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ASSISTANCE TO THE MAURITIUS STANDARDS BUREAU*

DP/MAR/75/008

MAURITIUS.

Technical report: Quality control and metrology

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

Based on the work of S. A. Thulin, expert in standardization, quality control and metrology

United Nations Industrial Development Organization
Vienna

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ABSTRACT

The expert was assigned for five and half months (12 September 1977 to 26 February 1978) as adviser to the Mauritius Standards Bureau (MSB). His mission formed a part of the project "Assistance to Mauritius Standards Bureau" (DP/MAR/75/008). The mission was a continuation of a previous assignment (1 February to 15 April 1977) which has been subject to a UNIDO report (DP/ID/SER.A/107).

The UNDP/UNIDO equipment ordered by the end of 1976 had fully arrived and was installed during the mission. Additional metrology and other testing equipment was requisitioned during the mission and is expected to arrive during the early part of 1978.

Counterpart staff was fully appointed by the end of the mission with the exception of the technicians in chemistry, metrology and paint testing.

Textile testing of wool products was started with the assistance of the International Wool Secretariat who has delegated a textile specialist to the project for a period of three years.

The international wool mark is now being delivered by MSB for the local manufacturers in Mauritius which is now the fourth greatest exporter of wool knitwear.

Proposals for regulations concerning MSB certification marking other than the wool-mark are included in this report as well as suggestions for protection of the export label "Made in Mauritius".

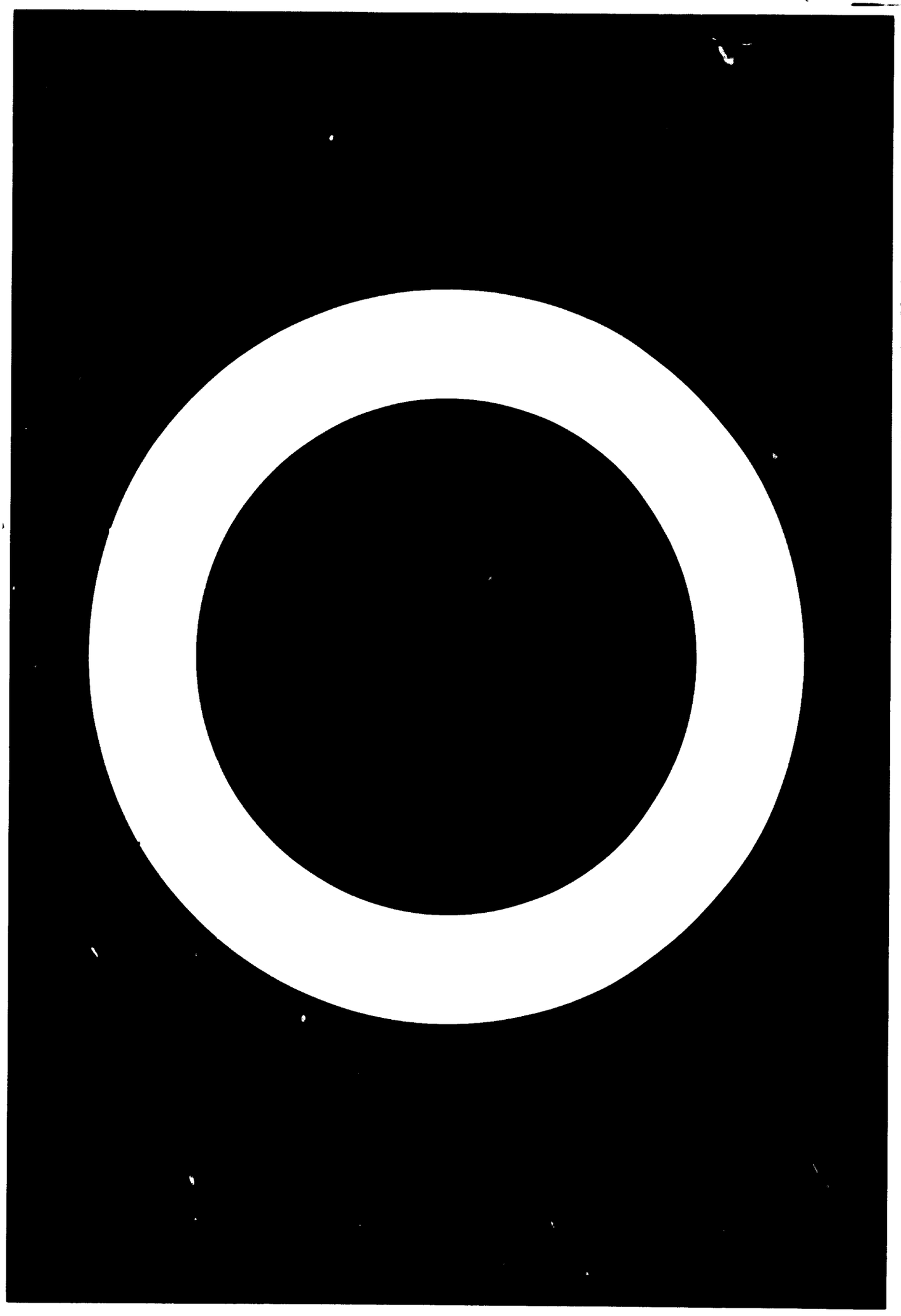
Paint testing activities, separately reported, were initiated by the UNIDO expert A. Kozlowski.

Activities were also started in the field of steel testing and testing of dry cells.

Training in metrology and electrical testing was initiated with the newly appointed staff.

Considerable time of the experts present had to be devoted to the drafting of standards for the technical committees so as to constitute a basis for MSB testing and certification marking.

The report stresses the necessities for continued expert support mainly in the field of chemical (and food) standardization and testing, paint testing and metrology.



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INTRODUCTION

This is a report of a mission forming part of the project "Assistance to Mauritius Standards Bureau" (DP/MAR/75/008) which was approved by the United Nations Development Programme (UNDP) on 8 December 1976. The executing agency is the United Nations Industrial Development Organization.

The expert was previouly sent on a short mission for the same project from 1 February to 15 April 1977, which was subject to a technical report published by UNIDO, referenced DP/ID/SER. A/107 of 13 May 1977.

The present mission from 16 September 1977 to 23 February 1978 was a follow-up of the previous one, the assignment as standards adviser being divided in instalments over a period of two years. According to the job description the expert was to assist the Government of Mauritius in developing and strengthening the activities of Mauritius Standards Bureau. He was specifically to advise and assist:

(a) In programming and planning activities in the fields of standardization, quality control and metrology;

(b) In solving managerial, operational and other problems arising in the course of the current activities of MSB;

(c) In equipping and putting into operation the testing and metrological laboratories of MSB;

(d) In working out a programme for training professional staff required to undertake the specialized tasks of standardization, quality control and metrology.

MSB was established in April 1975 by governmental decree (the Standards Act). It has its own testing laboratories which are mainly engaged in certification marking, but it can also execute comparative tests for manufacturers, consumers or public administration in the fields for which it is equipped.

In addition to the product-testing activities, MSB is responsible for the physical standards of measurements and has special metrological laboratories which may expand their activities according to the needs of the industry.

The following, in brief, are the testing and metrological services being provided at present:

(a) Testing to standards, or comparative testing, of textiles, paints, rubber, leather, plastics, steel and metals, electrical cables, dry cells etc.;

(b) Metrological services, including calibration of weights, balances, length measures, end gauges, electrical instruments, pressure gauges, thermocouples, thermometers, universal testing machines (force measurements) etc.

During the mission the project was subject to a tripartite review on 20 December, 1977, which was based on a separate progress report covering 1 January to 31 December 1977.

I. ORGANIZATION OF STANDARDS WORK

1. Technical committees

The general policy suggestions concerning standards which were outlined in the previous mission report (1 February to 15 April 1977) have been followed and the work of the technical committees has been fully resumed.

Meetings were held with the following committees

TC 4 - electrotechnical materials and installation

TC 6 - construction materials

TC 7 - protective coatings

TC 9 - rubber

Due to other urgent standardization priorities the resumption of the activities of TC 5 - furniture was postponed.

A new important committee was formed

TC 8 - chemicals and related products

The scope of activities of this committee will cover food and a large number of products for household consumption such as soap, detergent, matches etc. The selection of members of this committee has been sought to be as large as possible.

Preliminary meetings took place with textile manufacturers (they are about 30 in Mauritius) in view of constituting a textile technical committee. The work of this committee will to a large part cover export products or materials required for manufacturing such products.

The organization of the work of the technical committees was discussed at a meeting with the Standards Council. It was stressed by the adviser that the work of the committees must be strongly accelerated and that division in too many sub-committees should at least for the moment be avoided, as this usually means considerable secretarial work and delays.

Furthermore the technical committee must define priorities in each field and initiate work by selecting a drafter to cooperate with the secretary of the committee. The role of the chairman should not be limited to presiding the meetings but he should also be responsible for taking the necessary initiatives as regards the standardization in his field.

It was decided that each technical committee should, with this in view, elect its own chairman and the secretary of the committee should normally be the MSB officer in charge of the laboratory testing in the relevant field.

The chairman and the secretary should jointly convene the committee and take the initiative required for the promotion of work as well as for the establishment of deadlines for the production of the draft standards.

Sub-committees should only be constituted in cases where technical committee members, the chairman or the secretary cannot commission or among themselves find a suitable drafter of the standard. The subcommittee should preferably consist of maximum five members whereof at least one plus the secretary should be members of the technical committee. The three other members shall be chosen among the producers and/or consumers of the product and have such technical competance and free time as to be able to draft the standard. The sub-committee may also report other matters and make suggestions to the technical committee when required.

A sub-committee is generally constituted only for the drafting of a standard and should normally be dissolved when the work is accomplished unless the technical committee recommends otherwise.

2. Draft Standards

The need for processing a number of very urgent standards (outlined in Annex XI of the previous mission report) made it necessary for the foreign experts to devote considerable time, and overtime, to the drafting of standards for submission to the technical committees.

Laboratory testing and quality certification can in fact not start before such standards are fully laid down.

As a result 21 draft standards covering the most urgent items were produced, see Annex I.

It is felt that in addition to the processing of these standards the Standards Council and the relevant technical committees should pay particular attention to the following fields for which standards should immediately be established:

- construction materials
  and
- food products

A few standards for such construction materials which can be tested at MSB have already been drafted: reinforcement steel, plastic pipes, galvanized iron products. However, a number of products including cement, concrete blocks and other building elements have urgently to be standardized. It is hoped that official quality testing of such products can take place at the new laboratories of the Ministry of Works, which are being established with French bilateral assistance.

If it proves difficult for the technical committee on construction materials to devote enough time and expertise to the drafting of the most urgent standards concerning local building materials as well codes of practice it may be possible to request a UNIDO consultant for this job. However it will first be necessary for the committee to list clearly the priorities so that a detailed job description can be established.

It is also expected that some assistance in drafting standards for construction materials can be obtained through the French bilateral experts.

As regards the food standardization and testing programme the situation is still unclear, it is hoped that the new chemical committee which is being constituted will be able to suggest the lines to follow.

The National Consumers Council has in a letter to MSB dated 8 February confirmed the urgency of food standardization see Annex X.

Due to the time required for drafting at least a minimum number of food standards it has since long been suggested by the adviser that a UNIDO expert in food chemistry and general analytical chemistry is recruited from the project funds (see job description Annex IX).

II. CERTIFICATION MARKING

1. Regulations and mark models.

A suggestion for regulations concerning MSB certification marking has been drafted (see Annex II). Before official use the text should be reviewed by a legal adviser and submitted for approval to the Standards Council and the Minister.

The form of the certification mark should urgently be approved by the Standards Council as it will have to be used in publicity, see below.

Suggestions for various certification marks have been made by MSB staff and experts. Preferential models are given in Annex III.

2. Publicity for certification marking and MSB activities

The MSB project was during its preparatory stages given publicity in newpapers which may have lead to some misinterpretations as regards the functioning of the Bureau.

As the project has with some delay now finally come into its operational stage it is felt necessary to make clear through publicity the real services which may be expected from MSB.

The Minister of Commerce and Industry paid an inaugural visit to the project on 30th November, 1977 which was largely covered in the newspaper le Cerneen. Later, on 20 January 1978 the newspaper Express related with pictures the activities of MSB in an extensive article resulting from interviews with the Director and the experts.

An industrial exhibition is going to take place in Mauritius, starting on 10 March, 1978 and the MSB will be participating as a section of the Ministry of Industry and Commerce. The expert has preparod a suggestion for a description of the MSB-activities to be distributed at that occasion (Annex IV). It is essential that the definite form of the MSB certification mark is approved before this date.

A number of photographs have been taken of the laboratories to illustrate the pamphlet and to be used at the exhibition as well.

3. Use of the label "Made in Mauritius".

A number of textile products are exported from Mauritius which has practically become the fourth greatest exporter of wool knitwear.

The control of wool knitwear has started at MSI using standards of the International Wool Secretariat (IWS) and is presently in full operation.

This control allows Mauritius manufacturers to use the well known international wool mark which applies to the wool used and the finished product as well.

It will for other textile products including those made from acrylics, cotton etc., be necessary to draw up standards in consultation with the industries concerned and to equip the MSB consequently (see Textile Laboratories in chapter V).

The international woolmark is through extensive publicity known the world over. It is doubtful that the MSB mark to be adopted will be well known to more than local consumers.

However, it seems from enquiries that customers pay particular attention to the label of origin: Made in Mauritius - Fabriqué à l'Ile Maurice - Hergestellt in Mauritius, etc. Some customers who had purchased knitwear in France a few years ago reported privately to the expert that they were not satisfied and would not buy "Fabriqué à l'Ile Maurice" again. They did not remember the brand purchased. The same could have happened with knitwear from any of the other big exporters such as U.K., France and Italy but this fact would probably not prevent the customers for making new similar purchases. Conclusion from this limited enquiry: a foreign purchaser reacts in a negative or positive way when he sees the label "Made in Mauritius" or "Fabrique a l'Ile Maurice. The label of origin is furthermore compulsory for sale in most countries.

The expert suggests to the Ministry of Commerce and Industry and to the Standards Council that the mentions "Made in Mauritius" and "Fabriqué à l'Ile Maurice" on expert articles such as textiles etc. is without delay submitted to export quality control according to minimum standards to be established. The necessary laboratory and factory controls can be organized through MSB and a simplified form of the MSB mark may be used jointly with the label of origin.

Restrictions as regards the use of the label of origin may also be applied to other export articles especially when the Government expects that several different factories are going to produce similar articles in Mauritius or/ when other vital interests are to be preserved.

III. METROLOGY REGULATIONS

1. New Weights and Measures Bill

Various drafts of the Bill for introduction of the extended metric system (SI - system) in Mauritius have circulated since 1972. The copy of the most recent edition which was made available to the expert only a few months ago was unfortunately incomplete.

Following the original text of the legal adviser, the draft Bill has now been completed by the expert with the missing Schedules, corrected and extended so as to include all SI - units in accordance with practice in other countries, see Annex V. A list of measuring units subject to current conversions have been included in the third schedule, these measures include commonly used U.K. units, traditional Mauritius units and a few U.S. units for volume and mass which may be confused with U.K. units if not clearly distinguished.

The conversion factors for US and U.K. units are the most recent ones published in British Standard BS 397:1976.

The conversion factors for traditional (French) Mauritian measures are with a few corrections those obtained from the Ministry of Housing (letter from P.A.S., dated 19th October, 1975).

The definitions of the basic SI - units have been included in section 4 though they may be modified whenever appropriate by the General Conference of Weights and Measures.

To avoid confusion using English as official language the decimal sign has been maintained as a point (section 7 (2)(b). There shall however not be made use of comma at all to designate thousands (section 7 (2)(c).

Finally the exceptions in section 11 have been reduced to be in accordance with similar Bills in countries which are converting to metric units.

As the metrication in Mauritius should not create any great problems a rather short delay for the full introduction has been proposed, practically from 1st January 1980. Generally the trade is since long already regulated by metric measures. If required, the Minister may according to section 15 (e) of the law make amendments through ordinances so as to postpone the implementation in certain cases, if any strong reason prevails.

2. Ministrial regulations (ordinances)

More detailed rules as regards the implementation of the SI - system in various branches will have to be subject to ministrial regulations or ordinances. These ordinances shall include

- The form of commercial weights and denominations to be used. (The shapes of the presently admitted weights are are acceptable - the denominations may be changed to the more commonly used 100 - 200 - 500 g series instead of 125, 250, 500 g series).

- The tolerances on the mass of the weights shall be prescribed.

- The mode of verification and stamping of weights shall be prescribed.

- The type approval and regular verification of weighing, length measuring and volume measuring equipment shall be prescribed.

- The fees for original type approval and verification shall be prescribed.

- The original type approval shall be the duty of MSB for all imported and locally manufactured measuring instruments.

- The body authorized to verify and stamp the measuring instruments shall be prescribed (MSB and/or the Police).

- The mode of indicating the net content on packaged goods shall be prescribed. (The use of abbreviations such as "lb" on packaged goods or on signs in the market creates confusion and shall be prohibited i.e. quantities shall be indicated in metric measures. Possibly the French word "livre" may be accepted in full to designate 0.5 kg but this unit should not be abbreviated "lb").

The Minister may choose to make such regulations either in the form of ordinances or in the form of compulsory Mauritian Standards. The latter may apply in particular to specialized instruments involving safety such as pressure gauges, medical thermometers etc.

3. Preparedness of MSB laboratories to meet the new Bill and Regulations.

The metrology laboratories of MSB have been equipped to meet largely the requirements of the Bill on Metric Weights and Measures as regards reference instrumentation.

Means for obtaining the required "international" certification of the procured instruments is being investigated, some instruments have been delivered with certificates which are only "traceable" to national laboratories. The ultime authority for international certification, the Bureau International des Poids et Mesures (BIPM) does not certify but a limited number of types of highly accurate instruments. The national reference mass standard of 1 kg of Mauritius will be taken to BIPM for certification whereas the other weights may be compared to this reference mass using the available equipment at MSB.

The Commissioner of Police has requested that under the new regulations the police should be discharged from the verification and stamping of weights and balances. If these duties will have to be taken over fully by MSB there will be a necessity for increasing the metrology staff and revise the disposition of the premises so as to cope with routine check work on commercial weights. Furthermore, inspection of most balances, whether this inspection is initial or a reverification, has generally to be made on the site where the balance is installed which means that MSB will have to be equipped with at least one metrology van being used exclusively for verifications on a round the year basis.

The above considerations have been subject to a note to the Director in November 1977, see Annex VL. The metrologist which has only very recently joined the staff will have to investigate the various points raised by these routine metrology operations. It should be emphasized that the control of the quantity of packaged commodities sometimes becomes more important than the checking of commercial weights and that bulk weighing equipment for industry involves advanced technology and requires more accurate mobile means for verification.

A number of mobile metrology operations of MSB may be required by industries to assist them with production problems and quality control. The MSB has so far been equipped with the most accurate means for controlling analytical balances whereas the needs for equipment for checking lorry weigh bridges and other weighing machines still have to be investigated in consultation with the sugar industry, which already has an organization for such control (the Control Board).

Electrical reference measuring instruments are being procured so as to enable certification of volt-meters, voltage recorders and similar instruments required to settle disputes between suppliers and consumers of electricity. It shall be investigated whether the MSB reference equipment shall also be extended to cover testers for electric energy meters which in some countries are subject to control under Weights and Measures regulations.

IV. RECOMMENDATIONS TO THE GOVERNMENT

1. Administration, finance and filing

It is regretted that the recommendations of the previous report as regards the separation from the Ministry of MSB financial, purchases and filing matters has only been partially followed.

Taking into consideration the considerable inputs of both the government and UNDP it is hardly conceivable that the present dependency as regards errands to the Ministry continues.

MSB must have its own finance officer and filing system when it now comes into an operational phase. The cost accounting will also include the charging of fees which according to current practice is based upon the number of hours spent by engineers or technicians.

The hourly fee for engineers can probably tentatively be fixed to 50 rupees/hour and for technicians and secretarial staff to 30 rupees/h. These costs would include use of the equipment but not consumable materials, if any. For any test an additional registration fee of for instance 50 rupees may be charged.

The work must be duly registered in a chronological book and work orders issued to the various laboratories which may be divided as follows:

File series	Laboratory group	Responsible Chief
C	Chemical	Mr. R. Gopaul
E	Electrical	Mr. A. C. Hurdoyal
M	Mechanical	Mr. C. Dossa
P	Paints	Mr. J. Perbhoo
T	Textile	Dr. Tai Chung Ving
W	Weights & Measures	Mr. A. C. Hurdoyal

The work should normally be subject to an estimate of cost by the responsible chief of laboratory. When the order is received a work order number should be given such as

P - 78 - 39
(Lab) (Year) (Number)

The last number shall be inserted in consecutive order with one series for each laboratory. Internal work for MSB or experiments for elaborating standards should also be classified in files, the consecutive number being followed by the letter - B. In case of accepted certification marking a special file shall be established for each product and manufacturer including all correspondence, copy of the agreement, type tests and control tests, letters of complaints etc. (These files may be referenced by the Standards number followed by a manufacturer's number).

Work orders established for type tests or regular control within the scheme of certification marking should be referenced by adding the letter - Q, and the original should be kept in the central file with a copy in the file of the laboratory.

A work file shall when the work is completed contain all necessary documents: the letter requesting the testing - the work order - a copy of the invoice - a copy of the test report - notes and other results if essential.

Suggestions for forms of work orders and test reports are included in Annex VII.

2. Staff

The various laboratory units have finally been staffed as regards responsible chiefs. These chiefs should have the duty to take necessary initiatives as regards the promotion and execution of work, each in their field of competence. They will furthermore generally act as secretaries in the relevant and technical committees.

It is essential that each of these laboratory or section chiefs have technicians in adequate number to carry out routine testing and assimilated work.

Technicians are still not available for

- the chemical laboratories
- the paint laboratories
- the metrology and electrical testing laboratories

It is extremely urgent that these laboratories are properly staffed as routine operations will otherwise not be possible due to the workload.

The enlargement of the textile testing operations will require at least one additional textile technician. The same will be the case for metrology if routine verification of weights and balances is to be undertaken by MSB.

In accordance with the recommendations of the Standards Council, it is not suggested to recruit any more assistant technicians as their sheemes of service and duties are confusing and do not facilitate the distribution of work. On the contrary there is a definite need to increase the number of attendants for office and laboratory cleaning and also for operating the telephone exchange. Furthermore a driver must be employed for the van to be procured.

A list of the present staff is given in Annex XI.

3. Transportation

It is indispensable that the problem of transport for reasons of work, sampling, purchases etc., is solved by the procurement of a van.

4. Installations

The various laboratories should be equipped with door numbers and where required also with laboratory name plates.

The installations of the paint laboratory must be completed as well as the finishing of the workshop. All air conditionning equipment should be broughtto full working order.

The free space in room No. 4 should advantageously be reserved for wet testing in particular for calibration of capacity measures.

The external telephone lines must be increased without further delay as one line is practically constantly in use for the IWS operations.

The Telecommunications department should furthermore be requested to draw a new telephone cable as the present location of the cable creates troubles due to its immersion in the sewer system.

5. Government equipment

The equipment for equipping the mechanical laboratory with workshop facilities listed in previous reports must be procured as well as the air compressor specified in the report of the paint expert.

Furthermore the government shall procure the equipment required for yarn testing according to a list to be established by the textile technologist.

6. Library and reproduction facilities

A great number of foreign standards is constantly arriving as a result of MSB's membership in ISO and the library facilities will soon be saturated unless more shelves and storage boxes are ordered.

The first meetings with the technical committees have shown how indispensable it is for the standards work to have access to a Xerox machine. As the situation of travelling back and forth to UNDP for making copies for the drafting work could not last, UNDP accepted temporarily to rent a machine for the experts which made it possible for them to present the required copies of documents to the members of the committees.

Three typists were in addition engaged in typing most of the drafts on stencils.

The position taken by the Finance section of the Ministry by refusing to rent a Xerox machine makes it most difficult for the work of the technical committees and may slow down the effect of the push which was given to the standards work during the UNIDO experts presence.

7. Premises

There will practically not be a square meter left for extension of the activities of the laboratories unless some space is recovered from the University which is actually occupying the third floor.

The examination and testing of yarn and textiles, storage of test samples, office for the textile engineer etc., requires immediately at least 70 m^2 more space and a similar requirement exists for the activities within the field of food and other consumer products.

Immediate action should be undertaken by the Ministry in view of recovering entirely or the major part of the third floor of the MSB building.

8. Extension of present activities of MSB

Now when qualified staff and expertise is available it is warmly recommended to extend the activities of the textile operations in particular with regard to yarn testing for the local factories and for the control of minimum quality of exported textile products, see section II paragraph 3.

The role of MSB as regards food standardization and testing must be further clarified and a definite reply obtained as regards the planned UNIDO technical assistance in this field.

The activity of MSB as regards standardization and testing of building materials must also be reviewed and extended to cover a number of urgent items. The requirements for foreign expertise to draft standards and propose test schemes should be defined in consultation with the technical committee on building materials.

9. UNDP - UNIDO Technical assistance

The original plan for the second phase of the assistance to MSB (UNDP code number DP/MAR/75/008) has been modified in the project revision which took place in December 1977. In view of the importance of the project UNDP has accepted to increase substantially the inputs in expert man-months and in equipment.

Equipment

It was thus possible to order abroad in 1977 metrology and chemical testing equipment which would have come under the 1978 budget. A complementary equipment list including paint testing, electrical testing and some items for physico-chemical testing has recently been prepared for ordering (see Annex VIII).

Remaining UNDP equipment funds on 1978 and 1979 budgets are being reserved for urgent items which may be required in the work of the expert in Chemistry to join the project.

UNIDO experts

It is regretted that due to other engagements both the UNIDO adviser and the UNIDO paint expert cannot extend their present assignments with MSB according to the original plans. It is hoped however, subject to government request that the experts may return on complementary missions 2 month(July and August 1978) as concerns the adviser and 4 months starting December 1978 as regards the paint expert.

The practical training work of the adviser should then be concentrated on metrology and electrical testing for which further equipment will have arrived.

The late appointment of the counterpart metrologist together with the general duties of the adviser have in fact not allowed for a sufficient training time.

The various tasks of standardization concerning food and other consumer's goods requires the assistance of a chemical expert with sufficiently broad training and recent analytical experience in particular of modern physico-chemical analysis methods (use of gas chromotograph spectrophotometer etc.). The proposal of the recruitment of such an expert was formulated already in the last report, the need was further confirmed on the arrival of the adviser in September 1977.

A most urgent decision must be taken by the Ministry as regards the approval of the job description for this expert. (See Annex IX).

The remaining amount of man-months of the project should be used for short-term consultancies in various fields of activities. The exact distribution will much depend on assignment and the work of the chemical expert. The definite needs will have to be formulated by the end of 1978.

As the expert assistance from bilateral sources mentioned in the last report has so far not materialized it is proposed that due to the limited number of counterparts and space any further request from these sources is postponed until the expert man-months still available in the UNDP - programme have been fully used.

Fellowships

Due to the amount of laboratory work and the limited staff there has been delays in the implementation of the fellowship programme.

The following short-term fellowships are proposed for urgent approval.

Name	Title	Duration
Mr. S. K. Gujadhur Director MSB	Participation in BSI quality assurance course U.K.	10 April to 5 May 1978
Mr. J. Porbhoo Chief-paint laboratory	Testing of paint materials and coatings, Poland	4 months starting May 1978
Mr. J. S. Jahajeeah Textile technician	Textile testing, at IWS, U.K.	2 months starting July 1978

V. REVIEW OF LABORATORY EQUIPMENT AND WORK
as per 15 February 1977

With the definite assignment of chief staff at the end of 1977 it was finally possible to distribute the laboratory and standardization duties according to specializations. The following is a short review of the actual situation and the tasks undertaken during the last few months up to 15 February 1978.

Textile Laboratories (rooms 3 and 27)

Responsible chief	:	Dr. P. Tai Cheung Ving, Textile technologist (started 1 February 1978)
Expert	:	Mr. B. Nixon, International Wool Secretariat manager for Mauritius (Started 19 October 1977 - assignment: 3 years)
Technicians	:	Mr. S. Jahajeeah (Started July 1977)
Assistant technician	:	Miss Jaya Murugesa (started December 1977)

The international wool mark operations started from MSB in November 1977. Several hundred samples of wool knitwear have been tested and presently eleven local factories adhere to this quality marking scheme.

Test are done according to IWS standards and the work also comprises inspection and sampling in the factories. The staff problem has been solved in a very satisfactory way as regards the IWS operations.

Some testing of yarn has been undertaken but for certain tests complementary equipment and space is required. The newly appointed Mauritian chief of section is making a survey of the requirements for tests of yarn and other materials than wool as well as for the quality control of finished textile products manufactured in Mauritius. The thirty local factories have been invited to propose members for a special textile committee to work out a standardization and test programme for textile products other than wool.

Paint laboratories (rooms 5 and 6)

Responsible chief	:	Mr. J. Perbhoo (started September 1977)
Expert	:	Mr. A. Kozlowski, (started: 7 November 1977 assignment: 3 months)
Technicians	:	(not yet appointed)

Preliminary testing of locally manufactured paints has started in the dry testing laboratory room No. 5. The wet application and testing laboratory room No. 6 is not yet terminated as regards ventilation installation. Standards for the local paints have been prepared. A full account of the work and the laboratories is given in a separate mission report by Mr. Kozlowski.

It is expected that the expert will be abee to return for a secon mission in December 1978 to finalize the laboratory arrangement, install more equipment and continue the training.

Chemical laboratories (rooms 26 and 28)

Responsible chief	:	Mr. R. Gopaul (started January 1978)
Expert	:	(not yet assigned, assistance given by paint expert)
Technician	:	not yet appointed
Assistant technician:		B. Guness (started July 1977)

The laboratories are presently responsible for tests on items such as detergents, soap, matches, etc. and are assisting with chemical tests of products otherwise tested by the other MSB laboratories such as paints, plastics, rubber etc.

Standards for soap, detergents, matches, PVC pipe etc., have been drafted by the UNIDO exports present and chemical tests have been carried out by the laboratory staff under the guidance of Mr. Kozlowski, UNIDO, paint expert who is also chemist.

Mechanical laboratories, rooms 9 and 10

Responsible chief	:	Mr. C. Dossa (started January 1976)
Expert	:	(Not presently planned)
Technician	:	Mr. A. S. Joolia (started December 1977)
Assistant technician	:	Mr. Yan Yow Kwong (started July 1977)

These laboratories are responsible for mechanical tests on steel and other metals, rubber, plastics, leather etc.

The installations have only very recently been terminated and equipment for rubber testing and climatic tests not yet delivered will have to be installed in room 9. The metal testing room 10 has still to be equipped with a workshop. The activities have so far been concentrated on testing of reinforcement steel in tensile testing machines installed in room 10. A subcommittee for which Mr. Dossa is Secretary is presently finalising the standard for reinforcement steel. There are three rolling mills and extensive import of reinforcement steel in Mauritius. As the new standard will be compulsory the laboratory will be largely engaged in steel control. A draft standard for retreating rubber has also been elaborated and a government ordered vulcanizing press is to be delivered so that tensile and hardness tests can be made on locally manufactured retreading compounds.

Metrology laboratories (Weights and Measures) rooms 1 and 12

Responsible chief	:	Mr. A. C. Hurdoyal (started 1 January 1978)
Expert	:	Mr. S. A. Thulin UNIDO adviser
Technicians	:	(not yet appointed)

The weighing laboratory, room No. 1, was fully installed comprising a 25 kg balance which was somewhat damaged during the transport. The primary set of weights (mass standards) was received only a few weeks before the departure of the expert. Steps have been taken for certification of the primary kilogramme by BIPM in accordance with the legal requirements.

The responsible metrologist has been briefly trained in using the balances and evaluating results. The length measuring equipment has been installed in room No. 12 including a large surface plate, a standard brass meter for length verifications and gauge block control equipment. Dead-weight pressure gauge testers have also been installed.

A profile projector enabling measurement and inspection of small parts, cable sections etc. was ordered during the mission and shall be installed in room 12 when it arrives (expected June 1978).

If extensive calibration of volume measures will be required the partial use of room No. 4 is proposed for such wet tests.

Due to the late appointment of the metrologist and other engagements the training dispensed by the UNIDO adviser has been of too short duration.

Electrical laboratory, room No. 29

(Duties combined with metrology, see above)

Responsible chief : Mr. A. C. Hurdoyal
(started 1 January 1978)

Expert : S. A. Thulin,
UNIDO adviser

Technician : (not yet appointed)

The duties of the electrical laboratory are electrical and thermal metrology as well as electrical testing of materials. The metrologist is in charge of this laboratory as well as the mechanical metrology laboratories.

This laboratory has been equipped with dry cell testers manufactured at MSB and some testing has started. The Consumers Council is paying great interest to such tests and will be commissioning comparative tests within short. A new draft standard has been elaborated using the latest available international information and superseeding the proposal made in the previous report.

A draft standard for PVC cables has also been elaborated based upon most recent international information. Equipment for testing such cables has been government procured and is being installed.

The electrical committee has met and discussed the draft standards as well as questions concerning electrical safety in Mauritius.

Some electrical metrology equipment has been received but lack of time and equipment has again not allowed any extensive training by the advisor of the newly appointed staff. Some technical notes and work programmes have however been prepared.

Annex I

LIST OF MAURITIUS DRAFT STANDARDS

as per 15 February 1978

Standard number	Title	Drafter	Draft ready	Approved by technical committee
MS 100	S. I. System	S. A. Thulin	Feb. 78	
MS 101	Glossary for paints	A. Kozlowski	Feb. 78	
MS 102	Test methods for paints	A. Kozlowski	Jan. 78	
MS 103	Emulsion paints, interior	A. Kozlowski	Jan. 78	13 Feb. 78
MS 104	Emulsion paints, exterior	A. Kozlowski	Jan. 78	13 Feb. 78
MS 105	PVC Coldwater pipe	S. A. Thulin	Feb. 78	20 Feb. 78
MS 106	PVC Sewer pipe	S. A. Thulin	Feb. 78	20 Feb. 78
MS 107	Tread rubber	S. A. Thulin	Feb. 78	16 Feb. 78
MS 108	Adhesives for tread rubber	S. A. Thulin	Feb. 78	
MS 109	Safety matches	S. A. Thulin	Feb. 78	
MS 110	Reinforcement steel for concrete	TC Steel sub. commitee	Feb. 78	
MS 111	Detergent powders	A. Kozlowski	Jan. 78	14 Feb. 78
MS 112	Toilet soap	A. Kozlowski	Jan. 78	14 Feb. 78
MS 113	Hard laundry soap (pure type)	"	Jan. 78	
MS 114	Hard laundry soap (built type)	A. Kozlowski	Jan. 78	
MS 115	Toothpastes	A. Kozlowski	Jan. 78	
MS 116	Dry cells 1.5 V	S. A. Thulin	Feb. 78	
MS 117	PVC cables and Wires	S. A. Thulin	Feb. 78	
MS 118	Galvanized coatings	A. Kozlowski	Feb. 78	
MS 119	Galvanized flat steel sheets	A. Kozlowski	Feb. 78	
MS 120	Galvanized corrugated sheets	S. Kozlowski	Feb. 78	

Annex II

REGULATIONS FOR CERTIFICATION MARKING

Conditions for obtaining MSB certification marking of a product

1. The product shall be assured by its manufactuer (or distributor) to conform to the relevant Mauritius Standard at all times in normal use and storage.

2. The product shall be submitted for type tests to the Mauritius Standards Bureau. In cases where a sampling procedure for such tests is not prescribed in the relevant Standard, the sampling will be left at the discretion of the Mauritius Standards Bureau in consultation with the manufacturer.

3. The manufacturer (or distributor) shall, subject to section 4, have such control and test equipment as deemed required for routine control of the quality and the quantity of the product. The presence of such equipment, its maintenance and calibration shall be subject to inspection by Mauritius Standards Bureau or by any institution or laboratory delegated for such purposes by Mauritius Standards Bureau. Calibration or checking of such equipment will in each case be at the charge of the manufacturer (or distributor).

4. The manufacturer (or distributor) may for certain types of quality control tests for which he is not equipped request regular services from Mauritius Standards Bureau, such tests are normally charged to the manufacturer (or distributor) at current laboratory costs.

5. The manufacturer (or distributor) shall immediately inform the Mauritius Standards Bureau about any change in appearance, composition or other characteristic resulting from voluntary or involuntary changes in manufacture. If the modifications are considered by Mauritius Standards Bureau to be of such a nature as to require new type tests, those tests shall be undertaken at the cost of the manufacturer.

6. If the duration of new type tests as required by Section 5 is likely to be in excess of four months the right to use the certification mark shall be suspended until the result of the renewed type tests are known.

7. The product shall be manufactured by such means as to ensure a regular quality. In cases where such means, or close quality control, are considered not to prevail in the opinion of Mauritius Standards Bureau, certification marking shall not be granted even though individual samples may have been found to meet the specifications of the standard.

8. The manufacturer or distributor accepts to receive at any time staff delegated by the Mauritius Standards Bureau for sampling or inspection of manufactured or stocked products previously accepted for certification marking. The staff member of the Mauritius Standards Bureau shall to this effect in each case produce a letter signed by or for the Director of MSB specifying the nature and number of samples.

9. In case of complaints by purchasers of a product subject to certification marking the manufacturer undertakes to replace the product or fully refund the customer. He shall also undertake to notify Mauritius Standards Bureau of such complaints.

10. In cases where a customer's complaint is not found justified by the manufacturer (or distributor) the customer may submit samples for testing by the Mauritius Standards Bureau or by any laboratory specially delegated by the Mauritius Standards Bureau.

If such tests show that the product submitted does not meet the Standard and that the manufacturer can be held responsible for this fact, the costs of the testing shall be charged to the manufacturer (or distributor). In other cases the cost for such testing will be charged to the customer formulating the complaint.

11. Mauritius Standards Bureau will, subject to section 10 or whenever required, make new type tests or quality control tests of certain properties outlined in the relevant Standard by taking samples at the manufacturer (or distributor) or by means of purchases on the local market.

The cost of such occasional or routine tests will normally not be charged to the manufacturer or distributor unless they form part of a quality control scheme agreed upon with the manufacturer (or distributor) in accordance with section 4.

12. The cost of samples to be taken at the manufacturer or the distributor by Mauritius Standards Bureau shall not be charged for by the manufacturer.

13. The cost of samples purchased on the local market by Mauritius Standards Bureau in accordance with paragraph 11 shall be refunded by the manufacturer (or the distributor) to which the certification marking has been granted.

14. The manufacturer (or distributor) shall in addition to the costs outlined above pay a fee for the certification marking amounting to Rupees 20 000 plus the cost of the type test according to section 2 which will be charged at current laboratory costs.

15. The Mauritius Standards Bureau will withdraw the use of its Certification mark in repeated cases of non-conformity of the product or for any other reason indicated in section 1 to 14 above.

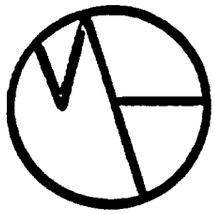
16. The form of the certification mark of the Mauritius Standards Bureau is given in Fig. 1. The minimum size in reproductions on products or packings shall be 5 mm.

17. Any misuse of the certification mark will be subject to legal action.

Annex III

SUGGESTED MODELS FOR MSB MARK

No 1



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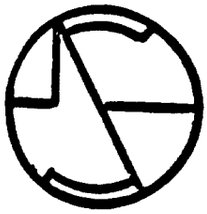

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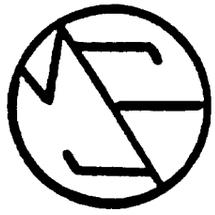

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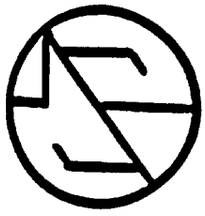

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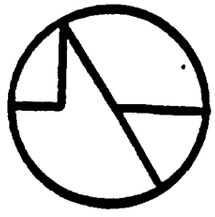

No 6

Annex IV

DRAFT OF PAMPHLET "MSB - WHAT IT IS AND HOW IT WORKS"

The Mauritius Standards Bureau was officially established in April 1975 through government decree (the Standards Act of 1975).

It is located adjacent to the School of Industrial Technology of the University of Mauritius at Reduit.

The advisory board for matters relating to standardization is the Standards Council which consists of

- the Chairman appointed by the Minister of Commerce & Industry
- the Director of Mauritius Standards Bureau
- a representative of the University of Mauritius
- a representative of the Mauritius Chamber of Commerce
- a representative of the Council of Registered Professional Engineers
- two members appointed by the Minister, one of which represents the interests of the consumers.

The laboratory work and certification marking scheme is conducted by the Director of MSB.

During its phase of establishment, MSB has been largely assisted by the United Nations Development Programme(UNDP) through its agenoy the United Nations Industrial Development Organization (UNIDO). MSB has an agreement with the International Wool Secretariat (IWS) by which wool testing according to IWS is made at MSB. The international woolmark for Mauritius is issued under the responsibility of an international woolmark manager assigned to Mauritius by IWS and who has his office at MSB.

Mauritius Standards Bureau is a correspondent member of the International Standard Organization (ISO).

ACTIVITIES

The role of the Mauritius Standards Bureau can be divided in three groups

- standardization, i.e. the issuing of Standards for products, methods of testing, or codes of practice related to essential goods and consumables whether locally manufactured or imported. Standardization includes both specification of quality and suitable sizes;

- laboratory testing of products usually by following established standards;

- metrology which includes the ultimate control of weights and measures in Mauritius as well as verification of measuring instruments used for testing in industries and in private and government laboratories.

STANDARDIZATION AND QUALITY

In the field of standardization emphasis is put on protecting the consumer by establishing quality standards for products but the aim is as well to protect the local industries against competition from low quality imported products.

The standardization work is presently concentrated mainly on a limited number of essential products but it is hoped that the standardization programme may be enlarged to include other items or codes of practice urgently required, in particular by the construction industry.

The main aim of the standardization in Mauritius is that it will be the basis of a voluntary (or in some cases compulsory) certification marking scheme whereby products marketed with the MSB label will imply an official warranty that they are in agreement with the relevant Mauritius standards. It will normally be the responsibility of the manufacturer (or distributor) to ensure that these quality specifications are followed but MSB is responsible for the initial and follow-up laboratory controls. Products which have been accepted for the quality marking scheme will bear the MSB mark.

For knitwear and other wool products manufactured in Mauritius the quality mark according to IWS - scheme is the well known international wool mark.

Exporters of textiles other than wool are advised to consult the Mauritius Standards Bureau as regards quality marking and the use of the label "Made in Mauritius".

TECHNICAL COMMITTEES

The preparation of the standards is normally the work of various technical committees which present a draft standard to the Standards Council for approval and submittance to the Minister of Commerce and Industry. This draft standard is then made available to the public for comments and objections. After six months from the date of official notice the Minister of Commerce and Industry may declare the standard approved for use in Mauritius. He may choose to make the application of the standard either voluntary or compulsory.

There are at present the following technical committees composed of members from Ministries, Public Corporations, the University and various industries:

- Electrotechnical products and installations
- Construction materials
- Protective coatings
- Rubber products
- Chemical and related products

LABORATORY TESTING

The wide range of products to be tested often requires time-consuming laboratory work using sophisticated equipment and well trained personnel. Most of the testing has to be done in the MSB laboratories but for some tests MSB has to rely upon the cooperation of other laboratories in Mauritius. Occasionally, special tests may be carried out in foreign laboratories.

The MSB laboratories are presently equipped to make the following tests

- textiles — tensile properties, burst strength, pilling, abrasion, shrinkage, colour fastness, laundering properties, etc.
- paints — testing of viscosity flash point, drying time thickness gloss, hiding power hardness, adhesion light fastness, influence of weathering, wet and dry abrasion, corrosion protection properties etc.
- metals — tensile properties, hardness, impact strength, etc.

- rubber, plastics and leather

  rubber: curing properties, tensile strength, hardness etc.

  plastics: chemical, mechanical and heat tests, softening point, impact strength.

  leather: flexing resistance, distension, tensile and tear tests.

- chemical

  testing of detergents, soap, safety matches, etc and chemical tests required for other listed products (textiles, rubber, paint, plastics etc.) physico-chemical analysis of materials.

- electrical

  dry cells: testing of minimum lifetime and leakage proofness.

  cables: testing of breakdown voltage, wire and insulation resistance, mechanical and heat resistance.

METROLOGY

The various product testing activities require well equipped metrology facilities for checking the various test instrumentation used in the MSB laboratories or at the manufacturer.

A new bill introducing the compulsory use of the enlarged metric system (so-called SI - system) is expected to come into effect very soon in Mauritius. As this system will apply to practically all activities in the country, it has been necessary to equip Mauritius Standards Bureau with all the metrology facilities required for checking metric measures commonly used in commerce and industry.

In accordance with the new bill the following "national standard measures" will be kept at MSB

- a reference standard metre
- a reference standard set of masses (commonly called weights)
- a reference set of volume measures

In addition to these devices imposed by the new law for use as references in commercial transactions, several other instruments have been procured for use as references in measurements related to product testing including

- certified sets of parallel end gauge blocks for control of instruments used in the precision industry
- reference tape length measures (up to 25 m)
- piston dead-weight testers for calibration of pressure gauges
- standard dynamometers for calibrating tensile and compression testing machines
- astandard cell enclosure for use as reference for voltage measurements
- standard resistors for use as reference for resistance measurements
- standard thermocouples and standard thermometers

A special laboratory is devoted to calibration of masses (commonly called weights) from 1 mg to 25 kg and the instruments available allow precise control "in situ" of analytical balances used in laboratories in Mauritius.

Another laboratory enables control of engineering metrology items such as gauge blocks, micrometers, dial indicators, etc. A large surface plate made of polished stone enables control of straightness, angle, etc.

The electrical metrology laboratory enables calibration of resistors, voltmeters, amperemeters, wattmeters, etc. This laboratory also handles the electrical product testing.

The reference standards used are calibrated in terms of the values of the basic metric units maintained at Bureau International des Poids et Mesures at Sevres, France.

HOW MSB CAN HELP YOU - IF YOU ARE A CONSUMER

It should be pointed out that the MSB is, first of all, a technical office. If you have any complaints about the quality of a product, this may be accidental and you should first contact the vendor, distributor or manufacturer to try to obtain its replacement.

If satisfaction cannot be obtained in this way or if the defect is repeated, you should keep the product or a sample thereof and describe the defect

A. if the product bears the MSB mark by writing to

The Director,
Mauritius Standards Bureau,
Reduit,
Mauritius.

MSB will start an investigation and if the product does not conform to the relevant Mauritius standard, the manufacturer will be warned, and the product shall be replaced. If not the use of the certification mark may be withdrawn.

B. if the product bears no MSB mark by writing to

The National Consumer Council
33, Corderie Street,
Port Louis.

The National Consumers Council can request MSB to undertake the standardization and quality control of the product.

IF YOU ARE A PRODUCER (OR DISTRIBUTOR)

The obtention of the MSB Certification mark may assist you in

- increasing local sales
- better customs protection or other facilities

The textile laboratories of MSB may assist you in

- promotion of export sales

You may be interested in

- calibration of certain instruments used for production of quality control
- comparative testing or testing to a standard of specific characteristics of a product

In all cases you should contact

The Director,
Mauritius Standards Bureau
Reduit.
Tel. 4-1933

As a result of your request the Director will inform you in writing whether and how MSB can undertake action on your request, the duration and approximate cost of the operation.

It is important to stress that all requests for individual tests addressed to MSB as well as the results communicated to you will be strictly confidential.

Annex V

DRAFT BILL OF WEIGHTS AND MEASURES

Explanatory Memorandum

The object of this Bill is to revise the Weights and Measures Ordinance to extend to Mauritius the International System of Metric Units.

February, 1978

Ministry of Commerce and Industry

THE METRIC WEIGHTS AND MEASURES BILL

CLAUSE

A BILL

To make better provision for standards of weights and measures and the wider application in Mauritius of the International System of Units

ENACTED by the Parliament of Mauritius, as follows -

Short title 1. This Act may be cited as the Measures Act, 1978

Interpretation 2. In this Act -

"approved device" means a device bearing a certifying mark;

"appropriate unit" means the prescribed unit in respect of a particular dimension;

"basic unit" means a unit specified in section 4;

"Bureau" means the Standard Bureau of the Ministry of Commerce and Industry;

"certifying mark" means a mark stamped or impressed on a device under the authority of the Director of the Bureau to certify that the device conforms to the national standard measure;

"derived unit" means a unit specified in section 5;

"device" means a measuring device and includes a weight, weighing machine, length measures and any other means of measuring mass, length, volume or any other dimension;

"dimension" means any physical dimension which may be measured;

"Minister" means the Minister to whom responsibility for the subject of commerce and industry is assigned;

"national standard measure" means a device held by the Bureau under section 12.

"SI-unit" means the unit of measurement by reference to which a dimension shall be expressed, and includes a basic unit, a derived unit and a supplementary unit;

System of units of measurement.

3. There shall be applied in Mauritius the coherent system of decimal units of measurement comprised in the International System of Units (Système International des Unites: SI), approved by the General Conference on Weights and Measures and founded on seven basic units.

Basic units.

4. (1) The unit of length is the metre, symbol m

(2) The unit of mass is the kilogramme, symbol kg

(3) The unit of time shall be the second, symbol s

(4) The unit of electric current shall be ampere, symbol A

(5) The coherent unit of temperature shall be the kelvin, symbol K

(6) The unit of luminous intensity shall be the candela, symbol cd

(7) The unit of substance of matter shall be the mole, symbol mol

The definitions of these units are at all times those attributed by the General Conference for Weights and Measures, i.e.

"one metre" is the length equal to 1650 763,73 wavelengths in vacuum of the radiation corresponding to the transition between the level $2p_{10}$ and $5d_5$ of krypton 86 atom;

"one kilogramme" is a mass equal to the mass of the International prototype of the kilogramme kept at Bureau International des Poids et Mesures, Sevres, France;

"one second" is the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the round state of the caesium 133 atom;

"one ampere" is the constant current which, if maintained in two straight parallel conductors of infinite length of negligible circular cross section and placed one metre apart in a vacuum would produce between these conductors a force equal to 2×10^{-7} newton per metre of length.

"one kelvin" is the fraction 1/237,16 of the thermo-dynamic temperature of the triple point of water;

"one candela" is the luminous intensity in the perpendicular direction of a surface of 1/600 000 square metre of a black body at a temperature of freezing platinum under a pressure of 101 325 newtons per square metre;

"one mole" is the amount of substance of a system which contains as many elementary entities as there are atoms in 0,012 kilogram of carbon 12;

Derived units. 5. (1) It shall be lawful to use for the measurement of dimensions other than those specified in section 4, other units derived from the product or the quotient of the basic units.

(2) The common derived units shall be -

(a) units which are expressed in terms of basic units and which include -

(i) for linear velocity, metre per second, symbol m/s, or kilometre per hour symbol km/h;

(ii) for acceleration, metre per second squared, symbol m/s^2;

(iii) for density, kilogram per cubic metre, symbol kg/m^3;

(iv) for area, the square metre, symbol m^2;

(v) for volume -

(A) the cubic metre, symbol m^3;

(B) for practical purposes, the litre, symbol l which shall be the exact equivalent of the cubic decimetre;

(b) units which have a particular denomination and which include -

(i) for force, the newton, symbol N, which is the force which accelerates in one second a mass of one kilogramme by one metre per second;

(ii) for pressure and stress, the pascal, symbol Pa, which is equivalent to one newton per square metre;

(iii) for energy of all forms, whether mechanical, electrical or thermal the joule, symbol J, which is the energy produced by a force of one newton when moved a distance of one meter in the direction of the force;

(iv) for power whether mechanical, electrical or thermal, the watt, symbol W, which is equivalent to one joule per second;

(v) for frequency the hertz, symbol Hz, which is equivalent to one periodic cycle per second;

(vi) for electric charge or quantity of electricity, the coulomb, symbol C, which is the electric charge or quantity of electricity equivalent to one ampere-second;

(vii) for electric tension and potential or electromotive force the volt, symbol V, which is the voltage between two points of a conductor in which the dissipated power is one watt when supplied with a constant current of one ampere;

(viii) for electric resistance, the ohm, symbol Ω, which is the resistance between two points of a conductor free from electromotive forces which produces a difference of potential of one volt between these points when the conductor carries a constant current of one ampere,

(ix) for electric conductance the siemens, symbol S, which is equivalent to one divided by one ohm;

(x) for electric capacitance, the farad, symbol F, which is the capacity of an electric condenser which produces between its connections a voltage of one volt when charged by a quantity of electricity equal to one coulomb;

(xi) for inductance, the henry, symbol H, which is the inductance of a closed circuit which produces an electromotive force of one volt when the current through the circuit varies uniformly by one ampere per second;

(xii) for magnetic flux, the weber, symbol Wb, which is the magnetic flux which when reduced to zero uniformly in one second produces in a closed circuit of one single loop an electromotive force of one volt;

(xiii) for magnetic flux density, the tesla, symbol T, which is equivalent to one weber per square metre,

(xiv) for luminous flux, the lumen, symbol lm, which is the luminous flux emitted within a solid angle of one steradian from a point-shaped source having the luminous intensity of one candela;

(xv) for illuminance the lux, symbol lx, which is the homogenous luminous flux received per square meter by a surface perpendicular to the direction of the flux;

(xvi) for radiactive activity, the becquerel, symbol Bq, which is the radiactive activity corresponding to one spontaneous nuclear transition per second;

(xvii) for absorbed dose of ionizing radiation, the gray, symbol Gy, which is equivalent to the absorbed energy of one joule per kilogramme of absorbing substance;

Supplementary units.

6. It shall be lawful to use in addition to the basic units and the derived units

(a) (i) the "radian", symbol rad, which is the supplementary SI - unit for plane angle defined as the angle between two radii of a circle which out off the circumference an arc equal in length to the radius;

(ii) the "steradian", symbol sr, which is the supplementary SI- unit for solid angle defined as the solid angle which having its vertex in the centre of a sphere, cuts off an area of the surface of the sphere equal to that of a square with sides of length equal to the radius of the sphere;

(iii) the degree Celsius which is the common unit for temperature. The degree Celsius is equal in size to one kelvin but has its zero point at 273.15 K exactly;

(b) for practical purposes the following non SI - units

(i). the "degree", symbol ^{o}, which is the common unit for plane defined as $\frac{1}{90}$ of the square angle or $\frac{\pi}{180}$ rad;

(ii) the angle "minute", symbol which is equal to $\frac{1}{60}$ degree;

(iii) the angle "second" symbol ", which is equal to $\frac{1}{60}$ angle "minute";

(iv) the time "minute", symbol min, which is equal to 60 time "seconds";

(v) the "hour", symbol h, which is equal to 60 time "minutes";

(vi) the day, symbol d, which is equal to 24 hours;

(vii) the metric "tonne", symbol t, which is 1 000kg;

(viii) the "are", symbol a, which is 100 m^2;

(ix) the "hectare", symbol ha, which is 10 000 m^2;

(x) the metric carat for use exclusively in the trade of pearls and precious stones. The carat is 0.2 g exactly;

(c) multiples or submultiples of SI-units as specified in section 7.

Multiples and sub-multiples of units.

7. (1) The multiples and sub-multiples of SI - units shall be those specified in the Second Schedule. These do not apply to practical non SI - units defined in Section 6(b).

(2) (a) Where any multiple or sub-multiple of a unit, other than those specified in the Second Schedule, is to be expressed, it shall be expressed as a decimal function, or in powers of ten, of the appropriate unit.

(b) For the purposes of paragraph (a), the decimal sign shall be indicated by a point.

(c) Separation of thousands or groups of thousands shall not be made by use of comma. Such groups shall be indicated, where required, by a space equal in width to that of one figure.

(3) (a) The Minister may, by Order, prescribe the magnitude and denomination of any other measure required for use in Mauritius.

(b) The magnitude of a measure prescribed pursuant to paragraph (a) shall be expressed in terms of the appropriate SI - unit.

Symbols for units; prefixes.

8. (1) No symbol shall be used to designate a unit or a multiple of sub-multiple of a unit other than a symbol specified in sections 4, 5, 6 and the Second Schedule.

(2) Where a prefix specified in the second column of the Second Schedule is used in respect of a multiple of a unit -

(a) it shall, in terms of the unit, have the size specified in respect of the prefix in the first column of that Schedule; and

(b) it may be designated by the symbol specified in respect of the prefix in the third column of that Schedule.

Prohibition of use of any terms other than SI-units in official documents.

9. (1) Subject to subsection (2) and section 12(1), no term of measurement, other than a SI - unit or a multiple or sub-multiple of a SI - unit, shall be used for expressing any length, mass, area, volume or other dimension in

(a) any enactment;

(b) any document to which the Government, a local authority or statutory corporation is a party;

(c) any judgment given in a Court.

(2) Where a Court enforces a document in which any length, mass, area, volume or other dimension is expressed by reference to a term of measurement other than a SI - unit, the Court may give judgment specifying the subject-matter in the term in which it is expressed in the document together with the equivalent in the appropriate SI - unit.

Measures expressed in terms other than SI - units.

10. (1) It shall be lawful to use a term of measurement, being a term other than SI - unit, specified in the first column of the Third Schedule -

(a) until the expiry of the period specified, in relation to the term, in that Schedule;

(b) such term of measurement shall be deemed to express the equivalent of the appropriate SI - unit as specified, in relation to the term, in the third column of that Schedule.

(2) Where in any enactment in force at, or any document drawn up before the commencement of this Act, a dimension is expressed in a term of measurement other than a SI - unit or a multiple or sub-multiple of a SI - unit, the enactment or document shall be construed as if the dimension were also expressed as its equivalent in the appropriate SI - unit.

(3) Subject to subsection (1) where, in any document drawn up after the commencement of this Act to which persons, other than the Government, a local authority or statutory corporations are parties, a dimension is expressed in any term of measurement other than a SI- unit, the equivalent of the dimension in the appropriate SI - unit shall also be stated.

(4) For the purposes of ascertaining the equivalent in the appropriate SI - unit of any dimension expressed in a term of measurement other than a SI - unit, a multiple or sub-multiple of a SI - unit, a term of measurement specified in the first column of the Third Schedule shall be deemed to express the equivalent of the appropriate SI - unit as specified in relation to that term in the second column of the appropriate Schedule.

Saving.

11. This Act shall not - apply to:

(i) any tax, licence, fees or dues which are levied per ton register of a vessel;

(ii) any measurement in sea or air navigation or meteorology which according to international practice is expressed otherwise than in the appropriate SI - unit.

National Standard measures.

12. (1) The Bureau shall, for the purpose of certifying devices of length, mass and volume, provide national standard measures consisting of

(a) an internationally certified copy of the metre;

(b) a set of internationally certified masses;

(c) a set of devices for measuring volume.

(2) In any proceedings for an offence under this Act in which the correctness of any length, mass, area or volume or of a device is at issue, a certificate from the Director shall be prima facie evidence of the correctness or incorrectness of the length, mass, area or volume or of the device.

Offences.

13. (1) Any person who -

(a) wilfully and fraudulently counterfeits a measure or a certifying mark on an approved device;

(b) wilfully defaces or damages a measure or defaces the certifying mark on an approved device;

(c) uses any false device;

(d) for the purposes of his trade or in his dealings with the public uses any device other than an approved device;

(e) has in his warehouse, shop or any other place where he carries or his trade or business or, in the case of a hawker, has in his possession while in the exercise of his calling -

(i) any device other than an approved device; or

(ii) any false device; or

(f) contravenes any other provision of this Act or of any subsidiary enactment made under this Act,

shall commit an offence and shall, on conviction, be liable to a fine not exceeding one thousand rupees and to imprisonment for a term not exceeding one year.

(2) No person shall commit an offence under subsection (1) (d) or (e) in respect of any device intended to be sold as merchandise, but not possessed or used for purposes of trade and the sale of other goods.

Publication of offender's name, etc.

14. (1) Where a person is convicted of an offence under this Act, the Court may, if it thinks fit, cause public notice to be given of the conviction.

(2) Any device which is the subject of an offence under this Act shall be seized and liable to forfeiture.

Regulations.

15. (1) The Minister may make such regulations as he thinks fit for the purpose of this Act.

(2) Any regulation made under subsection (1) may provide for -

(a) approved devices;

(b) tolerated errors of approved devices;

(c) the methods and frequency of verification of approved devices;

(d) the taking of fees for verification of approved devices;

(e) the amendment of the First or Third Schedule.

Repeal. 16. The Weights and Measures Ordinance of 932 and the Rodrigues Weights and Measures Regulations, 1941 are repealed.

Traditional pr isicn. 17. Subject to any subsidiary enactment made under this A before the commencement of this Act, a device has been stamped or marked as correct by the Commissioner of Police, the device shall, where it otherwise complies with this Act, be deemed to be an authorised device.

Commencement. 18. This Act shall come into force on a day to be fixed by Proclamation.

First Schedule

(Section 2)

Statutory corporations

Agricultural Marketing Board

Cane Planters and Millers Arbitration and Control Board

Central Electricity Board

Central Housing Authority

Central Water Aurhority

Development Bank of Mauritius

Development Works Corporation

Mauritius Meat Authority

Tea Development Authority

Any bank

Any urban authority

Second Schedule

(Section 7)

Multiples and Submultiples of SI - units

Multiplication factor of the unit	Prefixe to proceed the name of the unit	Symbol to proceed that of the unit
10^{18} or 1 000 000 000 000 000 000	exa	E
10^{15} or 1 000 000 000 000 000	peta	P
10^{12} or 1 000 000 000 000	tera	T
10^{9} or 1 000 000 000	giga	G
10^{6} or 1 000 000	mega	M
10^{3} or 1 000	kilo	k
10^{2} or 100	heoto	h
10^{1} or 10	deca	da
10^{-1} or 0,1	deci	d
10^{-2} or 0,01	centi	c
10^{-3} or 0,001	milli	m
10^{-6} or 0,000 001	micro	μ
10^{-9} or 0,000 000 001	nano	n
10^{-12} or 0,000 000 000 001	pico	p
10^{-15} or 0,000 000 000 000 001	femto	f
10^{-18} or 0,000 000 000 000 000 001	atto	a

Remarks to Second Schedule

(a) The names and symbols of multiples and submultiples of units of mass are formed using prefixes proceeding the word gram or the symbol g.

(b) The multiples hecto, deca and the submultiples deci and centi shall normally only be employed for measures of length, area and volume.

Third Schedule

(Section 10)

Measures which may remain in use until 31 December 1979

Designation	Equivalent to	Size in appropriate SI - unit	
Units of Length			
inch (in)	-	0.0254	m
foot (ft)	12 inches	0.3048	m
yard (yd)	3 feet	0.9144	m
fathom	6 feet	1.8288	m
chain	22 yards	20.1168	m
furlong	10 chains	201.168	m
mile	8 furlongs (1760 yards)	1609.344	m
pouce (French)	-	0.027 0701	m
pied (French)	12 pouces (French)	0.324 842	m
toise	6 pieds (French)	1.949 05	m
gaulette	10 pieds (French)	3.248 42	m
perche	2 gaulettes	6.496 84	m
Units of Area			
square inch (in^2)	-	0.000 645 16	m^2
square foot (ft^2)	144 square inches	0.092 903	m^2
square yard (yd^2)	9 square feet	0.836 127	m^2
acre	4840 square yards	4 046.86	m^2
square mile ($mile^2$)	640 acres	2.589 99	km^2
pied carré (French)	-	0.105 522	m^2
toise carré	36 pieds carrés (French)	3.798 80	m^2
perche carré	400 pieds carrés (French)	42.208 9	m^2
arpent	100 perches carrés	4220.89	m^2
gaulette for task work	50 pieds carrés (French)	5.2761	m^2

Designation	Equivalent to	Size appropriate SI - units
Units of volume		
cubic inch (in^3)	-	16.387 1 cm^3
cubic feet (ft^3)	1728 cubic inches	0.028 316 8 m^3
cubic yard (yd^3)	27 cubic feet	0.764 555 m^3
UK fluid ounce	-	28.413 1 cm^3
UK pint	20 UK fluid ounces	0.568 261 dm^3
UK quart	2 UK pints	1.136 52 dm^3
UK gallon	4 UK quarts	4.546 09 dm^3
US fluid ounce	-	29.573 5 cm^3
US gallon	-	3.785 4 dm^3
Units of mass		
ounce (oz)	-	28.3495 g
UK (and US) pound (lb)	16 ounces	0.453 592 37 kg
UK ton (long)	2240 pounds	1016.05 kg
US (short) ton	2000 pounds	907.185 kg
UK (and US) troy ounce		31.103 5 g
Units of force		
pound-force (lbf)		4.448 22 N
kilogram-force (kgf)		9.806 65 N
Units of pressure		
pound-force per square inch (lbf/in^2 or p.s.i.)		6 894.76 Pa
kilogram-force per square cm (kgf/cm^2)	technical atmosphere (at)	98 066.5 Pa
Units of energy		
British thermal unit (Btu)		1 055.06 J
scientific gramcalorie (cal_{15})		4.1855 J
Units of power		
Metric horse power		735.499 W
UK horse power		745.700 W

Annex IV

NEW LAW FOR WEIGHTS AND MEASURES AND ITS CONSEQUENCES AS REGARDS WORK FOR STANDARDS BUREAU

November 1977.

Note for the Director, MSB
by
S. A. THULIN, UNIDO Adviser

1. Present draft of the Bill

1.1. The copy I have so far been able to study was incomplete a number of corrections must be made and the schedules for SI - multiples and equivalences with old measures must be added for convenient consultation by the public (see also my note to P.A.S., Ministry of Commerce and Industry dated 27 October 1977).

1.2 As the old Bill for Weights and Measures will be declared obsolete it will be necessary that the new Bill provides for the issue of Ministerial decrees ordinances (or compulsory standards as to the technical regulations for weights and measuring instruments to be used for legal purposes in Mauritius. Such ordinances or standards shall specify the mode of making applications for import of measuring instruments (type approval), shape and dominations of weights and capacity measures, meter sticks etc. They shall also specify the mode of original verification by a competent body upn installation of the instrument and the tolerances of acceptance, etc.

2. Equipment and premises for original verification, site verification and regular control

From the Metrication file that I have just been able to study I can see that the original verification and stamping of new weights and similar operations should for technical reasons be the duty of MSB according to the suggestion by the Commissioner of Police. The original site verification of more complicated automatic balances may also become the duty of MSB.

As you know the metrology laboratories of MSB were planned already by my predecessors mainly for reference and high precision work. No particular facilities for stamping of weights or any wet room for checking of capacity measures were such foreseen.

2.2. As regards the checking and stamping of weights from 1 mg to 20 kg we have the necessary equipment and the space problem may be solved by sharing the operations between rooms 1 and 9 whereby checking of finer weights nor requiring adjustment operations can taken place in room 1 whereas the adjustment and stamping of cast iron weights will have to take place in room 9 close to the workshop facilities.

2.3. As regards meter sticks the checking and stamping can in a similar way be shared between room 12 (checking) and 9 (for stamping).

2.4. As regards capacity measures the situation is more difficult as no special "bath room" has been foreseen for these purposes. At present occasional testing from 1ml to 20 litres can take place in room 10 or 9 using the reference capacity measures which are normally stored in the mass laboratory room 12. In case of more extended control operations for capacity measures it will be necessary to find some other suitable premises such as the space available in room 4 which may be transformed into a wet testing room.

3. Conclusion of equipment and premises situation

3.1. For routine stamping of weights and meter sticks the following is required

- stamping tools for weights including MSB dyes
- lead material
- melting facility for lead
- stamping dye for meter sticks made in wood or metal.

3.2. For routine checking of balances and weights outside MSB

(at least) 2 sets of secondary (adjustable) weights in brass 10 mg to 5 kg

(at least) 2 sets of adjustable weights in brass consisting of two 10 kg weights with handle (in brass or cast iron)

25 adjustable cast iron weights of 20 kg to be procured from the local market (or specially manufactured in Mauritius using OIML - design)

3.3. For routine checking of capacity measures

- 2 Secondary sets of capacity measures 0.1 litre to 20 litres and suitable testing premises or site testing facilities.

4. Gasoline and gasoil pump checking

The procedure to be laid down by ordinance should be determined from discussions with the distributors.

5. Tank trucks

The extent to which the volume of tank trucks has to be determined legally should be investigated and suitable means for checking should be found.

6. Weigh bridges

Using the twenty five cast iron weights of 20 kg calibrated on the precision balance in room 1 it will be possible to do occasional checks of platform balances on the site up to a capacity of 500 kg provided a suitable van is available.

The extent to which weigh bridges with capacities in the range of 500 kg to 50 ton will have to be checked must be found out, in which case suitable iron weights of 200 to 500 kg each and trucking equipment will have to be procured or locally manufactured.

A suitable weigh-bridge of capacity 500 kg or 1000 kg for calibrating these weights using 20 kg weights will have to be found locally or procured. For such calibrations suitable premises must be found which have facilities for truck unloading.

Due to the limited space and lack of handling facilities for heavy equipment at MSB it will be necessary to take up this matter with the industries concerned (mainly the sugar industries) to define the necessities and possibilities. An inventory of all the weigh-bridges in Mauritius in the range of 100 kg to 50 tons should be made.

7. Metrology personnel and transport etc.

It may be too early to estimate the amount of metrology control work which has to be done outside the MSB premises as this will depend to what extent such control can be made by other personnel (from the Police or the Ministry etc.), but there will no doubt be required more than one metrology technician in future as well as increased transport facilities.

The ordinances (or compulsory standards) to be issued as regards original and periodic verification of balance and other instruments will have to take into account the possible work-load on personnel and facilities so that a realistic confidence in measurements can be obtained with limited staff and premises. The conditions prevailing in many countries where type approval, original and regular verification are extended operations would require too much staff for Mauritius. The Mauritius Standards Bureau must have at its disposal a complete list of the local importers and distributors of weighing, length and capacity measuring equipment.

CONCLUSIONS

The above notes may be considered as a WORK PROGRAMME in the field of the effective application of the planned Weights and Measures Bill in Mauritius. It may be an advantage if the various individual technical regulations for weights, balances, metersticks, capacity measures and perhaps other items such as pressure gauges, electricity meters etc., can be issued progressively as a set of compulsory (or non-compulsory) technical standards. In this case this should be mentioned in a relevant Ministrial Ordinance.

Annex VII

MODELS OF WORK ORDER AND TEST REPORTS

WORK ORDER

Number

Registration date:

Work requested by

Address

Tel. No.

Test

Make of items tested

Number of items tested

Markings

Methods of test

Results

Report attached ..... No. of pages .....

Tested items: Returned - Destroyed - Kept at MSB

Date started

Date terminated

Number of hours engineer

Number technician

Material used

cost

Cost invoiced.

TEST REPORT

Date of test report

Work order reference:

Item

Marked

Test

Requested by

Results

(Signature)

.....
for the laboratory

(Signature)

.....
Director

Annex VIII

UNIDO EQUIPMENT

for the second phase of MSB porject

Code No. DP/MLR/75/008

List of requisitions of UNIDO equipment by requisition numbers

Laboratory symbols:

C = chemical, E = electrical, M = mechanical, P = paints,

T = textile, W = weights and Measures

I. Equipment requisitioned in 1976 and beginning 1977 (all delivered)

Lab. Symbol	Reqn. No.	UNIDO Purchase order	Supplier	US dollar amount
C	76/1	15-6-00530	Griffin & George, U.K.	699
C	76/2	15-6-00521	Merck, FRG	227
C	76/3	15-6-00524	Fisher, Switzerland	335
C	76/4	15-6-00531	Griffin & George, U.K.	701
C	76/5	15-6-00525	Fisher, Switzerland	1 927
W	76/6	15-6-00527	Mettler, Switzerland	9 462
W	76/7	15-6-00544	Reverifications, U.K.	3 037
		15-6-00544 A		388
W	76/8	15-7-00199	Bayerische Massind. FRG	1 627
W	76/9	15-7-00206	Hommel Handel FRG	3.700
W	76/10	17-7-00245	Carl Mahr, FRG	10 432
W	76/11	15-7-00201	Spindler + Hoyer, FRG	2 675
W	76/12	15-7-00208	Budenberg GmbH, U.K.	3 430
W	76/13	15-7-00209	Wolters-Mohring, FRG	3 255
C	76/14	15-7-00176	Fisher Scientific Co. SWI	414
E	76/15	15-7-00204	Johnson Matthey Metals, U.K.	494
E	76/16	15-7-00175	Degussa, FRG	222
E	76/17	15-7-00244	Leeds + Northrup, USA	3.580
E	76/18	15-6-00610	Hartmann + Braun, FRG	4 700
W	76/19	15-7-00300	Mettler Instr. AG, SWI	730
W	76/20	15-7-00353	Cottl. Kern and Sohn, FRG	3 578
W	76/21	15-7-00177	Bragg Bros. Ltd., U.K.	1 577
W	76/22 76/23	15-7-00219	Esselte Studium, SWE (postponed to 1978)	3 588
E	76/24	15-7-00210	Haake, FRG	2 869

Lab. Symbol	Reqn. No.	UNIDO Purchase order	Supplier	US dollar amount
E	76/25	15-7-00178	Ruhstrat, FRG	4 925
E	76/26	15-7-00198	Sefram, FRA	1 060
E	77/1	15-7100168	Fluke Mfg. Co. Inc. USA	1 098
W	77/2	15-7-00169	Dipl. Ing. G. Wazau, FGR	6 576
		15-7-00169A	ditto	739
M	77/3	15-7-00223	Tinium Olsen, USA	39
E	77/4	15-7-00205	Suevia Uhrenfabrik, FRG	125
	77/5(1)	15-7-00481	Spindler & Hoyer, FRG	63
	77/5(2)	15-7-00504	Irion & Vosseler FRG	718
C	77/5(3)	15-7-00723	Reichert Austria	143
	77/5(4) (5)		(Cutting tools) postponed due to lack of supplier	
M	77/5(6)	15-7-00447	Metallurgical Services, U.K.	397
E	77/6	15-7-00659	SIPE, France	1 570
		Total req. 76/1 to 77/6 :		77 520 US Dollars

II. Requisitions dated 14 October, 1977

(purchased particlly delivered)

Lab. Symbol	Reqn. No.	UNIDO Purchase	Equipment	Supplier	Est. cost US $
E	77/7	15-7-00805	Standard cell enclosure and multiple standard resistor	Guildline, Canada	3 575
E	77/8		Standard resistors, volt box and optical pyrometer	Leeds & Northrup USA	4 731
E	77/9	15-7-00765	DC power supply 300 V 5A	P. Fontaine France	2 014
E	77/10	15-7-00801	Two potentiometric recorders	Sefram, France	3 329

Lab. Symbol	Reqn. No.	UNIDO Purchase No.	Equipment	Supplier	Est. cost US Dollars
E	77/11	15-7-00802	Thermocouple switches	Croydon Instruments, U.K.	909
C	77/12	15-7-00803	Analytical balance type H 10	Mettler, Switzerland	1 100
E	77/13	15-7-00844	Digital voltmeters and calibrator for DC	Fluke, USA	6 332
	77/14		Opaque illuminator for Zotopan microscope	Reichert, Austria (cancelled)	
E	77/15	15-7-00834A	Oscilloscope, function generator	Hewlett-Packard, USA	3 421
E		15-8-00137	Electronic counter	"	1 103
M	77/16	15-7-00888	Profile projector	Hauser, Switzerland	13 792
C	77/17(1)	15-7-00804	Gas Chromatograph	Perkin Elmer, USA	17 395
C	77/17(2)		Purenitrogen Contoiners	-	800
			Total req. 77/7 to 77/17		57 458 US Dolla

Note: Only equipment as per requisitions 77/11 and 77/12 had arrived at the project on 15 February 1978

III. List of equipment requisitioned on 10 February 1978

Lab. Symbol	Req.No.	Equipment	Supplier	Est. cost US Dollars
P	78/1	Reflectometer, etc.	Gardner, USA	3.016
P	78/2	Spraybooth	True Bros, U.K.	1-541
P	78/3	Electronic thickness meter	K. Deutsch, FRG	1 700
P	78/4	Blast cleaner	Kemiska Industries, Sweden	850
P	78/5	Cone and plate viscometer	Research Equipment, U.K.	1 282
P	78/6	Impact tester, scratch tester, etc.	Sheen Instruments, U.K.	1 710
P	78/7	Paint inspection gauge	Elcometer, U.K.	420
P	78/8	Sampling tools for paints	Erichsen, FRG	340
E	78/9	DC voltage calibrator Fluke model 341A	Fluke, USA	2 400
E	78/10	4 Timers SAIA model KOD 1 -e15 - 12s - 12 h	SAIA, Switzerland	660
		4 Timers SAIA model KOD 1 -e15 - 30 h	"	
	78/11	Toploading balance	Mettler, Switzerland	2.600
P		1 Mettler type P1210 capacity 1200 g $\pm$ 0.01g		
M		1 Mettler type P5N capacity 5000 g $\pm$ 0.1g		
W	78/12	Calibration of primary mass - standard (1kg) at Bureau Internation des Poids et Mesures, France.	BIPM, France	1 000
W	78/13	1 Set of chromium plated adjustable local standard weights in box composed of 5 kg - 2 kg - 2 kg - 1 kg 500 g - 200 g - 200 g - 100 g 50 g - 20 g - 20 g - 10 g 5 g - 2 g - 2 g - 1 g	Reverifications U.K.	2 300

Lab. Symbol	Req. No.	Equipment	Supplier	Est. cost US Dollars
	78/13	2 sets cylindrical brass weights in leather case composed of 2 kg - 2 kg - 1 kg - 500 g 200 g - 200 g - 100 g 50 g - 20 g - 20 g - 10 g 5 g - 2 g - 2 g - 1 g	Reverifications, U.K.	
W	78/14	Standard metre in steel length 1,000 mm divided in mm with official certificate	Hommelwerke, FRG	1 350
C	78/15	pH-meter and accessories	EEL, U.K.	1 735
C	78/16	Filter pump and 100 mm sieves	Baird & Tatlock, U.K.	670
M	78/17	Hardness tester and measuring microscope	Zwick FRG	9 000
		Total reqn. No. 78/1 to 78/17		32 574 US Dollars

Summary of equipment commitments

Requisition No.	List	Date	Estimated cost US Dollars	Comments
76/1 to 77/6	I	1976/77	77,520	Delivered
77/7 to 77/17	II	14/10/77	57 458	Purchased but not delivered
78/1 to 78/16	III	10/2/78	32 574	Requisitioned
			167 552	

The equipment budget as per budget revision (tripartite revie.) dated 20 December 1977 is

Year	Amount US Dollars
1976	14 907 (actual)
1977	80 000 (revised budget)
1978	80 000 (revised budget)
	174 907

Balance for other procurements in 1978:

174 907 - 167 552 = 7 355 US Dollars

Comments concerning UNDIDO equipment requisitions

The expert in chemistry when appointed will no doubt required some urgent procurements in the field of food testing equipment, the requirements will however much depend on the list of priorities to be drawn up in this field. They will also depend on the extent to which testing may be done in other specialized laboratories (Ministry of Agriculture, MSIRI, etc.). The rather limited balance indicated above 7 355 dollars should thus not be committed before clear decisions have been taken as regards the food testing.

It is in any case necessary that all workshop equipment required is urgently procured from government funds and preferably also the additional textile testing equipment.

In view of the necessity to test items such as razor blades requiring a Vickers microhardness tester but also for some macrohardness tests it has been found necessary to procure a hardness tester meeting all requirements (reqn. 78/17). The previously ordered one is now defective and does not allow sufficiently low loads as required for razor blades. The requisitioned tester from Zwick has a greater load range than most micro-macrohardness testers (1.96 to 294 N, i.e. 0.2 to 30 kgf). It can also be used as metallographic microscope and measuring microscope using the measuring table ordered as accessory. The new instrument should be installed fully dust protected, (preferably in room 12).

Polishing equipment for the mechanical laboratory should also urgently be procured so as to enable to obtain highly polished surfaces for microhardness tests and metallographic examinations (a diamond disc cutter and an embedding press are already available). This equipment should consist of

	Equipment	Supplier	Est. cost US Dollars
1	KNUTH-ROTOR pregrinding machine with supply of silicon carbide discs and spare parts for 220 V 50 HZ	Stuers, Copenhagen Denmark	800
1	DAP - U universal polishing machine with diamond and alumina powder, paste, polishing discs, lubricants etc. for 220 V 50 Hz.		700
	Aluming paste, diamond paste, polishing cloth, lubricant, polishing discs		1 500
			3 000

Due to the limited UNDP funds the following order for electrical metrology equipment already listed in the first report and required for calibration of AC - meters was still postponed for future ordering:

	Equipment	Supplier	Est. cost dollars
1	Light-spot voltmeter type ELF MV 1 class 0.1 range 150, 300 and 600 V Cat. No 36031 - 5-167214 cost 4205 DM	Hartmass & Braun FRG	2 100

	Equipment	Supplier	Est. cost dollars
		66	
1	Light- spot ampere meter type ELFMA 1 class 0.1 measuring ranges 3 and 6 A Cat No. 360 31-5-1672112 cost 3931 DM		1 960
1	Light-spot wattmeter type ELGMI class 0.1 ranges 2.5 and 5 A 30 to 300 V cat No. 36032-5-1675112 cost 4848 DM		2 200
1	Transformer 220V/6V cat. No. 36038 - 5 - 1828212 cost 121 DM		60
2	Spare bulbs 6 V Cat No. 94363-4-0880277 cost 18 DM		10
1	Multiple current transformer Ti 53 0.1 to 50 A primary 1 and 5 A secondary class 0.02%		1 250
	Cost estim. 2 500 DM		7 580 US Dollars

The abve light-spot instruments may be checked with DC current and voltage to the MSB DC reference standards and used to calibrate accurate AC instruments.

(At present the same DC to AC transfers can be made to about 1% using class 0.5 mirror AC/DC meters previously ordered for general in electrical testing).

Annex IX

JOB DESCRIPTION

PROJECT	MAR/75/008 Assistance to Mauritius Standards Bureau
POST TITLE	Expert in food and analytical chemistry
DURATION	12 months
DATE REQUIRED	April 1978
DUTY STATION	Mauritius Standards Bureau, Reduit, Mauritius (Ile Maurice)
PURPOSE	To advise in the operation of the chemical laboratories of the Mauritius Standards Bureau in particular as regards standardisation and testing of industrially produced consumables and food products
DUTIES	The expert will be attached to the Mauritius Standards Bureau of the Ministry of Commerce and Industry and specifically will be expected to: 1. assist in drafting local Standards concerning industrially produced food products 2. organise and operate the analytical chemistry laboratories for testing industrially produced consumables such as soap, detergents, edible oil, margarine, salt, canned food etc. 3. advise generally on chemical analytical methods as required for testing of products subject to application of local or foreign standards 4. train local counterparts in analytical chemistry
QUALIFICATIONS	University degree in chemistry and/or food technology with extensive experience of food testing, analytical chemistry and microbiology
LANGUAGE	English (official language), knowledge of French appreciated.
BACKGROUND INFORMATION	The MSB was established in April 1975 through the Standards Act. The Bureau is responsible for drafting local standards based on foreign and international standards and will operate a certification marking scheme. The MSB will carry out most of the testing in its own laboratories. In the field of food technology the laboratories of MSB will mainly concentrate on testing of industrially produced food which will have to meet local or international Standards whether for export or local consumption, such as canned fish, canned fruit, edible oil, margarine, salt. etc. The laboratories consist actually of one room for general chemistry and one room for physical chemistry equipped with microscopes, spectrophotometer, polarograph, automatic titrimeter and gas chromatograph, etc.

Annex X

PRIORITIES FOR STANDARDIZATION ACCORDING TO NATIONAL CONSUMERS COUNCIL
(Letter of 8 February 1978)

Mr. K. Gujadhur
Director Mauritius Standards Bureau
Reduit

Dear Sir,

May I thank you, Dr. Thulin and Mr. Koslaowski for so kindly receiving Mr. Hosker and myself at the Standards Bureau last week.

At our meeting you will recall that the NCC was asked to consider the Urgent Standardization Programme proposed by Dr. Thulin. We have now done so and would like to submit the following comments on what is in general a programme that reflects many of the urgents standards needs in Mauritius.

In the NCC's view the categories of product for which standards are most urgently required are food, textiles, drugs, drinks and electrical appliances. You will note that food is top of our list and we urge you to attach the highest priority to this sector. We believe that the M.S.B. should allocate or acquire adequate resources to push ahead rapidly with a programme of standards setting for a number of food products, many of which are on Dr. Thulin's list.

So far as the food items contained on the list submitted to us are concerned, we think the following items should be classed as urgent - milk, pasteurized milk, ice-cream, bread, rice, rhum, vegetables, fish, juices (if they include bottled fruit syrups), fresh and frozen chicken, processed meat products (particularly sausages of all varieties) and salted fish. Quality grading of fruit and vegetables are also important.

Of the household non-food consumables many of the complaints made to us are about toothpaste and we would like to see this upgraded to urgent. We should also like to see lipsticks added to the list of cosmetics.

Categories 3, 4 and 5 do not really concern us, though category 6, Electrical Materials, does. Here we should like to see electric water heaters and electric irons added to the list of electrical equipment for which standards are required. As you know we are concerned about the performance of dry cell batteries and we think a standard for them is very urgent.

So far as our own programme of testing is concerned we are exploring with the Ministry for Prices and Consumer Protection ways of dealing with the cost of tests we commission and we hope to be in a position to resolve this matter when we receive Dr. Thulin's proposals for the programme of battery testing that we want to undertake.

In the course of a discussion about standards work at its recent Executive Meeting, the NCC took the view that the results of tests carried out by the M.S.B. should be given wider currency than is presently the case. The N.C.C. committee considered that in many cases test results involved matters of public interest and should, wherever possible, be published openly. This is a matter which I think the NCC may wish to turn to again in subsequent correspondence.

I hope the comments in this letter are generally helpful.

Yours sincerely,

(Mrs. F. Roussety)
Executive Officer

Annex XI

List of Staff of Mauritius Standards Bureau

as per 15 February 1978

Mr. S. K. Gujadhur	Director
Mr. C. Dossa	Mechanical Engineer
Mr. J. Porbhoo	Chemical Engineer
Mr. A. C. Hurdoyal	Scientific Officer (Metrology)
Mr. R. Gopaul	Scientific Officer (Chemistry)
Dr. P. Tai Chung Ving	Textile Technologist
Mr S. Jahajeeah	Textile Lab. Technician
Mr. A. S. Joolia	Mechanical Lab. Technician
Mr. S. Yan	Assistant Mechanical Lab. Technician
Mr. V. Guness	Assistant Chemical Lab. Technician
Miss J. Murugessan	Assistant Textile Lab. Technician
Mrs. R. Matabudul	Executive Officer
Mrs. R. B. Khodabux	Clerical Officer
Mrs. I. C. Pillay	Typist/Stenographer
Miss M. Lingaya	Typist/Stenographer
Mr. M. Jugroo	Clerical Assistant
Mr. M. Boodhun	Clerical Assistant
Mr. I. Becharry	Office Attendant
Mr. M. Mudun	Office Attendant
Mr. B. Nixon	I.W.S. Expert
Dr. S. A. Thulin	UNIDO Expert
Mr. A. Kozlowski	UNIDO Expert

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