, the units, methods of measurement of quantity and documents to be used.

Article 17. The Minister may make regulations on any metrological or other trade practice in connection with the supply of goods or services that appears to him to be unfair or detrimental to the interests of any party to a transaction involving such practices.

Article 18. Such powers of the Organization to make specifications and powers of the Minister to make regulations shall include the power to prohibit absolutely or conditionally any quantity, units, document, label or trade practice concerning commercial dealing in goods or services.

- Article 19. (a) It shall be an offence knowingly to engage in any commercial dealing in goods or services contrary to a specification issued by the Organization under this Law;
- (b) It shall be an offence knowingly to use any metrological trade practice in connection with the supply of goods or services contrary to a regulation made by the Minister under Article 17;
- (c) It shall be an offence, in connection with a commercial dealing knowingly to commit any act calculated to mislead any person party to the dealing as to the quantity, size, gauge or dimension of any goods.

VI. APPOINTMENT AND POWERS OF INSPECTORS

- Article 20. (a) The Minister shall appoint fit persons to exercise the powers of the Inspector under this Law and a police officer or officer of the Ministry of supply may exercise such powers at any time provided that he has been so authorized in writing by the chief of police or the Minister of Supply, as the case may be, after consultation with the Organization;
- (b) The Minister may, in agreement with the Ministry of Internal Affairs or the Ministry of Municipal and Rural Affairs, entrust the powers of an Inspector under this Law to duly appointed officers of governorates, municipal councils, local councils and village councils. No officer shall be appointed in pursuance of this sub-section except after consultation with the Organization.
- Article 21. An Inspector, may, on production of his credentials, enter any premises, other than premises used solely as a private dwelling, in which he has reason to believe measuring instruments or goods which are subject to the control of this Law are kept.
- Article 22. (a) An Inspector may compare any measuring instruments subject to the control of the Law with an appropriate working standard and if any measuring instrument so compared is found not to comply with the appropriate specification issued by the Organization, the Inspector shall, subject to the provisions of Article 22(b), obliterate the stamp thereon, using a mark of the form described in Schedule VI and cancel, by means of endorsement, any Certificate of Accuracy issued in connection with the instruments;
- (b) Where it appears to the Inspector that the extent of non-compliance with the appropriate specification is not sufficient to justify the immediate obliteration of the stamp, he shall give notice of not exceeding thirty days of his intention to do so if the measuring instrument is not repaired or corrected before the expiry of such notice.

- Article 23. (a) An Inspector may, on production of his credentials, measure any goods in the possession of any person in connection with any of the matters set out in Article 4 (a), (d) and (e) and the person having charge of the goods for the time being shall render reasonable assistance in the measurement as the Inspector may require;
- (b) The Organization may authorize an Inspector to make test purchases of any goods for the purpose of measurement under the section, and may authorize an Inspector to seize and detain any goods found to be in contravention of this Law.
- Article 24. An Inspector may, on production of his credentials, seize and detain any measuring instrument that is found in use or intended to be used contrary to the provisions of Article 10, 13, or 15 of this Law. Where instruments are seized and detained under these Articles, the owner or person in charge of the instrument shall be given a receipt if requested.
- Article 25. It shall be an offence knowingly to obstruct an Inspector in the exercise of his powers under this Law.

VII. DEFENCES

- Article 26. (a) Nothing in this Law shall operate to create an offence when the matter complained of arose through a mistake or accident for the avoidance of which all reasonable steps had been taken;
- (b) Where a person is charged with an offence under this Law in connection with a deficiency in the quantity of goods and he proves to the satisfaction of the Court that the deficiency was due to an unavoidable evaporation or drainage, he shall be acquitted of the charge;
- (c) Where a person is charged with an offence under this Law and he proves to the satisfaction of the Court that the offence was due to the unauthorized act or default of another person not under his immediate control, he shall be acquitted. The Court may, if it thinks fit, order that the said other person be charged with the offence.

VIII. PENALTIES

- Article 27. A person found guilty of an offence under this Law shall be liable to a fine not exceedingJD or to imprisonment for a period not exceeding months, or to both such fine and imprisonment.

IX. RESTRICTIONS

- Article 28. Notwithstanding the foregoing, this Law shall not apply to measuring instruments used solely for household purposes in a private dwelling house; nor shall it apply to any of the following unless the Minister so prescribes by regulation:

- (a) Meters for the measurement of the volume of water consumed;
- (b) Meters for the measurement of electrical energy consumed or converted;
- (c) Instruments used for the measurement of land;
- (d) Measuring instruments used for person weighing without charge.

Article 29. The Minister may make such regulations as are deemed to be necessary to facilitate the enforcement of the provisions of this Law and such power to make regulations shall include the power to amend any Schedule to this Law and if deemed necessary to cancel any Schedule.

Article 30. This Law shall repeal Act No.58 for the year 1972 and any other legislation to the extent that such legislation conflicts with its provisions.

Article 31. The Prime Minister and the Ministers shall enforce the provisions of this Law.

SCHEDULE I

NATIONAL STANDARD METRE

This shall be a rigid bar of 58% nickel steel marked IG. Mint Bombay (1976) standard at 20° C, about 1030 mm in length, graduated by 1 mm divisions from 0-1000 mm with additional graduations of 10 mm before the 0 and after the 1000 graduations.

The national standard representation of the metre shall be the distance between the graduations marked 0 and 1000 measured in a horizontal plane along a line the extremes of which bisect the two graduations aforesaid, the bar being at a temperature of 20° C and supported on the rollers at least 1 cm in diameter placed symmetrically 571 mm apart.

NATIONAL STANDARD KILOGRAM

This shall be a cylinder of . . . (Here will follow an exact description 1/ of the chosen weight.)

SCHEDULE II

- (a) Cylinders ofrepresenting respectively weights of: 20, 10, 5, 2 and 1 kg; 500, 200, 100, 50, 20, 10, 5, 2, and 1 g.
Discs and wires of aluminium representing respectively weights of 1/: Contained in boxes marked..... together with the cylinder described in Schedule I.

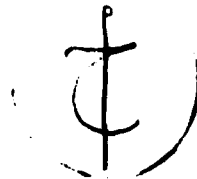
1/ This description may be added by regulation when the equipment is received.

(b) (Here will follow an exact description^{2/} of the chosen standards of capacity (in litres) and volume (in cc or ml).

SCHEDULE III

The form of the stamp to be used by Inspectors in respect of their duties under Article 11 is as follows:

(a) The letters arranged in the form of the diagram below;



(b) In close proximity to the letters aforesaid a number identifying the Inspector and his office.

SCHEDULE IV

The form of the Certificate of Accuracy to be issued by Inspectors in respect of measuring instruments found to comply with the appropriate specifications is given below.

CERTIFICATE OF ACCURACY OF MEASURING INSTRUMENT

(This certificate is valid for twelve months only.)

I hereby certify that the following measuring instrument(s) namely:

<u>Item</u>	<u>Description</u>	<u>Stamped</u>	<u>Reason for not stamping^{2/}</u>
-------------	--------------------	----------------	---

Submitted by.....of.....
.....

have/has this day been examined and tested by me and found to comply with the appropriate specification.

Date:Signed:

Date of Expiry:

(Office Stamp)

^{2/} The Inspector should enter here "Too small" or "Too delicate" as appropriate where instruments are to be correct but he finds it impracticable to stamp them.

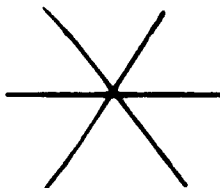
SCHEDULE V

Fees to be charged for testing measuring instruments with a view to stamping and issuing Certificates of Accuracy:

(a) <u>Weighing instruments</u>	JD
Maximum load through 30 kg	0.200
Over 30 kg through 100 kg	0.500
Over 100 kg through 1 000 kg	1.000
Each additional 1000 kg or fraction thereof	0.750
(b) <u>Weights</u>	
Through 1 kg	0.050
Each additional kilogram or fraction thereof	0.100
(c) <u>Measures of length</u>	
Through 1 metre	0.050
Each additional metre or fraction thereof	0.100
(d) <u>Measures of capacity</u>	
Through 5 l or 5 dm ³	0.150
Each additional 5 l or dm ³ or fraction thereof	0.100
(e) <u>Flow meters for gasoline, kerosene, solar and other liquid fuel</u>	
Each instrument	3.000
(f) <u>Instruments other than those mentioned above</u>	
Per kilogram, square metre, cubic decimeter, or metre, or fraction thereof, maximum reading, indication or representation	0.500
(g) <u>Taximeters</u>	
Each instrument	0.200
For example a 40,000 kg weighbridge would be charged at JD 1 + 39 x JD 0.750 = JD 30.250	

SCHEDULE VI

Form of mark of obliteration of stamp:



Annex IX
PLAN FOR THE ORGANIZATION
OF THE
METROLOGICAL SERVICES SECTION

A. Organization

It is recommended that the organization of the Metrological Services section should be undertaken in three phases:

Phase I

- (a) The establishment of the Central Laboratory and the installation of the national standard metre, kilogram and ancillary equipment. Within the Central Laboratory will be facilities for precious metal assaying and marking;
- (b) The establishment of a District Weights and Measures Office in Amman to serve the Governorates of Amman, Kerak and Ma'an. Provision has been made for this office to be accommodated in the project laboratory building;
- (c) The establishment of a District Weights and Measures Office in Irbid to serve the Governorates of Irbid and Balqa.

Phase II

- (a) The strengthening and extension of the services to be offered by the Central Laboratory, including the provision of at least 10 tons of cast iron roller weights for calibrating truck weighbridges and the provision of a suitable vehicle for transportation and handling. Another essential piece of equipment is the provision of a 200 or 500 litre proving tank for testing bulk liquid fuel meters. During this phase the Jordan national standard metre could be upgraded by the substitution of the present Hommel-Werke nickel steel section metre for the Indian Mint metre. The Hommel-Werke metre (as mentioned in the body of this report) will require a two-microscope transverse comparator to put it into use;
- (b) The opening of a sub-district Weights and Measures Office at Salt (to serve Balqa Governorate) and a District Weights and Measures at Ma'an or Kerak (to serve Ma'an and Kerak Governorates);

Phase III

- (a) Phase III should see the further strengthening and extension of Central Laboratory facilities by the provision of some basic engineering metrology equipment. It is suggested that a reference set of gauge blocks, a surface plate, sine bar, and dial gauges would be the minimum necessary to provide assistance to industry. The provision of some reference electrical measuring equipment might be considered at this stage;
- (b) A sub-district office for Amman Governorate should be established at Zarqa during this phase. Cost/benefit analysis would, it is thought, reveal considerable advantages.

As to the time scale for this phased development, it is suggested that a year for each phase might be the target. Once the Central Laboratory is established, and this should be accomplished at the latest by the end of 1977, the organization of the district offices should be a simple process, provided that suitable office accommodation can be found, and the necessary trained staff is available.

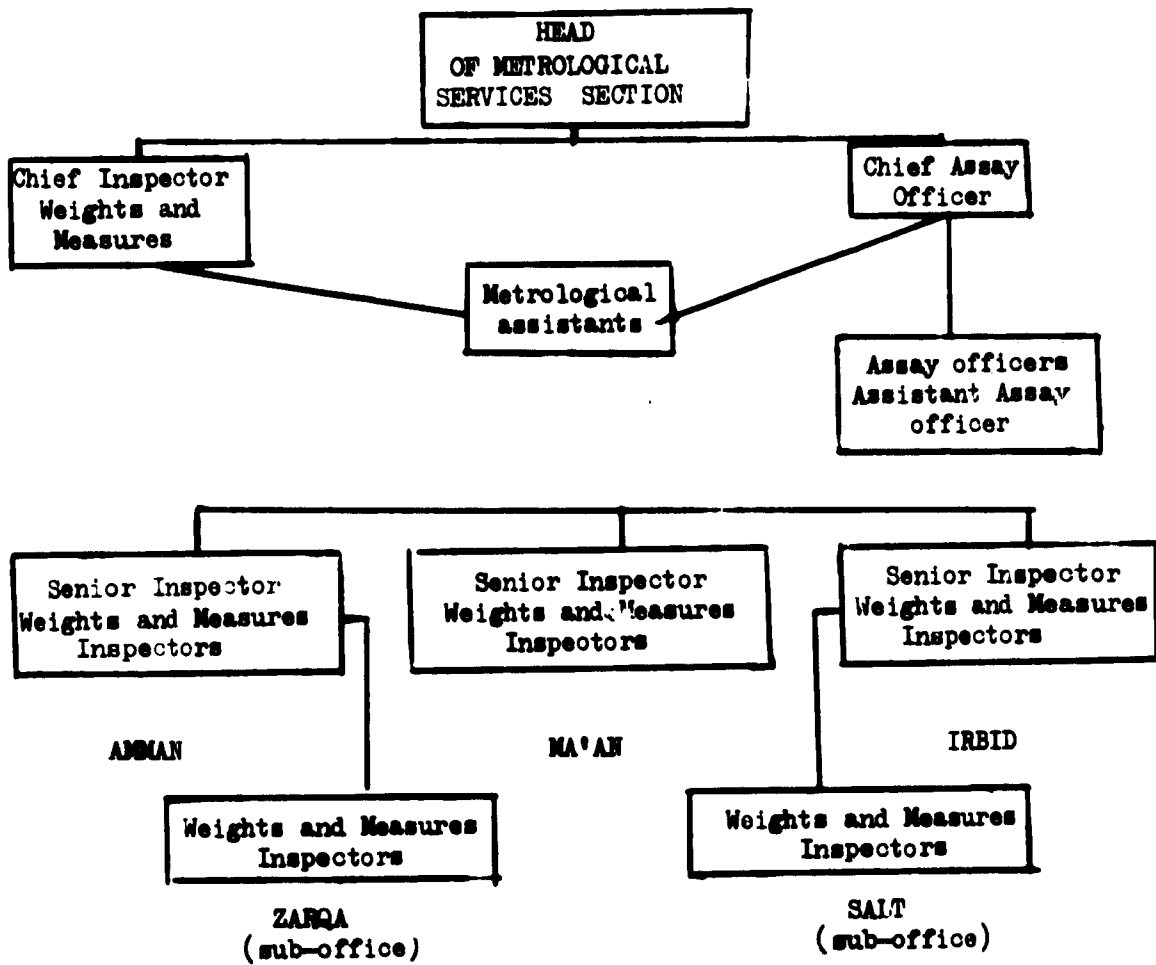
B. Staff

1977 PHASE I	1978 PHASE II	1979 PHASE III
<u>Management</u>		
1 Head of Metrology Services	1 Head of Metrology Services	1 Head of Metrology Services
1 Chief Inspector Weights and Measures	1 Chief Inspector Weights and Measures	1 Chief Inspector Weights and Measures
1 Chief Assay Officer	1 Chief Assay Officer	1 Chief Assay Officer
<u>Central Laboratory</u>		
1 Metrological assistant	1 Metrological assistant	ADD:
5 Assay officers	5 Assay officers	1 Metrological assistant
		1 Assay officer
		2 Assistant assay officers ^{3/}
<u>Amman District Weights and Measures Office</u>		
4 Inspectors W and M	ADD:	
	1 Senior inspector W and M	1 Senior inspector W and M
	1 Assistant inspector W and M	1 Assistant inspector W and M
<u>Irbid District Weights and Measures Office</u>		
2 Inspectors W and M	ADD:	ADD:
	1 Senior inspector W and M	1 Assistant inspector W and M ^{3/}
<u>Ma'an District Weights and Measures Office</u>		
nil	1 Senior Inspector W and M	1 Senior Inspector W and M
	1 Inspector W and M	1 Inspector W and M
	1 Assistant inspector W and M ^{3/}	1 Assistant inspector W and M ^{3/}
<u>Salt Sub-District Weights and Measures Office</u>		
nil	2 Inspectors W and M	2 Inspectors W and M
<u>Zargua Sub-District Weights and Measures Office</u>		
nil	nil	2 Inspectors W and M
<u>Total staff</u>		
Manager 3	Manager 3	Manager 3
Central Laboratory 6	Central Laboratory 6	Central Laboratory 10
District Offices <u>6</u>	District Offices <u>14</u>	District Offices <u>17</u>
15	23	30

Note: The services required of the metrological assistant may be supplied from the Central Laboratory maintenance unit.

^{1/} Training cadre.

Organizational structure of Metrological Services section (after Phase III)



C. Job description

Management

Head of Metrological Services

He is responsible to the Director of Standards for the management, organization, planning, future development and day-to-day running of metrological services; he is responsible also for training, information and public relations in the field of metrology.

Chief Inspector of Weights and Measures

He is responsible to the Head of the Metrological Services Section for the day-to-day running of the District and Sub-District Weights and Measures Offices and the Central Metrology Laboratory as far as weights and measures are concerned; also for the safe custody, maintenance and validation of all classes of weights and measures standards. He is also responsible for the supervision of the duties of inspectors of weights and measures, planning their inspection tours, reception and collation of inspection records.

Chief Assay Officer

He is responsible to the Head of the Metrological Services Section for the organization and day-to-day running of the Precious Metals Assay Section. He should have chemical or metallurgical qualifications and have had training in the assay and marking of precious metal objects.

Metrological assistants

These assistants are responsible, under the direction and supervision of the Chief Inspector of Weights and Measures and the Chief Assay Officer, for the installation and maintenance of laboratory equipment and the mechanical processes of adjustment of secondary and working standards. They should be fitters, trained in the use of hand tools, and capable of performing simple drilling, tapping and shaping operations. (This service may be available in the Central Laboratory Maintenance Unit.)

Senior inspectors of Weights and Measures

They are responsible to the Chief Inspector for the day-to-day running of a District Weights and Measures office with its sub-office where applicable. They should be inspectors of weights and measures of long experience, capable of supervising and directing inspectors. It is preferred that senior inspectors have a knowledge of physics and mathematics and have had specialist training in metrology.

Assay officers

They are responsible for the mechanical processes of assaying and marking precious metal articles, under the supervision of the Chief Assay Officer; they should have a knowledge of chemistry and specialist training in assay work.

Inspectors of Weights and Measures

Inspectors are responsible for the enforcement of the Legal Metrology legislation; testing, stamping and certifying measuring instruments including taximeters; measuring goods subject to metrological control; and visiting commercial, industrial and agricultural premises for these purposes. Inspectors should preferably have had specialist training in metrology.

Assistant inspectors/assay officers

These should be younger officers (preferably school leavers who have a knowledge of physics and mathematics). They will be trainees gaining on-the-job experience by assisting inspectors and they should also be given formal training on a regular basis by the Chief Inspector or Senior Inspector.

Annex X

PERIODICALS SUBSCRIBED TO BY THE PROJECT

Industrial Specifications, Croydon, Surrey, United Kingdom
Metrology and Inspection, IPC Business Press Ltd., United Kingdom
Monthly Review, Journal of the Institute of Trading Standards Administration,
United Kingdom
Quality, Journal of the European Organization for Quality Control (EOQC)
Quality, Hitchcock Publishing Co., United States
Quality Assurance, Journal of the Institute of Quality Assurance (IQA), United
Kingdom
Quality Progress, Journal of the American Society for Quality Control (ASQC),
United States
Quality and Quantity, European-American Journal of Methodology, published by
Elsevier Scientific Publishing Co., Amsterdam, the Netherlands
Quality and Reliability, Journal of the Indian Association for Quality and
Reliability, New Delhi, India
Standards Engineering, Journal of the Standards Engineers (SES), United States

Annex XI

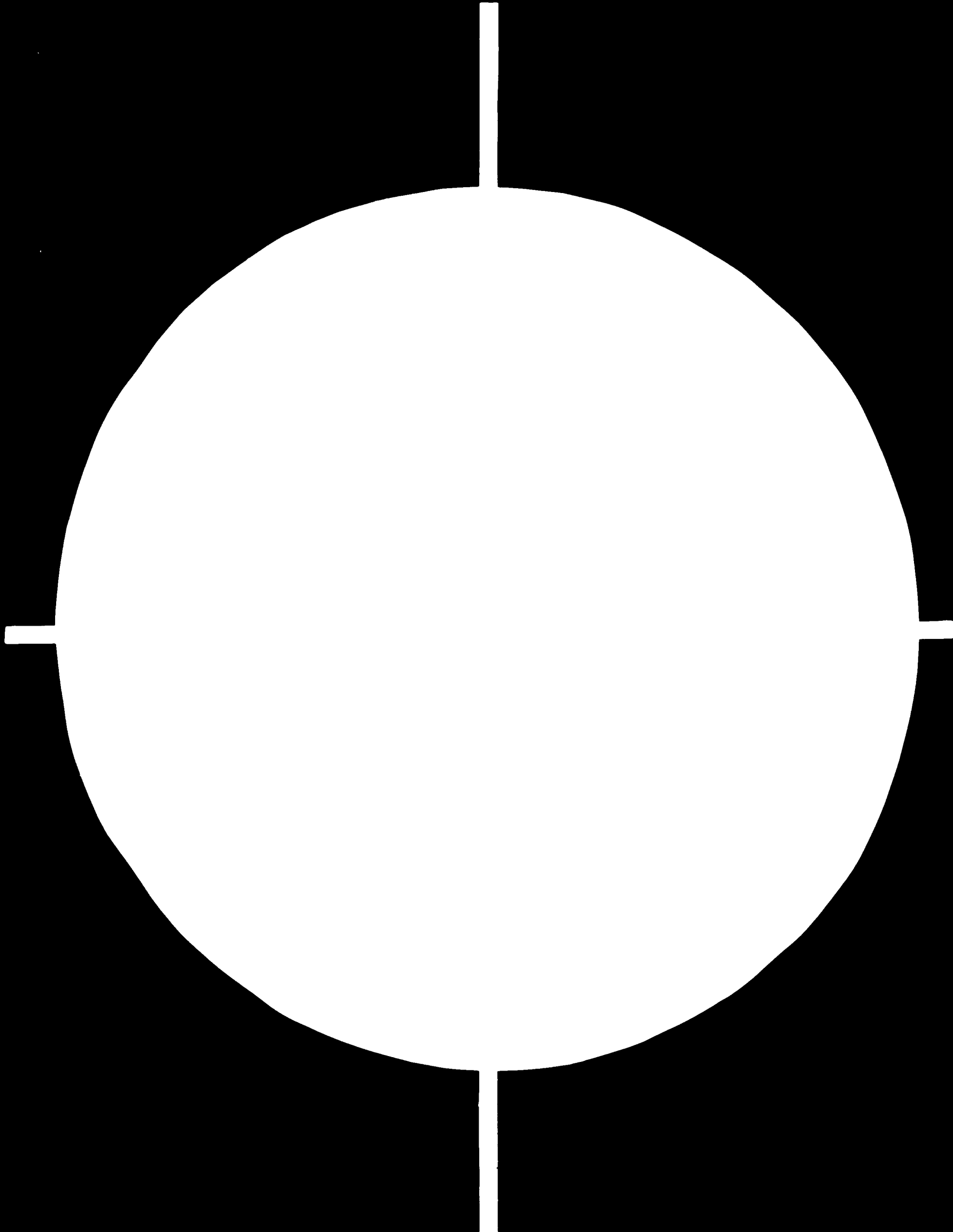
PROJECT FELLOWSHIPS

Name	Title of Fellowship	Duration m/m	Date		Country of study	Remarks
			Starting	Concluding		
Dawahir, B.	Materials testing	4	24/3/75	19/7/75	United Kingdom	
Habaybeh, A.	Organization and operation of standardization, certification marking and metrology activities	1	3/4/75	30/4/75	United Kingdom, France	Ex co-manager Left June 1975
Kakish, I.	Instrumental methods of chemical analysis	3	2/7/75	29/9/75	United Kingdom	Left in Oct. 1975
Falteh, R.	Certification marking	3	27/6/76	23/9/76	United Kingdom	
Saudi, H.	Quality control	4	17/3/77	15/7/77	United State	
Qheiri, S.	Standardization	3	11/7/77	10/10/77	United Kingdom	
Abu-touqa, H.	Quality control 3	28/7/77		6/10/77	Sweden	
Mehyar, M.	Instrumental methods of chemical analysis	4			United Kingdom	To be implemented in 1977
El-Kilany, A.	Legal metrology	4			United Kingdom	To be implemented in 1977

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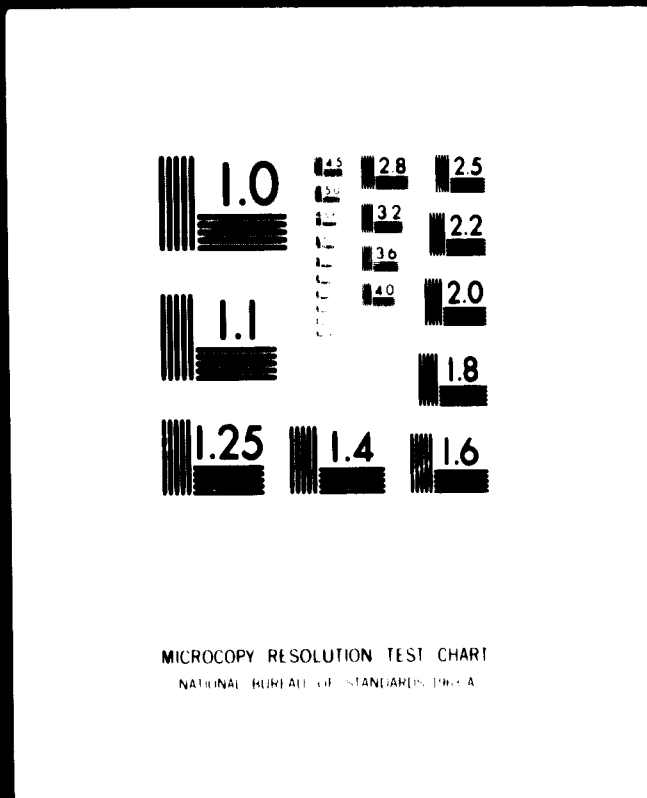


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24x

B

Annex XII

RECOMMENDED SHOP EQUIPMENT AND TOOLS FOR THE ITQCL

<u>Quantity</u>	<u>Description</u>
1	Tube tester, dynamic type
1	Vacuum-tube voltmeter
1	Oscilloscope, 5 inch
1	Portable millivolt potentiometer
2	Circuit-test meters
1	Portable resistance measuring set
1	Dead-weight tester
2	Stop-watches
1	Oxyacetylene welding set complete with set of tips, hose etc.
1	Bench vice, swivel base, 3 inch
1	Portable circular saw
1	Portable electric drill, $\frac{1}{4}$ inch
1	Grinder and buffer
1	Drill press, $\frac{1}{2}$ -inch chuck
2 sets	Metal drills, inch and cm
2 sets	Dies and tapes, complete with handles
1	Breast drill, $\frac{1}{2}$ -inch chuck
2	Tubing cutters
1	Gasket cutter
2	Robertson screwdrivers
2	Philips screwdrivers
1	Tweezers, pointed
1	Electrician's test lights
2 sets	Swiss key-files
2 pairs	Curved needle-nose pliers
1	Wire stripper
1 pair	Long-nose pliers
1 pair	Vice-grip pliers
1 pair	Lineman's pliers
1 pair	Diagonal cutting pliers
1 pair	Needle-nose pliers, 6 inch
2 pair	Vice-grip pliers, 10 inch
1	Tee-square depth gauge
1	Hole-saw mandrel
2 sets	Hole saws
2 sets	Combination open-end and ring wrenches ($\frac{1}{4}$ inch to $1\frac{1}{2}$ inches)
10	Steel tapes, 6 feet
3	Hacksaws
1 set	Inside micrometers up to 12 inch
1	Outside micrometer, 0-1 inch
1	Inside caliper, 6 inch
1	Outside caliper, 6 inch
1	Plastic-tag maker
12 rolls	Red plastic tape, $\frac{1}{4}$ inch
12 rolls	Black plastic tape, $\frac{1}{4}$ inch
12 rolls	Green plastic tape, $\frac{1}{4}$ inch
12 rolls	Yellow plastic tape, $\frac{1}{4}$ inch
1 set	Dividers
2	Tin snips

<u>Quantity</u>	<u>Descriptions</u>
1 kit	Gasket cutter
2 sets	Drift pins
2 sets	Cold chisels
2 sets	Extractors standard
2 sets	Extractors small
6	Machinist's 6 inch steel rules
1	2-cell flashlight
1 set	Pointer puller
2 sets	Feeler gauge
1 set	Thread gauge, also metric
2	Ballpeen hammer 4 oz
1	Ballpeen hammer 1 oz
1	Carpenter's hammer
1 set	Allen wrench, large
1 set	Allen wrenches
1 set	Metric wrenches
2 sets	Spline wrenches
2 sets	Pin punches
1	Pipe wrench, 6 inch
2	Pipe wrench, 10 inch
2	Pipe wrench, 14 inch
2	Pipe wrench, 18 inch
1 set	Hollow-shank nut drivers
1	Adjustable-type wrench, 10 inch
2	$\frac{1}{4}$ -inch drive-socket set, complete with ratchet, etc.
2 sets	Open-end wrenches, $\frac{1}{4}$ -1 $\frac{1}{2}$ inch
1 set	Open-end wrenches, thin
1	Electrician's jackknife
1 set	Jeweler's screwdrivers
10	4-inch broad-blade screwdrivers
10	6-inch slim-blade screwdrivers
2	Stirrup-pump fire extinguisher for sealing, 2- $\frac{1}{2}$ gal
1	Precision thermometer, -10 $^{\circ}$ C to +50 $^{\circ}$ C
1	Precision thermometer, 0 $^{\circ}$ C to +300 $^{\circ}$ C
1	Precision thermometer, -100 $^{\circ}$ C to +50 $^{\circ}$ C
1	Precision thermometer, -200 $^{\circ}$ C to +30 $^{\circ}$ C
1	Precision thermometer, -50 $^{\circ}$ C to +100 $^{\circ}$ C
2	Propane hand-torches
2	Electric soldering gun
1	Electric soldering iron, small
$\frac{1}{2}$ lb	Silver-solder wire
10 pairs	Safety goggles
1 lot	Assorted shim stock
1 lot	Assorted piano wire
1 kit	Assorted small springs
1 kit	Circular clips inside (assorted)
1 kit	Circular clips outside (assorted)
1 kit	Assorted O-rings
1 kit	Assorted gaskets, small
1 kit	Assorted spline screws
1 kit	Assorted allen screws
1 kit	Assorted flat brass washers
1 kit	Assorted flat steel washers
1 kit	Assorted steel lock washers
1 kit	Assorted resistors
1 kit	Assorted capacitors

Bibliography

DOCUMENTS PREPARED DURING THE PROJECT

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- The Directorate of Standards (March 1974, 3 p)
Certification and Quality Marks (May 1974, 17 p)
Notes on the Design and Planning of Industrial Testing
and Quality Control Laboratories (July 1974, 22 p)
Standardization (Training Manual) (May 1975, 181 p)
The Importance and Development of Standardization
in Jordan (November 1975, 45 p)
The Standardization and Quality Control Project
Promotion of National Standardization in Jordan (January 1976, 24 p)
(March 1976, 154 p)

Knight, G.E.C.

- Procedure for Operation of Certification Mark and
Licence (June 1975, 9 p)
Report on Quality Control in the Jordanian Training Co. (June 1975, 45 p)
Report on Quality Control in ICA Biscuit Factory (August 1975, 12 p)
Report on Quality Control in the Jordanian Paper and
Cardboard Co. (September 1975, 12 p)
Practical Quality Control (Training Manual) (October 1975, 120 p)
Quality Control Manual and Guide for Industry (November 1975, 56 p)

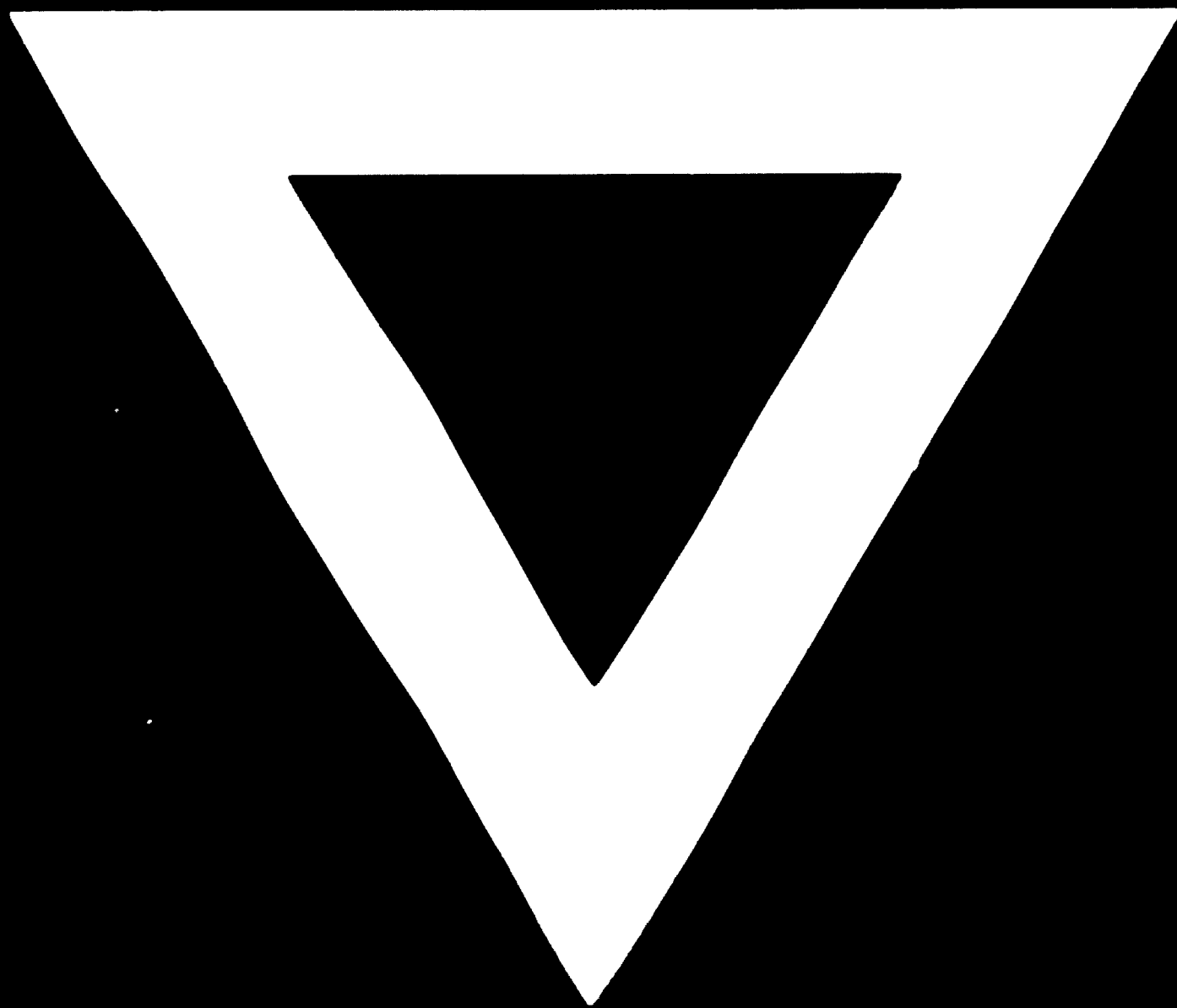
Theobald, L.

- Report on Investigations into the Implications
for the Directorate of the Precious Metals Law (August 1976, 3 p)
Report on Taxi Meters (September 1976, 3 p)
Training Course for Inspectors of Weights and Measures (October 1976, 93 p)

Also prepared were progress reports by the project manager and periodic reports by the experts.



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