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Edited by:

H. Steffen Peiser
Robert S. Marvin

Office of International Relations
National Bureau of Standards
Washington, D. C. 20234

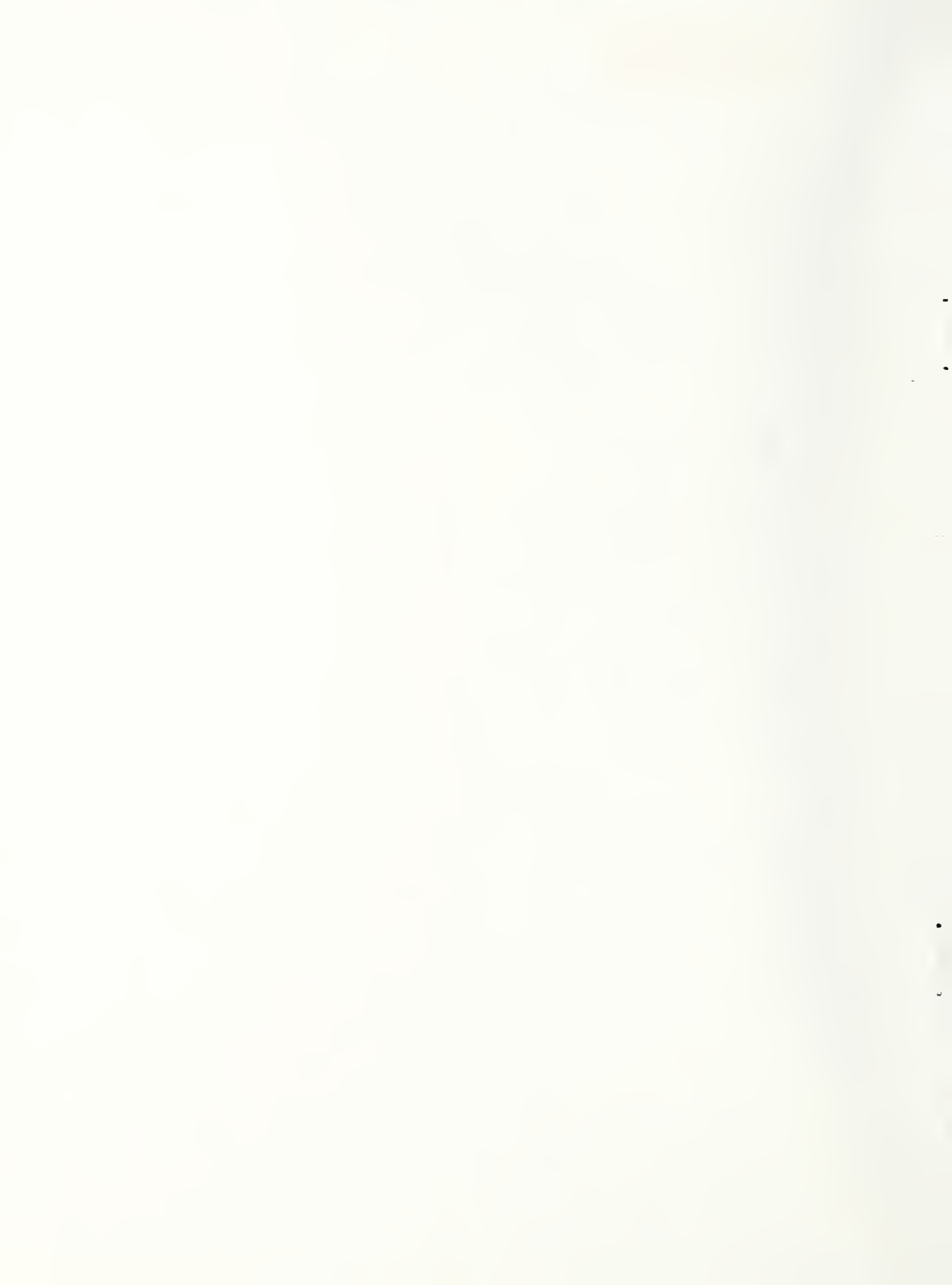
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**REPORT TO AID ON A PHILIPPINES
SURVEY ON STANDARDIZATION AND
MEASUREMENT SERVICES**

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U.S. DEPARTMENT OF COMMERCE, Elliot L. Richardson, Secretary
Dr. Betsy Ancker-Johnson, Assistant Secretary for Science and Technology
NATIONAL BUREAU OF STANDARDS, Ernest Ambler, Acting Director

PHILIPPINES

Railroad
Road

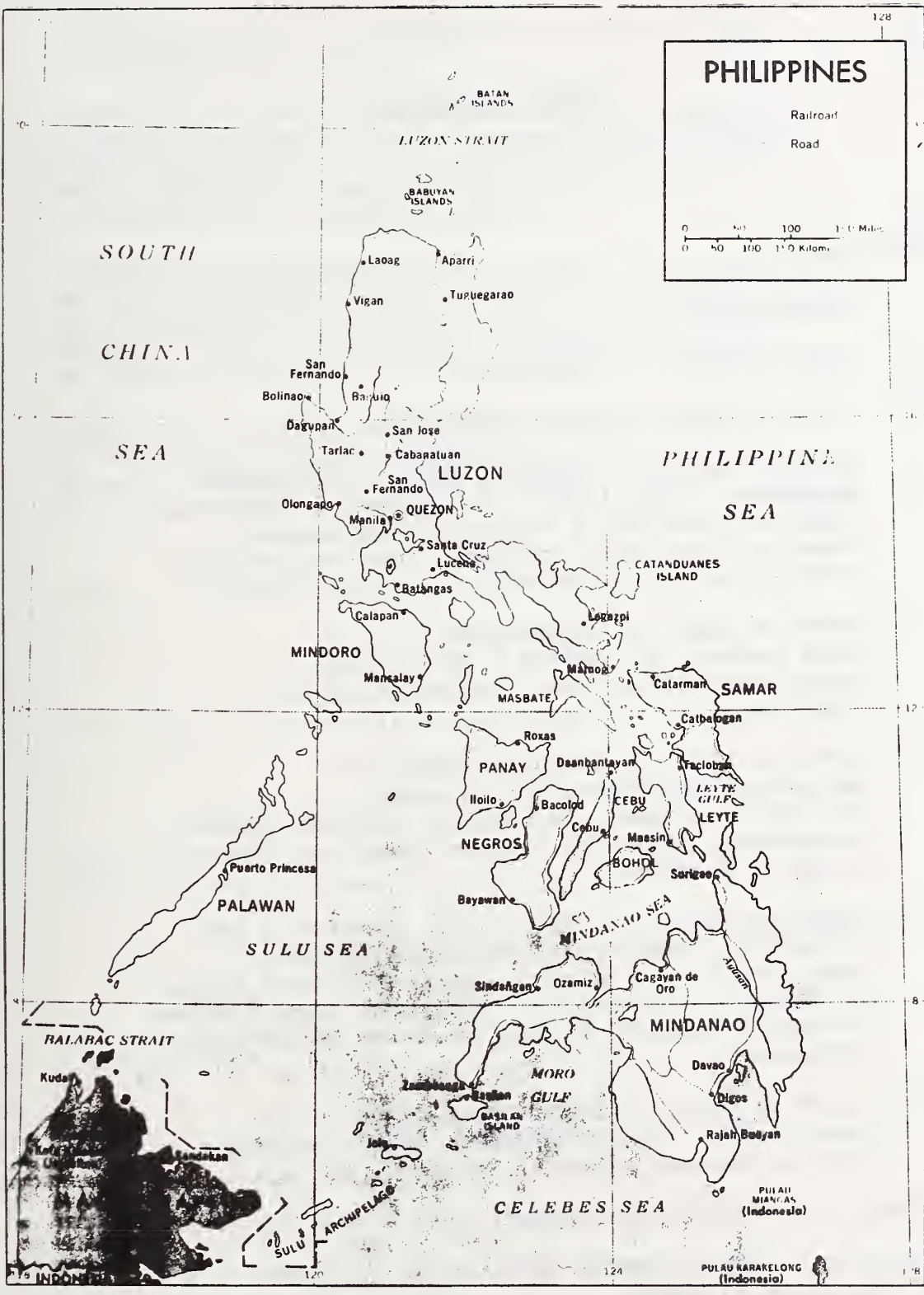
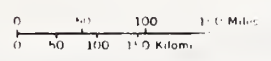


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PHILIPPINES SURVEY ON STANDARDIZATION AND MEASUREMENT SERVICES

May 4 - 17, 1975

I. INTRODUCTION

A survey of standardization and measurement services in the Philippines was part of a continuing program of the U. S. National Bureau of Standards (NBS) sponsored by the Office of Science and Technology of the Agency for International Development (AID) on "utilization of the industrial technology capability of the National Bureau of Standards". The purpose of the Philippine Survey was to contact standardization and metrological experts and determine the facilities in the country to assess and discuss their role in support of industrial development and other progress directed towards the fulfillment of national goals.

The Survey was under the direction of Mr. Vidalito F. Rañoa, Director of the Philippines Bureau of Standards (PBS) and followed the general pattern and aims described in the reports of similar surveys conducted in Ecuador [1], Korea [2], and Turkey [3]. There were five NBS staff members in the Philippine Survey, one U.S. professor and three third-country participants complemented by Philippine specialists. A novel feature was the division of the Survey Team after the initial two days of joint programs into five expert groups with separate programs.

Group A with Professor Kenneth S. Stephens as U.S./NBS member on Technical Standards Committee Management;

Group B with Jeffrey Odom as NBS member on Metrication;

Group C with Noel Raufaste as NBS member on Building Technology;

Group D with Joseph Hilsenrath as NBS member on Technical Information Handling; and

Group E with Arnold Wexler as NBS member on Testing Facilities.

H. Steffen Peiser acted as leader of the foreign survey participants and in various organizational matters. The planning and execution of the Survey was almost entirely in the hands of Director Ranoa and his staff. It is their achievement that the complex program was carried out efficiently, smoothly and in a spirit of close friendship between all the team members. PBS served as overall host for the survey team. Key members of the office staff accompanied the survey team, affording

a continuous dialogue. Several visits were made to the offices of PBS including a number of provincial offices. Furthermore, the position of PBS in the national program of standardization singles it out for emphasis in this study.

The Survey Team read and discussed general literature about the Philippine history, culture and the economy, which was well summarized for the two preceding years in a governmental report reproduced in Appendix I. In the Philippines, as in the U.S.A., there exists a great diversity of independent active organizations often with overlapping interests and functions. Appendix II gives a list of agencies establishing or enforcing engineering, product or safety standards. In Appendix III a list of agencies with metrological laboratories is assembled. This list should not be held to be all inclusive.

There can be no doubt that the Survey had a unique opportunity to serve the Philippine organizations concerned with industrial development by creating a wider awareness of technical opportunities and of scientific and technological expertise available in the Philippines and by offering recognition of achievements as well as constructive suggestions for solutions of problems. These are the results of the Survey.

The problems noted here are recorded with full recognition of the fact that most exist to a greater or lesser extent in most countries, and that many remain unsolved even in highly developed countries. However, an explicit recognition of existing problems should enable those concerned to assess the actions and facilities required to resolve them, to evaluate the costs of such solutions in terms of the magnitude of the individual problems and to plan a feasible and realistic plan of action. The assistance of experts from many countries can be requested through agencies of the United Nations and the International Organization for Standardization.

*See Rañoa, V.F., Testing and Certification of Philippine Export Products, in National Bureau of Standards (U.S.) Spec. Publ. 438, "Testing and Certification for Export Products in Industrializing Countries", 168 pp. (Feb. 1976)

II RECOMMENDATIONS - SUMMARIZED

The following is a numbered listing of recommendations in summary form based on the discussion in the remainder of the report. This is not a summary of the complete report, since certain problems and possibilities for alternative actions are difficult to summarize and are best presented in context with the related discussion. A review of earlier recommendations is presented in reports by David Desmond and A. B. Rao (and Lal Verman is referenced in Rao's report), UN advisors to PBS. These reports are referenced at the end of Section 1 of Part III.

SUMMARY RECOMMENDATIONS FROM GROUP A ON TECHNICAL STANDARDS COMMITTEE MANAGEMENT

1. A major review of standardization needs and procedures in the Philippines should be undertaken by a working committee with representation from the key agencies involved. This should be completed within a relatively short period - preferably not more than six months. Topics to be studied should include:
 - a) rationalization* of standardization and certification
 - b) organization and operation of technical committees to reach a consensus
 - c) a resolution of the question of mandatory vs. voluntary implementation, and actions needed to make the method chosen an effective means of harmonizing industry, trade, and economic development
 - d) provision of a consultative service to industry
 - e) establishment and/or rationalization of laboratory services
 - f) agreement on fundamental subjects for standardization and rationalization between agencies
 - g) reorganization of weights and measures and legal metrology work
 - h) adequate handling of export and import inspection
 - i) safety and environmental control

*Rationalization in this report will be understood to have the following meaning, consistent with that believed to be current in standards circles in the Philippines. A set of systems, types, methods, processes, standards, codes, sizes, organizations, etc., is said to be "rationalized" when each member of the set is justified in terms of specific practical objectives and the set outlines the minimum number adequate to achieve these objectives.

- j) an equitable fee structure to promote the economics of standardization
 - k) designation of the organizations responsible for carrying out recommendations 2 through 6 below.
2. Undertake a public and industry-wide campaign to promote understanding and knowledge of standardization, certification and quality consciousness.
 3. Design an improved format for published PBS standards. Make proper use of the metric system in layout and presentation as well as in technical specifications. Subject all final drafts to both technical and copy editing prior to publication.
 4. Accelerate the issuance of standards for Quality Mark Certification purposes by adopting international, foreign, national, and/or company standards with appropriate designations.
 5. Expand standards library and technical information services to industries and other technical and scientific organizations.
 6. Develop a training program for industrial personnel in quality control techniques and principles, measurement and calibration procedures, etc. Provide training for standardization staff personnel locally and abroad through programs such as those of Sweden, U.S.A., U.S.S.R., etc.

SUMMARY RECOMMENDATIONS FROM GROUP B: METRICATION

1. The Philippine Government should assess the priority to be given to the changeover. In order to be successful, the program should be supported and financed on a significant scale.
2. The Government should establish a full time office to coordinate and direct activities with regard to metric conversion, the functions of which would be to:
 - a. Educate the general public as to the reasons for the change to metric;
 - b. Serve as a point of contact for industry and government agencies concerning proper metric usage and common sense methods of converting to metric;
 - c. Encourage and coordinate activities among the various government departments.

3. The aid of the private sector should be enlisted to aid in publicizing the changeover to metric. This could include distributing information brochures to the general public and providing additional assistance to employees and their families by firms particularly involved in the changeover.
4. The Metric System Board should take every opportunity to share in the experiences of the Australian Metric Conversion Board. This Board is directing probably the most successful of the current metrication efforts.
5. Enlistment of the services of an expert on metrication programming and implementation should be considered.

SUMMARY RECOMMENDATIONS FROM GROUP C: BUILDING TECHNOLOGY

Sixteen recommendations classified in five groups are presented below. They are presented as an aid to help PBS shed its current lack of an image, characterized by people asking such questions as "Who are they and what do they do?", and to help PBS become more responsive to the building needs of the Philippines. Several of the recommendations could be implemented immediately while others would require coordination between PBS, other government agencies, private organizations and the professional building community.

Institution Building

1. A dialogue should be maintained between the Philippines Bureau of Standards, the National Bureau of Standards and the Agency for International Development to provide survey feedback to all parties for coordinating local responses to project reports and recommendations, for assessing the impact of the survey on Philippine building technology and for identifying additional local technical needs.
2. Communication about building technology between Philippine Government agencies, professional societies and the private sector should be improved. One of the means of achieving this would be by holding periodic workshops and conferences on different subjects.

Application of Codes and Standards

3. Codes and standards should be upgraded by inclusion of provisions for more comprehensive fire safety regulations, wind and seismic forces and other live loading. This will lead to an improvement in the quality and safety of buildings and would minimize the loss of life and property due to natural calamities and fires.

4. The enforcement of codes and standards should be improved and harmonization with the National Building Code should be favored with a minimum of local departures. Zoning practices should be more widely adopted.
5. A wider dissemination of building standards and specifications to the professional community, government agencies and private industry is needed.

Laboratory Services

6. An accepted uniform laboratory accreditation program should be developed for use by all government and private organizations. This will lead to a better adherence to test methods and enforcement of standards.
7. There is a need for developing standard methods of testing for indigenous products such as bamboo, coconut, lumber, aggregates, cement, sand, etc.
8. In order to ensure better quality control of building products, the facilities at testing laboratories should be expanded.
9. Facilities for full-scale testing of building components should be available at one laboratory facility.
10. Sampling methods - particularly of concrete - should be better enforced at the construction site.

Education

11. An accreditation system for engineering schools should be introduced. This will ultimately lead to more uniformity in the quality of graduates.
12. Undergraduates should receive more exposure to current building practices and building technology; this should lead to an improvement in building practices.
13. An intermediate level of education (para-professional) should be provided to produce specialists to perform certain functions like inspection and supervision of construction and testing of materials. Releasing the engineers, who currently perform the above jobs, for more vital ones, will lead to better utilization of engineering manpower.

Research

14. Collaboration between PBS and government, manufacturers, and the building community toward establishing a national building research program would be beneficial to all parties concerned with improving buildings. For this to occur, some form of government subsidy would be needed to finance the high cost of research.
15. Research efforts should be directed towards developing a safe low-cost shelter for transients, displaced families and the poor. This will necessarily mean a further use of local natural resources.
16. A research program to develop and standardize simple prefabrication systems for use in various building types should be undertaken. Such a system could offer a saving in material costs as well as in future maintenance costs. It should also lead to a better enforcement of codes and standards.

SUMMARY RECOMMENDATIONS FROM GROUP D: TECHNICAL INFORMATION HANDLING

1. Endorsement of recommendation 6 of Group A above.
2. Establishment of an adequately funded project at the University of the Philippines - to be operated jointly by the main library and the computer center - to operate a computer-based national Selective Dissemination System (SDI) service.
3. Relative to the burden of maintaining an up-to-date library of current foreign standards, we recommend that serious consideration must be given to the acquisition of one of the commercially available comprehensive microform collections of industrial and governmental standards

SUMMARY RECOMMENDATIONS FROM GROUP E: TESTING FACILITIES

1. The information on available test facilities and technical training courses should be publicized, and expanded to include industrial services.
2. Use of selected modern electronic equipment should be demonstrated to industry.
3. Advice should be sought from government agencies, universities, and technical associations on modern control techniques for

pollution, food contaminants, and other environmental studies requiring advanced sensitive analytical techniques.

4. Critical examination of requests for foreign currency for scientific and technological instrumentation and supplies should not prevent rapid decision on the requests.
5. Nationally recognized physical standards in support of science, technology, and commerce should be appropriately maintained.

III. THE JOINT PROGRAM OF THE SURVEY TEAM

On May 4 the Survey members were guests of Professor Luz Salonga, President of the Association of Women Chemical Engineers of the Philippines for an excursion to Pagsanjan Falls and Lake Caliraya. For the next two days the teams made the following joint visits:

- May 5, 1975 Philippines Bureau of Standards (PBS)
Department of Trade and Secretary of Trade,
Hon. Troadio T. Quiazon, Jr.
National Science Development Board (NSDB)
Philippine Textile Research Institute (PTRI)
Metals Industry Research and Development
Center (MIRDC)
Test and Standard Laboratory (TSL)
- May 6, 1975 Philippine Chamber of Industries (PCI)
Mariwasa Mfg. Corp.
Chamber of Commerce of the Philippines (CCP)

These joint activities enabled the participants to become acquainted, and to familiarize themselves with the overall goals of the Survey and with the principal Philippine organizations concerned with standardization and metrology.

Peiser also visited the USAID Mission and U.S. Embassy for general information and to reiterate the welcome to the Survey's program extended by the Director. However, during those historic days U.S. officials stationed in Manila were preoccupied with the emergency situation in Viet Nam and could only express their support for the Survey.

1. Visit to The Philippines Bureau of Standards (PBS)

Although this description of PBS is written from the viewpoint and by the members of Group A of the Survey it is of cardinal interest also to the other groups which all visited PBS on May 5. The report of the visit together with that of subsequent visits is therefore presented in the section on the joint programs of the Survey Team.

PBS was established in 1964 by Republic Act 4109 and assigned the responsibility for issuing mandatory commodity and product standards for both export trade and domestic use. A Copy of RA 4109 is given in Appendix IV for reference. In addition, a paper on the first ten years of PBS by Vidalito Rañoa, Director, is given in Appendix VI.

A summary of statistics by year from 1965 to 1975 on number of employees, standards, technical committees and quality certifications is given in Table 1 as obtained from PBS. This summarizes progress to date and clearly indicates that a foundation has been laid for the continued growth of standardization. A Bureau of Standards Catalogue of June 30, 1972 with supplement from July 1, 1972 to January 3, 1975 is available. This lists the standards by number and subject groupings together with an alphabetical index of commodities. A list of "Companies Issued PTS Certification Mark License" (as of December 1, 1974) is available from the Certification Mark and Quality Control Section. By product groupings, this lists the names of company, plant site, license number and date of license expiration. A summary by product groupings is given in Table 2.

As discussed, these data indicate the beginning of a program of national standardization and certification. Examination of the data in Table 1 reveals setbacks in growth of staffing of PBS (dropping to almost the 1970 level in 1973 and 1974). Corresponding setbacks are seen in the number of standards issued, technical committees organized, and certification licenses issued.

**Philippines Bureau of Standards
EMPLOYEES, STANDARDS, TECHNICAL
COMMITTEES AND CERTIFICATION**

YEAR	Number of PBS EMPLOYEES			NUMBER OF STANDARDS ISSUED	NUMBER OF TECHNICAL COMMITTEES ORGANIZED	NUMBER OF TECHNICAL COMMITTEE MEETINGS HELD	NUMBER OF CERTIFICATION LICENSES ISSUED	
	TOTAL	CENTRAL OFFICE	PROVINCES				NO	CUM
1965	31	22	9	6	6	—	—	—
1966	36	27	9	2	8	—	—	—
1967	52	36	16	4	12	1	—	—
1968	52	36	16	18	30	22	86	—
1969	57	36	21	42	72	13	92	24*
1970	73	34	39	30	102	8	98	19
1971	92	78	14	17	119	2	100	47
1972	92	78	14	19	138	6	106	24
1973	74	63	11	9	147	5	179	28
1974	75	56	19	36	183	6	203	19
1975 (to May)	113	91	22	21	204	5	—	15

* Year PTS certification was created.

Table 2
Summary by Products of PTS Certification Mark Licenses

<u>Product</u>	<u>No. of Licenses</u>
Bananas	14
Canned Pineapple	2
Canned Pineapple juice	2
Cotton Yarn	1
Fertilizer	4*
Fish	2
Fresh Pineapple	1
Galvanized Iron Sheets	3
Glazed Tiles and Glazed Fittings	2
Laundry Soap	2
Lead-Acid Storage Battery	12
Multi-Wall Kraft Paper Bag	2
Petroleum Products	20**
Plywood	13
Portland Cement	17
Sewing Thread	3
Shrimps	2
Veneer	22
Vitreous China and Sanitary Wares	1
	<u>125</u>

*One company on four products

**Four companies on five products each.

Steady and accelerated progress in all of these categories will need to be realized for standardization and quality certification (implementation of standards) to keep pace with national industrial and economic growth. For comparisons, Table 3 presents growth over a similar period for three major economic categories, viz. agriculture crops, fish production, and manufacturing, all of which require standardization, export inspection and certification activities.

Table 3
Summary of Growth in Value of Three Major Economic Categories

(Figures in million pesos - - ₱7 = \$1. U.S.)

	Value of Crop Production	Value of Fish Production	Value of Gross Manufacturing Output
1964	3146.1	785.0	6708.4
1965	3278.4	806.5	7423.4
1966	3644.8	826.0	7467.0
1967	4216.8	963.1	8205.9
1968	5155.2	1361.9	11281.4
1969	5728.0	1457.4	11991.7
1970	8099.9	1725.3	15847.0
1971	9143.9	2613.4	19521.7
1972	10305.1	2827.5	-
1973	10742.7	-	-

Data from NEDA Statistical Yearbook of the Philippines, 1975.

The overwhelming task in national standardization, export inspection, and implementation of standards via quality certification, etc., is further evidenced in the data of Tables 4 and 5. Table 4 presents growth in exports by total and by several categories important to standardization activities. Table 5 outlines the large number of product areas included in the Sixth Export Priorities Plan of the Philippines.

Table 4
Philippines Exports by Major Commodity Groups and Total
in \$ Million FOB Value

	<u>Agriculture Products *</u>	<u>Mineral Products</u>	<u>Forest Products**</u>	<u>Manufacturing Products</u>	<u>Re Exports</u>	<u>Total</u>
1964	481	65	178	16	2	742
1965	474	83	195	14	2	768
1966	454	116	240	17	1	828
1967	409	116	249	26	21	821
1968	438	129	262	28	1	858
1969	374	173	259	46	3	855
1970	471	241	295	51	4	1062
1971	545	240	264	79	8	1136
1972	532	231	235	104	4	1106
1973	775	350	444	315	2	1886

*Includes coconut products, sugar and sugar products, fruits and vegetables, abaca and products, tobacco products

**Includes chemicals, textiles, and miscellaneous manufactures.
(Reflects more than a 200% increase from 1972 to 1973) Data from NEDA
Statistical Yearbook of the Philippines, 1975.

Table 5
Summary of Sixth Export Priorities Plan, 1975

<u>Category</u>	<u>List A</u>	<u>List B</u>
Food Products	36	8
Wood Products	16	7
Paper Products	7	-
Fiber Products	5	-
Processed Rubber Products	16	1
Chemicals & Chemical Products	30	14
Pharmaceutical Products	5	-
Textile Products	11	6
Non-Metallic Products	15	6
Metallic Products	33	12
Machinery and Equipment and Parts	12	-
Electrical Machinery, Equipment and Parts	17	4
Other Products	23	3
Totals	226	61

Numbers shown are the number of product types listed under each category in the Sixth Export Priorities Plan 1975, prepared by the Board of Investments of the Philippines.

List A: Exportable Products of Existing Firms

List B: Exportable Products of Preferred Areas of Investment:

It should be noted that the numbers listed in Table 5 often represent broad types of products under the indicated category - requiring multiple standards for each product type. To keep up with exports alone will require an accelerated effort in standardization. But national standards must also serve the domestic area as well. The present combined efforts of the various existing standards bodies is inadequate to meet the needs of the Philippines.

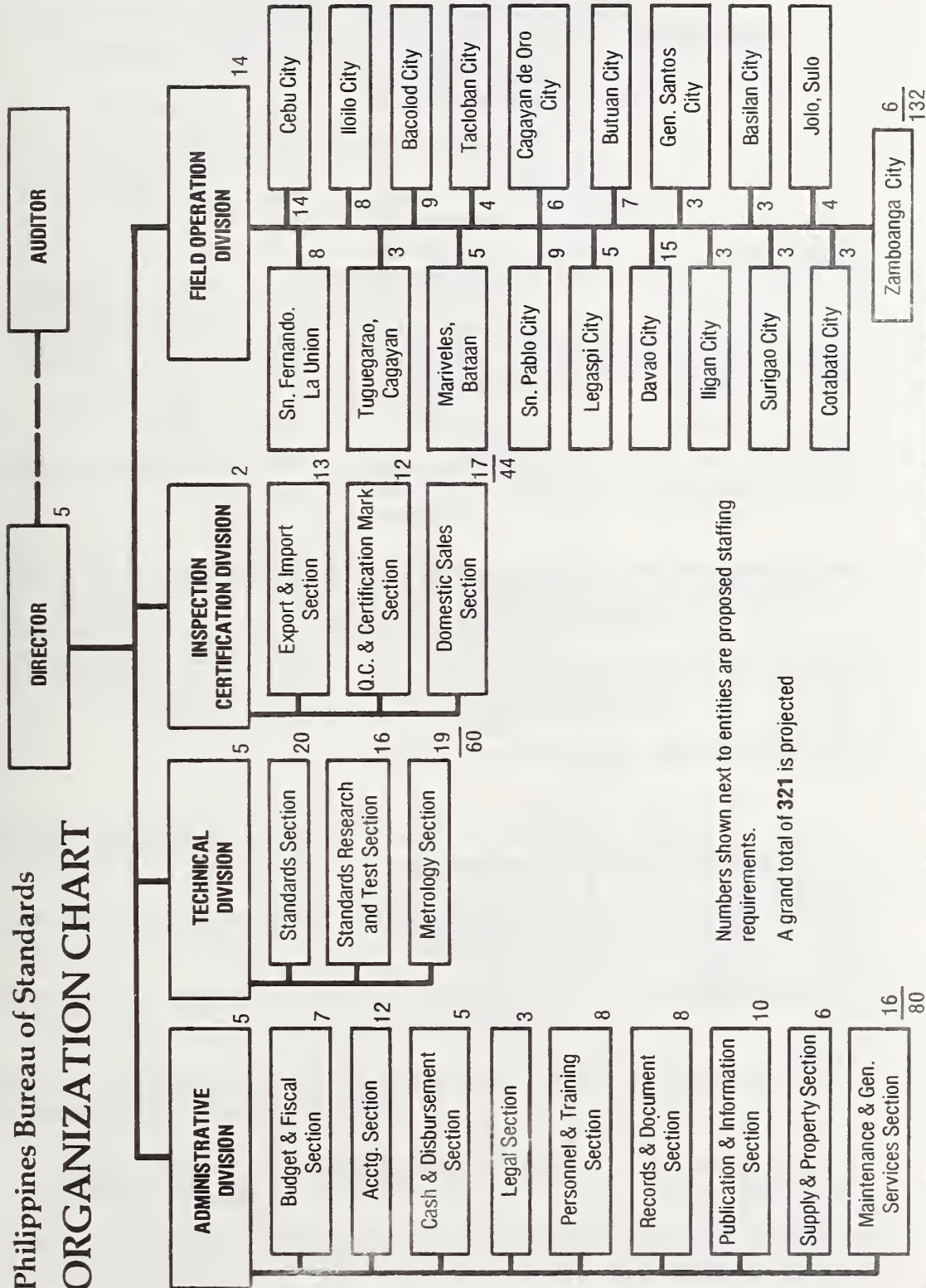
An organization chart of the Philippines Bureau of Standards is presented in Figure 1. Organizationally PBS consists of the four divisions indicated, viz. Administrative, Technical, Inspection and Certification, and Field Operations. As shown in Table 1, PBS now has a staff of 113. For its assigned task including standards developments for commodities and products, export inspection of standardized as well as unstandardized commodities and products, implementation of standards via a national quality marks certification program, etc., this staffing is probably inadequate. Exactly what level of staffing would be required to fulfill these tasks adequately is a question requiring considerable study and planning - best preceded by establishing policies regarding (1) functions which should be carried out by PBS, (2) whether mandatory standardization is in the best interests of industrial and economic growth of the Philippines, and (3) other principles of standardization, metrology, certification, etc. These matters will be dealt with somewhat later. However, with respect to the staffing question, a number of internal studies have been carried out. Under the same type of organization, the numbers shown next to each organizational entity in Figure 1 are projected staffing requirements. This proposal represents a projection of 321 staff or a 184% increase. In view of the task it may be reasonable. A separate study of the technical division only with respect to a proposed reorganization and associated staffing is shown in Figure 2. This projects staffing requirements for this division only at a total of 94 or an increase of 34 above the proposed staffing of Figure 1.

An issue parallel to staffing is that of the qualification of staff members and associated salary scales. There appear to be a number of areas where staff with better qualifications is needed. PBS should be given serious consideration for exemption under the Wage Position Classification Office (WAPCO) to enable the recruitment of personnel with higher qualifications comparable to the industrial personnel with whom they must work. Short of this, other incentives to attract more highly qualified staff should be found or created.

In addition to RA 4109 and the paper on PBS in appendices IV and VI respectively, as well as the BS Catalogue and list of certification licenses issued, the following rules and regulations and reports are available on the operations of PBS, particularly as they pertain to the main interests of Group A.

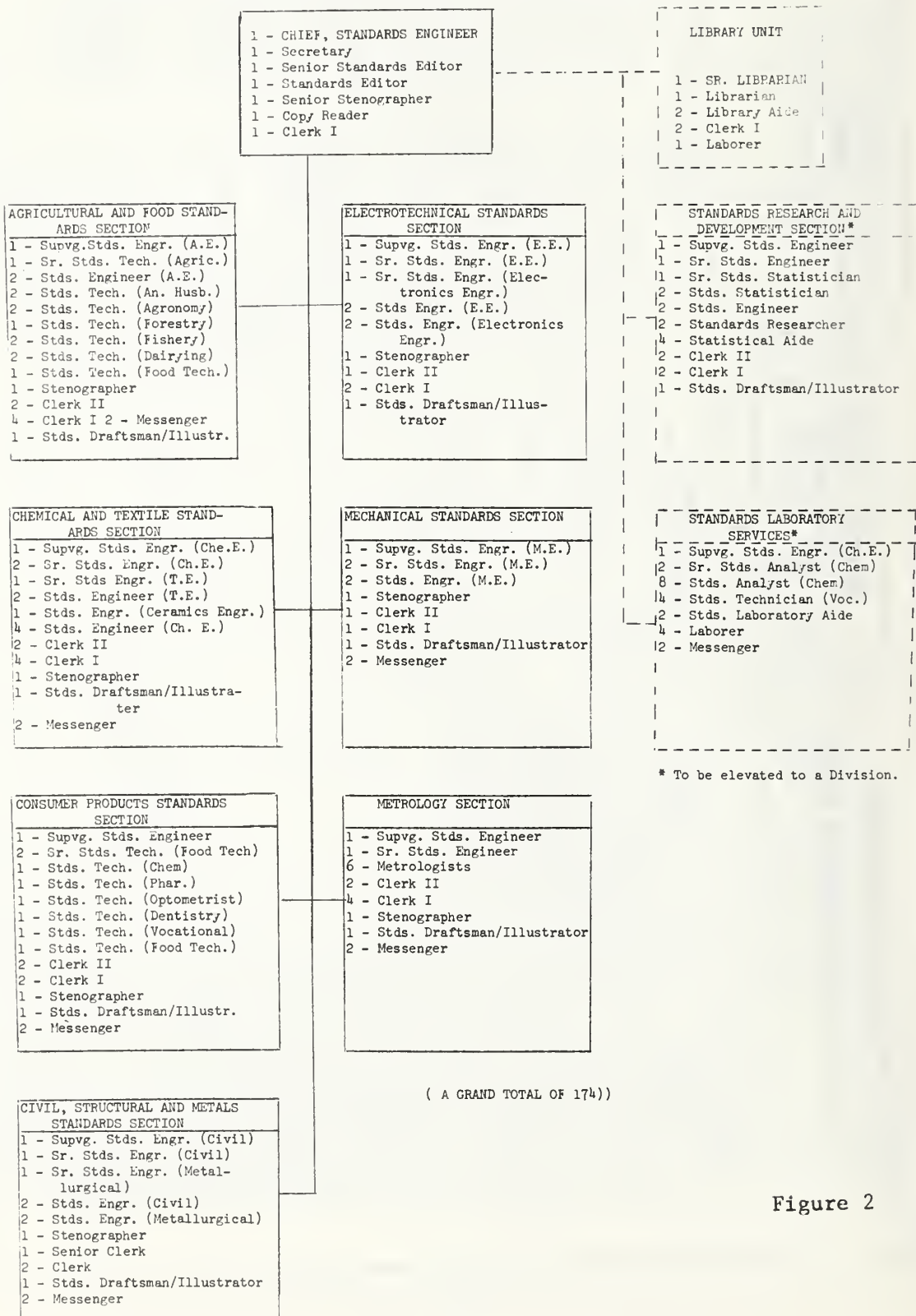
Philippines Bureau of Standards

ORGANIZATION CHART



Numbers shown next to entities are proposed staffing requirements.
 A grand total of 321 is projected

PHILIPPINES BUREAU OF STANDARDS
PROPOSED ORGANIZATION CHART OF THE TECHNICAL DIVISION



* To be elevated to a Division.

(A GRAND TOTAL OF 174)

Figure 2

- SAO 1, Series of 1964 Rules and Regulations on the Standardization and Inspection of Standardized Commodities and for Other Purposes.
- SAO 1.1, Series of 1966 Amendment to SAO 1
- SAO 8, Series of 1965 Rules and Regulations on the Inspection and Standards and Release of Commodities Imported in the Philippines and for Other Purposes.
- SAO 20, Series of 1968 Rules and Regulations Providing for the Marking of Goods Standardized by the Bureau of Standards and for Other Purposes.
- SAO 71, Series of 1970 Rules and Regulations on the Rate of Fees to be Collected and for Other Purposes.
- SAO 100, Series of 1970 Numbering of Commerce Administrative Orders Converted into Standards Administrative Orders.
- SAO 146, Series of 1972 Rules and Regulations in the Issuance of Commodity Clearances.
- Working Procedure in Preparing Standards
- PHI/ISE 1-3, August 19, 1973 Bureau of Standards Appointment and Functions of Technical Committees.
- PHI-71-813, December, 1972 Proposal for New Policy at Bureau of Standards by David J. Desmond.
- IS/PHI/71/816, February, 1975 Project Findings and Recommendations by A. B. Rao.

Additional observations on standardization in the Philippines are contained in the report of Group A.

2. Courtesy Call on the Secretary of Trade - Honorable Troadio T. Quiazon, Jr.

The entire team was presented to the Secretary of Trade, the Honorable Troadio T. Quiazon, Jr., said to be one of the most senior cabinet

members and advisors to President Ferdinand Marcos of the Philippines. Despite obvious pressures of important and urgent affairs of state, Secretary Quiason listened and responded to briefings about the Survey by PBS Director Rañoa and Steffen Peiser. The Secretary showed genuine interest, concern and encouragement. He expressed the strongest friendship for the U.S.A. despite current Philippine insistence on an independent stance which should not mislead the team members into believing there was any change of sentiment by the Philippine people toward the American people. The Secretary surprisingly picked out as of special significance the stated condition of governmental stability in a country for an NBS/AID Survey of Standardization and Measurement Services. He requested Peiser to extend to the U.S. Government the appreciation of his Government that by the fact of this Survey the U.S.A. had thus recognized the present Government of the Philippines.

The Secretary arranged an elegant luncheon for the entire Survey Team, although at the last minute the Under Secretary of Trade, the Honorable Mario R. Reyes, had to preside at this function. The Under Secretary is also Administrator of the National Cottage Industry Development Authority (NACIDA).

3. Visit to the National Science Development Board (NSDB)

The NBS/AID Survey Team was received by the Vice Chairman of the National Science Development Board, Mr. Pedro G. Afable, which has direct control of major governmental laboratories including:

- the National Institute for Science and Technology (NIST)
- the Philippine Textile Research Institute (PTRI)
- the Test and Standard Laboratory
- the Metals Industry Research and Development Center (MIRDC).

Present at the meeting were Mr. Ricardo C. Cruz, Director of PTRI and Mr. Jose Planas in charge of metrology at NIST.

At this meeting a number of key issues were first debated by the Survey Team. These issues included:

- 1.) The move of NIST to the impressive NSDB site some distance from Manila.
- 2.) The air-conditioning of the new NIST building to house the primary national standards with other equipment mostly given by the United Nations.

- 3.) The intent for NIST to emphasize research rather than principally their test functions for which PBS itself has no laboratory facilities.
- 4.) The publication of standards by organizations other than PBS (see appendix II). PTRI is a good example of an organization which develops worthwhile standards. Yet they tend to be kept away from PBS adoption because such adoption would entail their becoming law with added inspection costs to manufacturers.
- 5.) The repair, maintenance and calibration of instruments. Various units of NSDB have started good programs to assist industry, universities and test laboratories with those problems. More such services are needed.
- 6.) The training of technical personnel in specialized fields related to their employment in industrial units too small to organize such training courses. In this field, too, a good start has been made by NSDB.

A laboratory visit followed. MIRDC, for example, is well equipped to serve in industrial problem solving. PTRI, too, has good facilities which can be built up further. The chemical and mechanical laboratories are especially well equipped. The new NIST laboratory is a shell that is architecturally impressive. The laboratory is moving from downtown Manila, thus creating some commuting problems for staff. NIST undertakes agricultural, biological, nutritional and medical research.

4. Visit to Philippine Textile Research Institute (PTRI)

The Philippine Textile Research Institute (PTRI) is a joint project of the Government and the private sector to promote the development of the textile industry in the country. It is presently housed in a modern 3-story building located within the 35.6 hectare Philippine Science Community Site in Bicutan, Taguig, Rizal, some 15 kilometers from Manila.

Republic Act 4086, passed by the Congress on June 18, 1964 provided the legal basis and source of funds for the establishment of the Philippines Textile Research Institute. This Act created a special textile research fund which was derived from one percent of the gross sales of textile manufacturers who registered for tax exemptions from 1964 - 1970.

In 1967 the National Science Development Board (NSDB) established the PTRI to implement the objectives stipulated in Republic Act 4086,

namely: to undertake researches and studies that would contribute to the local production of raw materials, improvement and/or invention of textile machinery, processes and production methods needed by the textile industry.

In 1974 the PTRI became a regular agency of the NSDB by virtue of Presidential Decree No. 1, implementing the Integrated Reorganization Plan of the Executive Branch of the Philippine Government.

The PTRI is now operating under the general supervision of the National Science Development Board, as one of its eight regular agencies. It has five divisions operating under a Textile Research Director. Policies are formulated by an Advisory Committee composed of seven members, four representing private millers upon recommendations of the Textile Mills Association of the Philippines, one member each representing DANR and NSDB, and one member at large.

Pilot Plant and Laboratory Facilities

Aside from the 3-story main building the Institute has a pilot plant, a single-story building with more than 2000 square meters of floor space housing PTRI's modern equipment for textile processing operations, from spinning to finishing.

Physical and Chemical Testing

The PTRI has a well-equipped laboratory to service the needs of textile mills and allied companies, as well as consumer groups by undertaking physical and chemical tests of fibers, laps, slivers, rovings, yarns, fabrics, chemicals and dyestuffs.

Mrs. Maternidad Palmares served as our guide for a tour of the test facilities, assisted by M. S. Palmain. There was some indication at the time of the Survey that the facilities may be under-utilized.

Standardization

Since 1971, the PTRI has been undertaking a standardization program aimed at formulating standards for locally produced textiles. This program is implemented through working committees created and organized under the direct supervision of the PTRI Standards Council in accordance with the priority needs of the country.

To date, at the time of the Survey, PTRI had prepared and published 68 standards, some 60 on test methods, sampling, definition of terms, etc., and some 8 performance standards. A list of these standards by number and title is available. The standards are published in yellow

to orange colored booklets approximately 6 1/4 by 9 1/4 inches (approx. 159 by 234 mm) and make a nice presentation. The standards list the membership of the technical committee and their affiliation. Included in the foreword of the standards are references to resource materials used in preparing the standards. Frequent references are made to ASTM, ISO, BSI, ISI, etc. PTRI indicated some difficulty in the implementation of their standards, not being in the main stream of standards promotion. They definitely feel that their constituents desire to keep the standards voluntary. For this reason they are reluctant to have the standards promulgated by the Philippines Bureau of Standards - all of whose standards become compulsory by law. This further retards the implementation of their standards.

Technical Manpower Training

The Institute sponsors training programs, intended to develop skilled laborers for the industry in order to produce substantial replacements to fill the gap created by heavy labor turnover.

Seminars and Workshops

As the center for textile research and development, the PTRI sponsors and promotes scientific meetings, seminars, symposia and workshops for textile and allied technologists and researchers. This activity is designed to promote professional growth, coordination of research activities and wide dissemination of scientific and technical information among textile technologists and researchers.

Advisory and Consultation Services

The Institute, in its desire to assist industry in solving their processing and production problems, has availed itself of the services of foreign experts made available to the Institute by international bodies like UNIDO and IESC, and some foreign governments through their Technical Assistance Program.

Research and Development Projects

The PTRI is undertaking R & D projects aimed principally at utilizing available local raw materials for textile production. For this purpose the Institute's chemists and textile engineers, using the latest research instrumentation and equipment, undertake researches on cotton, ramie, pina, and silk.

The PTRI also sponsors research and development projects through its extramural program. Under this program, interested government and private agencies and other organizations can submit project proposals to PTRI and undertake actual implementation of said projects.

Noteworthy among R & D Projects of PTRI are:

1. Cotton Project in Nueva Ecija.
2. Sericulture Project in Baguio City.
3. Development of better handlooms for weaving in Miagao, Iloilo.
4. Ramie Project in Cotabato.
5. Improvement of pina fiber weaving techniques in Kalibo, Aklan.
6. Mechanical pina fiber production in PTRI.

5. Visit to the Philippine Chamber of Industries (PCI)

At the Philippine Chamber of Industries (PCI), the Survey Team was received by Mr. Raul A. Boncan, President of PCI, and Managing Director of Philippine Standard Co., Mr. Julio B. Francia, Jr., Vice President of AM-Parts, a diversified manufacturing group, and Past President of PCI, Estefanio M. Gacad, Marsteel Corporation, P. S. Guevara, 1st Vice-President of PCI, B. M. Lopez, Galzaxie Steel and J. Lumban.

The Chamber is a private organization "consolidating and mobilizing the resources, talents, and capabilities of the private industrial sector to promote economic development and to assist the Government in the formulation and implementation of policies and programs pursuant to industrial growth".

PCI has just short of 500 member firms manufacturing everything from pins to ships. A recent bylaws change now allows membership of medium to small scale industries. Discussion with the Survey Team focused on inspection fees which increased if a PBS standard existed for the item manufactured. It was fixed at 0.2% of the value of the products. PBS retains only 25% of the sums collected for Standardization and Inspection Funds. 75% goes to the Philippine Treasury. Members of PCI do not receive any service for the greater part of these sums which are regarded as a tax on production. Moreover, only by obtaining PBS quality mark recognition can a manufacturer avoid having every batch inspected. Commercial pressures, rather than the wish to produce quality products, have become the principal incentives for applying for the mark.

The discussion also revealed that compulsory standardization (as undertaken by PBS by virtue of R.A. 4109) has been suspended on imports since 1970. They felt that the net effect of universal compulsory standards was to interpret these standards for exports rather than for domestic use. Concern was expressed over the lengthy time needed to establish a standard. Members of PCI were active in regional standardization activities, as for example, in the Southeast Asia Iron and Steel Institute (SEASISI) representing the Philippine Iron and Steel Institute.

PCI/PBS relationships appeared to be entirely satisfactory. There appeared to be a genuine desire to collaborate on technical programs. It is our impression that leadership for establishing new, effective testing programs for quality control would be welcome and supported by PCI.

6. Visit to the Mariwasa Manufacturing Corporation

The entire Survey Team visited the Mariwasa Manufacturing Corporation. Mr. Voltaire H. Gonzales, Assistant Vice-President, Planning and Control, was our very knowledgeable and congenial host. The Mariwasa Manufacturing Corporation is an excellent example of a well-organized quality conscious successful manufacturer using a flexible mixture of capital and labor intensive process steps. Mariwasa's ceramic tiles (approximately 60%) are exported to many parts of the world including the U.S.A., Southeast Asia, and Australia. The recession in building is creating problems which are probably temporary. Metric conversion would not cause difficulties, because space in the tunnel kilns is not critically programmed. Inspection steps are introduced at all stages of production. Rejection rates appear to be a little high (more than 5%) but material recovery is almost complete. The laboratory control is adequate to ensure a standard product, but more modern methods of controlling the raw materials and their admixture would perhaps be rewarding.

Initial company standards and manufacturing technology were adopted from Italy. Presently SAO No. 22-1968 or PTS No. 662-02.04, 1968, Glazed Ceramic Tiles and Tile Fittings is applicable through the mandatory program of the Philippines Bureau of Standards. Mariwasa was granted PTS quality mark license number 34-4 on 15 March, 1975. The standard specifies two grades of tiles but is very vague as to make-up of these grades in terms of percentage of acceptable type defects. Company standards appear to recognize four grades made up as follows:

Standard Grade:	95% A + 5% B
Commercial Grade:	80% A + 20% B
Local Grade Nova:	40% A + 60% B
Economy (ECO) Grade:	20% B + 80% C

A tiles are those which meet all requirements of the standard, B tiles consist of those with broken corners, chipped glaze, dents, dirt, pinholes and underfired, and C tiles consist of those with underfired and warped defects. Only the standard grade is used for export. The other grades are used for local consumption with the lowest grade utilized in low cost housing. Staff and labor relations appear good. This Corporation enjoys a justified spirit of achievement.

7. Visit to the Chamber of Commerce of the Philippines (CCP)

The entire Survey Team also visited the Chamber of Commerce.

The Chamber of Commerce of the Philippines (CCP) publishes an annual trade directory of its member firms (350 in 1975) and individual members (850 in 1975). It also publishes Commerce, the journal of Philippine business, on a monthly basis. Its mission is to "promote and uphold the material interest of the Philippines and the Filipino people by availing itself of whatever legal means there are which would advance the steady expansion of the Philippines commercial relations with other countries and improve the situation of businessmen in the Philippines, especially the Filipino businessmen".

The Survey Team was received by Mr. Fred J. Elizalde, CCP President, an impressive Chairman, with many Board Members and Executives, including Mr. Jesus Sivios, Mr. Kien Go, Mr. E. Silva, Mr. O. de Ocampo, and Mr. P. C. Luombas.

CCP has conducted some workshops and seminars on subjects related to standards and quality control especially focused on the handicrafts industry. Some discussion on information, metrication, harmonization of standards, marketing, and building materials problems led to mutual understanding and considerable agreement between the two groups.

IV. REPORT OF GROUP A

TECHNICAL STANDARDS COMMITTEE MANAGEMENT

1. Terms of Reference for Group A

The areas of interest and concentration by Group A were:

1. The organization, infrastructure, and activities of agencies engaged in the development, promulgation and implementation of standards with specific emphasis on the Philippines Bureau of Standards as the principal governmental agency with assigned responsibility for this task.
2. Summary and evaluation of progress made to date in the development, promulgation and implementation of standards. This includes the number and nature of standards issued, the number and extent of certification licenses issued, and the influence of these activities on the industrial community.
3. Recommendations for the improvement of standardization activities and their contribution to improved quality of products and commodities, harmonious industrial growth, and economic progress of the Philippines.

To assist the members of Group A in carrying out their objectives, an excellent program of visits to a variety of governmental agencies, trade and business associations, industries, and provincial offices was arranged by the planning committee organized by the Philippines Bureau of Standards. This comprehensive and efficiently run schedule enabled the Group to cover a broad spectrum of their assigned responsibilities in the short period of two weeks. These visits, involving discussions with key personnel, together with a study of related documents and reports, form the basis for the observations, impressions, evaluations and recommendations contained in this report.

2. Members of Group A

The following is a list of the members of Group A. Dr. Stephens served as leader of the group, representing US/NBS. Mr. Cruz accompanied the team on visits in the Manila area with Mr. Racela participating in the visits to the provinces. Mrs. Mortera participated in other groups part of the time. In addition, Mr. Vidalito Rañoa, Survey Team host, accompanied the group on many of its individual visits.

Dr. Kenneth S. Stephens
School of Industrial & Systems Engineering
and Industrial Development Division, Engr. Exp. Station
Georgia Institute of Technology
Atlanta, Georgia

Mr. Lauro M. Cruz
President
Philippine Standards Association, Inc. (PHILSA)

Mrs. Angeles J. Mortera
Chief, Technical Division
Philippines Bureau of Standards

Atty. R. E. Racela
Project Director
Philippine Standards Association, Inc. (PHILSA)

Mrs. Celia R. Sia
Chemical Engineer
Philippines Bureau of Standards

3. Program of visits by Group A

The following is a list of the program of visits and daily schedule followed by Group A, in addition to the combined visits with the other groups of the Survey Team, described above. Information, observations, impressions and/or items of discussion significant to the interests and objectives of Group A are presented in the next section.

May 7	Philippine Standards Association, Inc. Food and Drug Administration	(PHILSA) (FDA)
May 8	Imperial Textile Mills Magnolia Dairy Products Plant National Grains Authority	(ITM) (NGA)
May 9	Manila Electric Company Phelps Dodge Philippines, Inc.	
May 10	Cebu City Branch Office, Philippines Bureau of Standards Durano Sugar Mill Chamber of Export Industries, Cebu City	
May 11	Atlas Consolidated Mining & Development Corp. Atlas Fertilizer Corp., Toledo City	

- May 12 Iligan City Branch Office, Philippines Bureau of Standards
Iligan Institute of Technology (Mindanao State Univ.)

Iligan City - Mayor Camilo P. Cobili
Maria Cristina Chemical Industries, Inc.
- May 13 Cagayan de Oro City Branch Office, Philippines Bureau of Standards
Cagayan de Oro City
- May 14 Davao City Branch Office, Philippines Bureau of Standards
Tagum Agricultural Development Corp. (TADECO), banana plantation
Standard (Philippines) Fruit Corp. (STANFILCO), banana plantation
- May 15 Zamboanga City Branch Office, Philippines Bureau of Standards
Philippine Packing Corporation, Zamboanga
Zamboanga Curio Shop (Shellcraft products for export)
Far Eastern Shellcraft (Shellcraft products for export)
Sikatuna Fishing Corp.
- May 16 Philippines Bureau of Standards

4.0 Information and Observations on Organizations Visited

4.1 Wednesday, May 7 - Visit to the Philippine Standards Association (PHILSA)

The Philippine Standards Association plays a key role in the development and promotion of voluntary standards for locally made commodities for public use. Accompanied by Mr. V. F. Rañoa of PBS, Group A visited PHILSA to review their organization and work. We were received by President Lauro M. Cruz (also a Member of the Group A Survey Team) in addition to Remedios E. Facela, Project Director Ambrosio R. Flores. Past President and Director; Carlos T. Aenlle, Director of Elizalde Paint and Oil Factory; Lt. Col. Ramon R. Doreza, Director of Research; Carlos D. Carreon, Project Leader; and Proceso P. Gatdula, Vice President for Administrative Affairs and Corporate Secretary.

Historically, the Philippine Standards Association (PHILSA) was born out of the necessity to standardize local products for public consumption. This need was first recognized by the National Economic Protectionism Association (NEPA) as early as 1935 when locally manufactured products could not compete with imported goods. The move towards industrialization to improve the economy of the country was supported by the Bureau of Commerce and the Philippine Chamber of Industries (PCI) and in 1954 the latter passed a resolution pointing to the necessity of a "standards movement" to complement industrialization.

The initiative started by the PCI with the full backing of NEPA and enthusiastic cooperation of both government and private sectors led to the formation of the "Philippine Standards Association" on June 6, 1955. The Incorporation Papers were formally signed on June 22, 1955, and registered by the Securities and Exchange Commission as a NON-STOCK corporation on June 27, 1955.

PHILSA now has 129 members, some 40 sectional committees, and 30 technical committees preparing standards with 20 more under study. To the date of the survey visit, 76 standards had been prepared. A list by number and title is available. Four of these standards have been adopted by the Philippines Bureau of Standards. Concern was expressed over the lengthy time (three to five plus years) to produce a standard.

PHILSA's standards are printed in booklet form approximately 6" x 9" (153 x 229 mm). Members of the technical committee are listed together with a table of contents having a standardized format. The standards make a nice presentation.

Management of PHILSA's activities is through a nine member board of directors from which the president, and vice presidents for administrative affairs (corporate secretary), technical affairs and finance (treasurer) are elected. A five member advisory council is organized to advise the board and give consultation in the formulation and implementation of policies governing the activities and operation of the Association. In addition, a standards Council is organized consisting of at least six members for coordinating the standards preparation activity including testing and certification.

Basically, PHILSA's organization and operating procedures are similar to other private and/or government standards bodies in many countries. To assist in the preparation of standards and production processes, PHILSA has developed a library by collecting pamphlets and books purchased from or donated by foreign standardization institutions like the British Standards Institution (BSI), United States National Bureau of Standards (US-NBS), American Society for Testing and

Materials (ASTM), the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), and similar institutions in Japan, Australia, India and other countries. A seal of approval under a certification program is also maintained by PHILSA to promote the implementation of standards and quality manufacture.

Recognizing the difficulty of financing its operation from funds coming only from membership dues of individual companies, or institutions, PHILSA has negotiated for financial assistance from NSDB. A project entitled, "Development of Standards for Philippine Products" has been set up and funded since April 1963 by NSDB.

This project has been instrumental in achieving a degree of rationalization of standards promulgation between organizations otherwise competing and/or duplicating standards work. A Memorandum of Agreement on the "Extent of Cooperation" was signed on February 15, 1963 by the Bureau of Commerce, Bureau of Supply Coordination, Bureau of Research and Laboratories, Philippine Chamber of Industries (PCI), National Economic Protectionism Association (NEPA), Chamber of Commerce of the Philippines (CCP) and the National Institute of Science and Technology (NIST). PHILSA also agreed to have a joint standardization project with NACIDA on February 19, 1963. An excellent air of cooperation exists for rationalization of standardization in the Philippines.

4.2 Wednesday, May 7 - Visit to the Food and Drug Administration (FDA)

Members of Group A visited FDA and were received by L. M. Pesigan, Administrator; A.M. Regala, Deputy Administrator, and Emmanuel E. Alego, Chief, Inspection and Licensing Division. Vidalito F. Rañoa of PBS also accompanied the group resulting in an open dialogue between heads of three standardization organizations, namely, FDA, PHILSA and PBS.

FDA is chartered by Republic Act No. 3720. They maintain a library of U.N. Codex Alimentarius standards on food products along with U.S. and other publications on foods, drugs and cosmetics. A staff of 80 inspectors (equivalent to one or more for every province) is maintained, being mostly college graduates in Pharmacy.

FDA issues permits on processed foods such as canned pineapple, pineapple juice, milk, vinegar, meat and meat products, ice cream, etc. They reported that microbiological requirements have not been established as yet for the Philippines. Present activities place emphasis on sampling, testing and reporting rather than controlling. More rigid controls (via reporting) are placed on foods taken

directly without further cooking or processing. A form of control exercised by FDA is the issuance of Semestral Commodity Clearance Certificates.

It was brought out that FDA is participating in the activities to achieve some rationalization of standards with organizations such as PBS, Bureau of Fisheries, NACIDA, PHILSA and Bureau of Supply Coordination. Agreements have been reached to rationalize respective areas of standards work with meetings still being held to implement these agreements.

An area needing further work is the rationalization of the issuance of certificates of approval to processors of various commodities. It was brought out that some food processors may require certificates from three to four organizations covering overlapping aspects.

4.3 Thursday, May 8 - Visit to Imperial Textile Mills (ITM)

ITM is located at Km 21, McArthur Highway, Marulas, Bulacan. It is a large textile mill producing fabrics of good quality with close ties to Japanese technology. ITM personnel met during the visit include Pablo Gonzales, Vice President, Pros P. Paredes, Manager, finishing plant; Delio M. Aseron, Corporate Secretary; Teody Cayetano, Department Head, T/C Finishing; Mar de Guzman, Department Head, piece goods dying and Vic T. Cisneros, Department Head, Inspection. We received a briefing on the company and toured the manufacturing facilities.

Items of significance to the survey which were brought out in the discussion were (1) key members of the staff were not aware of PBS or PTRI even though products made (and exported) by ITM are covered by standards promulgated by these organizations (PBS's being compulsory). The company essentially uses JIS standards and staff are trained in Japan, returning to the Philippines with JIS standards for implementation, (2) Semestral Commodity Clearances to ship export products covered by compulsory standards are obtained through their broker and have little or no impact on company operations or personnel.

4.4 Thursday, May 8 - Visit to National Grains Authority (NGA)

A combined visit of Groups A & E of the Survey Team was made to the National Grains Authority located in the Development Bank Building in Quezon City. NGA was established in 1972 to provide an adequate and continuous supply of cereal grains to the nation at reasonable prices. One of their chief functions is price stabilization as they coordinate grain procurement and distribution.

Administrator Jesus Tanchangco and a large number of staff and board members were present for the meeting and discussion. Particularly pertinent to the interests of Group A are the following items brought out in the discussions:

(1) NGA representatives served on the technical committee for milled rice and rough rice standards, SAO 16 and 17 respectively, promulgated by PBS. Currently, these standards are not being implemented due to shortage of rice in the country with 1st class milling waived in favor of a 2nd class to produce more rice.

(2) The Shelled Corn standard, SAO 75, has been suspended by the Secretary of Trade upon request of the Corn Producers Association.

(3) The Grain Sorghum Standard, SAO 125, is only partially implemented.

4.5 Friday, May 9 - Visit to Manila Electric Company

This is a large and well established electric company, generating and distributing electric power throughout the Metro Manila area. Actually, their area of operation has now been fixed by presidential decree, placing some constraint on expansion. We were received by Filemon M. Zablan, Senior Vice President, Technical Service Group and later by Alan M. Razovsky, Senior Manager for Engineering and President of MERALCO Industrial Engineering Services Corporation.

The company appears to operate on a very independent basis, lacking much awareness of or concern for the activities of PBS. They expressed concern over the quality of local supplies, which forces them to use imported products mostly to ASTM and ANSI standards. This precipitated a discussion in which it was brought out by PBS personnel that a plant closure had been made in the case of cast iron pipe for failure to produce a quality product in conformance to the standard.

A question was raised as to the selection of products for standardization. The electric company felt a need for standards and controls on safety shoes and working gloves. It was brought out that the Board of Investment listing of urgent products was used to set priorities for standards making by PBS.

4.6 Friday, May 9 - Visit to Phelps Dodge Philippines, Inc.

A visit was made to Phelps Dodge Philippines, Inc. manufacturers of electrical cables and wires, located at Pioneer Street, Mandaluyong, Rizal. We were received by Manufacturing Manager, Esmeraldo J. Estrella. Other members of Phelps Dodge staff participating in discussions and a tour of facilities were Rogelio M. Avenido,

Technical Service Group Manager; Alejandro E. Mendoza, Production Superintendent and Arsenio S. Arboledo, Quality Control Supervisor.

Phelps Dodge is one of two companies producing cables which are licensed by foreign companies. One other has a Japanese affiliation. Altogether about 20-22 companies are producing cables in the Philippines. The P-D factory is approved under a Bureau of Labor Standards Certification Program of Factory Inspections and is visited annually under this program.

Items of interest to the Survey Group which were brought out in the discussion are:

- (1) P-D is aware and concerned that the quality of cables from some producers is not meeting standards - especially with respect to reduced insulation and reduced cross sectional area. Such producers are able to cut their prices - forcing P-D to discontinue production of standard quality cable in some sizes.
- (2) In carrying out its program of certification and product testing, PBS has the practice of testing inside the factory on company owned equipment - since companies have complained that they do not derive any benefit in paying for the tests outside the factory. P-D is concerned that this practice of test set-up in the factory does not accomplish an adequate check on the quality of cables produced.
- (3) The Bureau of Supply Coordination sets its own standards different from those of PBS and reference to these standards "Complies to Bureau of Supply Coordination Standards", often appears in newspaper advertising.
- (4) There is a Philippine Electric Code promulgated by the Philippine Society of Electrical Engineers with Part I in 1973 and Part II in 1974. This has become the national electrical Code (It is not metric), but it was not clear whether this was by consensus or by law.

4.7 Saturday, May 10 - Visit to Cebu City Branch Office, PBS

Travel to Cebu City afforded an opportunity to meet and hold discussions with members of the Cebu City Branch of PBS. The branch consists of nine staff with seven professionals, one clerk and one messenger. Besides the administrative and clerical work, the main activity of the branch is inspection of locally made products. Inspection of domestic and export products is done on standardized products while inspection of exports only is carried out on unstandardized products.

It was brought out that the inspection fee is based on 0.2% of the value for export plus five pesos for certification of each shipment of standardized products. The inspection fee for unstandardized products is 0.1% plus five pesos.

Some products inspected in Cebu are rattan poles and furniture, shell and coral jewelry, hides and animal skins, coconut carvings, abaca products, etc. Mr. Aniano S. Noval, Provincial Standards Officer, hosted the group and accompanied the Survey Team on other visits in the southern Philippines.

4.8 Saturday, May 10 - Meeting with Chamber of Export Industries (CEI)

This meeting was arranged by the Cebu City field office of PBS to discuss some of the problems with standards and inspection of products for export. The meeting was presided over by Mr. Guido G. Castillo, President of CEI and President and General Manager of G.G. Castillo Tradeways, Inc.

Items significant to the group's interest are:

(1) CEI has to submit their products to three government bureaus for approvals, viz. PBS, Bureau of Fisheries, and NACIDA.

(2) They have had problems with moisture in wood furniture, with field complaints of cracking after use in dry environments. This situation reflects a lack of concern or complacency in adequately assessing the overall quality requirements of products to be exported. This is a significant responsibility of a manufacturer and/or exporter who may require training and/or other assistance in this regard.

4.9 Sunday, May 11 - Visit to Atlas Fertilizer Corporation

Company literature received during the visit refers to meeting specifications of the Philippine Automotive Battery Manufacturers Association, PABMA and the American Chemical Society. There is no reference to PBS standards or certification for which they have qualified on ammonium sulfate, complex fertilizer, sulphuric acid and calcium superphosphate.

4.10 Monday, May 12 - Visit to Maria Cristina Chemical Industries, Inc.

MCCI uses primarily, ASTM and JIS standards on calcium carbide, PVC resins, acetylene and ferro-alloy products.

4.11 Monday, May 12 - Visit to Iligan Branch Office, PBS

Members of the PBS staff consulted in Iligan were Arturo B. Castro and Florence Ong. Products inspected including those under PS Certification at Iligan were plywood, cement, steel reinforcement bars, steel bars, steel sheets, liquid caustic soda, hydrochloric acid and fertilizers.

4.12 Wednesday, May 14 - Visit to Tagum Agricultural Development Corp. (TADECO)

Accompanied by Pedro Maceda of the PBS Davao City Branch, Group A visited the banana packing plant and plantation of TADECO. Generoso M. Ebo, Personnel Manager, and Diosdada C. Ardone, Comptroller, were our hosts. The compound consists of 16 farms of approximately 300 hectares each served by 8 packing stations. The giant Cavendish banana of the Valery strain is grown and harvested primarily for export to the Japanese market. This is a joint venture with United Fruit of the U. S. carrying the "Chiquita" brand. Company specifications are used together with the PBS standard on bananas under PS certification.

4.13 Wednesday, May 14 - Visit to Standard (Philippines) Fruit Corporation (STANFILCO)

A second banana plantation and packing plant were visited. STANFILCO is affiliated with Castle & Cook Foods and its bananas carry the Dole brand. Almost 6000 hectares of land are devoted to growing bananas with operations beginning in 1966. Company specifications with PS certification apply here also. An informational brochure and a map of the Philippine banana industry are available. Mr. Aurelio Pena and Rodolfo M. Almendras served as our hosts.

4.14 Wednesday, May 14 - Visit to Bacnotan Consolidated Industries, Inc.

Discussions and a tour of the facilities were included in a visit to the Davao cement plant of Bacnotan Consolidated Industries. This plant holds a license to use the PS quality mark under PBS certification. However, plant informational literature refers to tests to establish conformity to ASTM standards.

4.15 Thursday, May 15 - Visit to Zamboanga Branch Office, PBS

At Zamboanga the Survey Team were hosted by PBS staff members, Effendi P. Shuck, Provincial Standards Officer, and Gulamu Taib, Product Standards Inspector I. Discussions were held with Mr. Frank S. Lucido,

Superintendent of fishery development of the Philippine Packing Corporation, a subsidiary of Del Monte, preparing frozen tuna for refrigerated transport to Manila and transshipment to the U.S. for canning. Visits to the Zamboanga Curio Shop and Far East Shellcraft were held to survey inspection by PBS of shellcraft products for export.

5.0 Some Further Observations on Standardization in the Philippines

Section 4.0 and its associated subsections, includes certain information, observations, impressions, and items of discussion related to the visits by Group A team members to agencies, associations, and industries during the Survey. A number of topics important to progress in standardization have been selected from the section 4.0 and associated subsections for additional emphasis in the following. This will provide partial input to Part II, Recommendations - Summarized, placed in this report immediately following the Introduction.

5.1 Mandatory vs. Voluntary Standardization & Certification

RA 4109 specifies the mandatory implementation (via inspection and certification) of the standards issued by PBS with respect to government purchases, safety, exports, imports, and "sold and/or disposed of in any manner". The Act further requires the inspection of unstandardized commodities (within the purview of Part III) with respect to government purchases, safety, exports and imports.

Certification via a quality mark is not mandatory and is not explicitly mentioned, thus not directly linking quality mark certification with mandatory standardization or inspection under the Act. Hence while standardization is mandatory, quality mark certification is voluntary.

Mandatory (or compulsory) standardization can be an effective means of implementation of a national standardization system with its associated benefits. Upon reflecting on the Soviet system with a Ministry for Standardization and the impracticality of this for some economies, Dr. Lal Verman* states:

"Nevertheless, it must be admitted that if a government were conscious of the far-reaching consequences of standardization and were anxious to promote a planned development of its resources at a rapid pace in an organized, rational and least wasteful manner, it would stand to reap handsome dividends by adopting a somewhat similar course of action (the Soviet system) and assuming direct responsibility for the promulgation and implementation of standards."

*Verman, Lal C. "Standardization - A New Discipline", Archon Book, 1973, Page 210

Given an adequate infrastructure, this can be a viable means of developing and implementing standards. In a word of caution concerning the direct transferability of such a system, Dr. Verman makes direct references to the Philippines:*

"In particular, the problem presents an interesting challenge to countries like Brazil and the Philippines where the NSBs issue mandatory standards but where the patterns of economy differ considerably from that of the USSR...".

Mandatory standardization imposes a legal basis on standards in addition to the technical and economic basis otherwise inherent. It thus requires enforcement of standards (as other laws) through constant vigilance by some policing authority with due penalties for non-observance or non-conformance. The Philippines Bureau of Standards is assigned this responsibility by RA 4109. Yet as outlined in Part III above, staffing and organizational infrastructure are grossly inadequate in light of the industrial and economic growth of the country.

Numerous references to the undesirability and/or ineffectiveness of mandatory standardization in the Philippines are mentioned in Part III and section 4.0 and its associated subsections of this part. Some of these are as follows:

1. It appears to be a deterrent to widespread development and implementation of standards - constituents of PTRI, PHILSA, and PCI prefer voluntary standards. (See the report of the visit to the Philippine Chamber of Industries (PCI) in Part III, section 5 and section 4.1 of this report.) PBS's output of standards has been low. (See the visit to the Philippines Bureau of Standards in Part III)
2. Suspensions of mandatory requirements have been made, nullifying the effect - as in the case of inspection of imports or standards for rice, shelled corn, grain sorghum. (See the report of the Philippine Chamber of Industries (PCI) in Part III, section 5 and of NGA in section 4.4 of this part.)
3. Enforcement and influence on quality improvement are questioned. (See sections 4.5 and 4.6 of this part.)

* Ibid

4. Annulment, at least in part, of one of the principal purposes of standardization, that of a reduction in the number of sizes, grades, etc., of products and commodities and the economic benefits of such variety reductions. (See Desmond's report referenced at the end of section 1, Part III.)

One solution to the problem of mandatory vs. voluntary standards may be in a better understanding of various forms of compulsion. This is the subject of a paragraph in a paper by Dr. Ken Stephens* with recommendations for developing an effective quality control program as follows:

"2. Create government and commercial compulsion for reasonable levels of quality via quality requirements in purchase contracts, building specifications, standardization and certification, export inspection programs, etc. Some quality requirements need enforcement from an organization or program with a broader perspective than the manufacturer himself or his immediate customer. (For example, the higher cost of electricity or even the cost of a fire from poor quality electrical cable is most often not borne by the manufacturer of the cable or by the construction contractor; without some independent enforcement of such quality, they may be tempted to cut their individual cost by supplying a low grade cable). There are at least two levels of compulsion which may be created. One can be referred to as a "subtle compulsion" obtained by the politico-technical activity of convincing responsible authorities to specify or require quality in products and services. The other may be referred to as "hard core compulsion" obtained by the politico-technical-legal activity of decreeing by law that imported and/or manufactured products must conform to a given standard with associated liabilities."

In light of the survey results it would appear that the Philippines have several alternative approaches to improve the development and implementation of standardization, especially with respect to mandatory standards. Some alternatives, not necessarily mutually exclusive, are as follows:

1. Strengthen the staffing and organization of PBS to enable it to meet obligations specified in RA 4109 including the consideration of raising standardization and its associated activities to the "Department" level.
2. Create a separate export (and import) inspection agency to carry this responsibility while adequately organizing and staffing PBS to carry out the main functions of promoting, developing and implementing

*Stephens, Kenneth S., "The Modern Concepts of Quality Methodology and Techniques of Quality Control and Quality Inspection", UNIDO Study Tour Workshop on Quality Control Certification Marking for Industrial Products, Singapore, 20-25 May, 1974 ID/WG. 180/2,29 April, 1974.

standards (including fundamental standards), quality mark certification, research, inspection, and training.

3. Modify RA 4109 to permit both voluntary and mandatory standardization with criteria for establishing each and an infrastructure to create less rigid compulsions where justified to permit local option in compliance.
4. Delineate, via a mechanism for national rationalization of standards (including the voluntary and mandatory standards question as in 3. above, but including inter-agency responsibilities), the specific areas of mandatory standards for promulgation and enforcement by such agencies as PBS, FDA, etc. and voluntary standards for promulgation, promotion and implementation by PHILSA and other organizations or agencies (PTRI, etc.). Upon such delineations of scope and responsibility, further strengthen the NSDB project with PHILSA to enable more widespread and accelerated preparation of voluntary standards and implementation through quality mark certification.
5. Develop an effective program of certification and inspection as a means of promoting the PS certification mark and strengthening the application of the quality control system, particularly in small and medium scale industries, through the assistance of a quality control expert and close coordination and collaboration with the Philippine Society for Quality Control, the UP Institute for Small Scale Industries, and the chambers or associations of industries.

5.2 Impact of PBS and Standardization on Industry and Public Awareness

Even after 10 years of operation, the visibility of the Bureau of Standards in industry and the general public appears to be only minimal. Numerous instances of unawareness of the existence and/or the operations and activities of PBS are contained in section 4.0 and its associated subsections. (See sections 4.3, and 4.5 in particular).

And even where there is awareness of PBS through a direct interface of activities with industries, many of these industries deliberately choose to minimize references to PBS standards and quality mark certification. References in company literature, advertisements and other publications are to other standards such as ASTM, ANSI, JIS, PABMA, etc., to the exclusion of PBS standards. (See sections 4.5,

4.9, 4.10, 4.12, 4.13, 4.14 of this report and the visit to the Mariwasa Manufacturing Plant contained in Part III, section 6).

Some of this is healthy in terms of promoting regional and international commerce and standardization, but not to the apparent extent of exclusion of PBS evident from the Survey.

Strengthening of the entire national infrastructure of standardization as discussed in section 5.1 will have a profound effect on creating a positive influence and image for PBS and allied standard bodies. But in addition to this, it is highly recommended that a dynamic program of industrial, commercial, and public relations for standardization in the Philippines be launched. An excellent guideline for such a program has been prepared by the project team leader and UNIDO adviser to the Thai Industrial Standards Institute, Mr. Rohn Hopper.* It should be consulted and used to develop an effective program.

5.3 Rationalization of Standards and Certification

This activity is included in the alternative recommendations of section 5.1. At the working level, an excellent start has been made in the Philippines as brought out by several of the Survey visits reported in the subsections of 4.0 (See sections 4.1 and 4.2).

However, the enormity of the problem at the policy level is presented vividly in Appendix II of the Survey Report with the listing of some 22 agencies establishing standards and/or enforcing standards. A coordinated effort is needed to rationalize and utilize more effectively the resources and activities of these agencies. The creation of a national umbrella, such as a national standards council, for standards development is highly recommended.

5.4 Presentation and Quality of Published Standards by PBS

A major objective of standardization is to establish and/or improve the quality of products, services, procedures, etc. This objective is better achieved if the standards themselves are of a good quality. There are many characteristics of quality in published standards: a neat, attractive and standardized cover and bond presentation; standardized, informative and readable format; clear, sharp and accurate printing; clarity of expression; technical acuity and completeness; etc.

The image presented by the published standards of PBS is not conducive to quality motivation or quality consciousness - falling short of good quality on almost all of the characteristics enumerated above. The standards have no cover or binding. They are mimeographed (not printed) on a very low quality paper. Trimmed size is irregular and

*Hopper, Rohn, A Manual for the Operation of an Information/Public Relations Department in a Standards Organization, 1974-12-24, TISI/UNDP-UNIDO Project, Bangkok, Thailand

unstandardized. Printing is very poor, making portions of copies difficult to read or unreadable. There are omissions of lists of technical committee members, reference sources, and other information in some standards.

Lack of clarity of expression (related to technical accuracy) is illustrated for example in the specification of "Grade 2" in SAO 22 on Glazed Ceramics Tiles and Tile Fitting. This document states the following:

Grade 2 "Tiles with some minor blemishes and defect which are not permissible in Grade 1 but free from blots and biscuit cracks"

This is a vague specification of grading capable of causing considerable disagreement between interested parties. Reference to the application of this standard is contained in the discussion of the visit to the Mariwasa Manufacturing Corporation in Part III, section 6.

An example of incompleteness of standards is afforded by SAO 38 on Automotive Lead-Acid Storage Batteries. A copy obtained for the purpose of examining the varieties allowed in the standard (mandatory standards often allow too many varieties, nullifying the variety reduction objective of standardization) makes reference to table 2 containing the "requirements specified by the type". Table 2 is missing from the copy examined with continuous numbering of pages from 1 to 25 plus three unnumbered pages of configuration diagrams. If table 2 was to follow at the end of the standard as the last page then its absence in this copy is an excellent argument for a careful binding in the preparation of the standards. Needless to say, without table 2 the standard is almost totally useless.

References to the presentation of standards reviewed during the Survey visits are contained in Part III, section 4. and 4.1 of this part. The contrasts between the published standards of PTRI and PHILSA with those of PBS are striking.

The discussion leads to the following recommendations.

1. PBS should undertake a complete redesign of its published standards. A sufficient budget should be approved to permit professional printing, layout, binding and overall presentation.
2. With commitment to the metric system the international A sizes should be used for the

standards. Common sizes are A4 and A5 with other A size folded sheets used within the standards to present larger tables, graphs, etc.

3. A standardized format should be followed by PBS in preparing the standards. Each should be subjected to critical technical and copy editing. Standards should be promoted and sold to offset preparation expenses.

V. REPORT OF GROUP B*

METRICATION

1. Introduction

The mission of Group B was to survey and assess the progress of metric conversion activities in the Philippines. Discussions were held with key government agencies and individuals and appropriate industry groups. In addition, tours of several important industries and universities were made. This report presents observations and several recommendations, based on these observations, which may strengthen the program of metric conversion already underway in the Philippines.

2. Members of Group B, Metrication

Jeffrey V. Odom, Chief
Metric Information Office
U. S. National Bureau of Standards

Dr. A. B. Rao
Deputy Director
Indian Standards Institute

Dr. Ibara Cruz
Director, Graduate Division
College of Engineering
University of the Philippines

Mrs. Virginia Paraiso
Coordinator, Metric System Board Secretariat
Philippines Bureau of Standards

Mr. Vicente Coloso (responsible for metrication and other
Philippine Department of Trade programs, a very busy person who
Metric System Board was unable to participate fully in
the Survey)

3. Principal Visits of Group B, Metrication

May 5 - Philippines Bureau of Standards
Secretary of Trade, Honorable Troadio T. Quiazon
National Science Development Board

May 5 - Philippine Chamber of Industries
Mariwasa Manufacturing Corporation
Philippines Chamber of Commerce

*Includes additional information supplied by Dir. Rañoa after completion of the Survey.

May 7 - Department of Education
Philippine Atmospheric, Geophysical and Astronomical
Services Administration
National Institute of Science and Technology
Secretary of Public Works, Transportation and Communications

May 8 - San Miguel Corporation
Magnolia Dairy Products
National Grains Authority

May 9 - Department of Trade
Mr. Vicente Coloso
Director of Metric Programming
of the Metric System Board

4. Scope of Report

This report will focus on the process of introducing metric measurements into everyday life in the Philippines, with strong emphasis on possible actions by the Philippine Government in support of this changeover.

This report will not cover areas related to measurement science or measurement standards. These subjects are admittedly important to the Philippines and have in fact formed the major portions of earlier reports on metrication prepared by Dr A. B. Rao in cooperation with the Philippines Bureau of Standards. These reports were thorough and remain valid today.

5. Prevalent Measurement System

Indigenous as well as Spanish, American, and English weights and measures have all been used in trade and commerce.

The meter was never popular for length measurements. The yard, foot and inch together with the Spanish length measures of pulgada (2.32 centimeters), pie (2.784 decimeters) and legua (5.573 kilometers) were prevalent.

For weight, the Spanish onza, libra, arroba, and quintal were used. Kilogram as well as pound and ounce were also used for solids and packed goods. For bulk sugar trading picul (63.26 kilograms) was used.

For grain capacity, the Philippines was accustomed to chupa (3.75 decimeters), ganta (3 liters) and cavan (75 liters).

For liquid measures, gallon (US), liter and fluid ounce were all used for different commodities.

6. Presidential Decree 187 and the Metric System Board

To eliminate confusion, promote domestic and foreign trade and for other intrinsic advantages, the President of the Philippines promulgated a Decree No. 187 on May 10, 1973 (App. V.) prescribing the metric system of weights and measures for all products, commodities and materials, services, and commercial transactions in all contracts, deeds and other legal instruments. The Decree initially specified complete conversion should be achieved by January 1, 1975; a request to extend the date to January 1, 1977 was approved on July 17, 1975.

A Metric System Board was created to effect an orderly change to the system. The composition and functions of the Board are given in Appendix V.

7. Efforts at Metric Conversion

As in all other countries, metrication in the Philippines is a four-phase program of investigation, planning, scheduling and implementation. Formulation of basic metric standards and the general investigation of the problems of metrication in the country have been practically finished. The Technical Committee, its sub-committees and working groups have worked to complete this basic phase. A total of 17 documents which include definitions of metric units, rules for SI style and usage, conversion tables and standard specifications have been prepared by the Committee and approved by the Board.

Planning for the various levels of physical standards and the drafting of the implementing rules and regulations have already been done. The scheduling or programming of the implementation of the system in various sectors is still in progress.

7.1 Physical Standards

To implement the standards established, various levels of physical standards are to be maintained in the country for length, weight, capacity, time, current, temperature, luminous intensity and plane angle. The prototype will be maintained by the National Institute of Science and Technology except for time which will be under the custody of the Philippine Atmospheric, Geophysical and Astronomical Services (PAGASA). A project proposal entitled "Establishment of Physical Standards of Measurement, Metrology, Testing and Standardization" was drafted by an Ad Hoc Committee composed of National Institute of Science and Technology, PAGASA, PBS and the National Economic Development Authority for submission to the United Nations Development Program.

7.2 Rules and Regulations

To carry out Presidential Decree 187, implementing rules and regulations were drafted complete with technical data such as details of primary and subsequent levels of standards and calibration, as well as the maintenance of standards of weights and measures and their certification. The document is under study by the Committee on Rules and Regulations before final approval by the Metric System Board.

7.3 Metrication Programming Committee

Orientation seminars and dialogues with various industries have been conducted by the Committee, including:

- 1) Orientation seminar for officials of private schools
- 2) Gold and base metal mining industries
- 3) Glass bottle manufacturers
- 4) Infant milk producers
- 5) Philippine Association of Paint Manufacturers, Inc.
- 6) Progressive car manufacturers
- 7) Purchasing Association of the Philippines
- 8) PVC plastic manufacturers
- 9) Steel bar manufacturers
- 10) Philippine Chamber of Industries

The Department of Education and Culture organized a number of orientation seminars all over the country. Initially, the seminars organized in Manila were for officers of the Department and for all levels of teachers. The seminar outlined a program of introduction of the metric system in teaching at all levels and in all scientific and technical expressions. The Association of Physics Teachers in the Country supported the effort of the Department, the group having started implementing the system in teaching, school publication, scientific instruments and gadgets.

Position papers of various industries such as oil refining and marketing, chemical, paint, iron and steel, milk, and cream have been

evaluated to determine the implementation date for each particular industry.

7.4 Publicity

The Department of Public Information has developed a program in which various media will be pressed into propagating information about the metric system to the public. It was proposed to create an ad hoc committee so that various agencies could help in the matter of disseminating information regarding the Metric System.

○ Pamphlets, Brochures, Tables, etc.

Copies of the 17 metric system standards finalized by the Technical Committee on Weights and Measures and approved by the Metric System Board were made available at the Bureau of Standards. The base, supplementary and derived units and the designations of multiplying factors were in a 6-page pamphlet. The Conversion Factors and Tables and the Rules for Style and Usage of the International System (SI) and other Related Units are also being disseminated to the public by the Bureau of Standards. The Conversion Table includes conversion and interconversion factors ranging from commonly used units for mass and length measurements to highly technical factors. Philippine units with their equivalents in the metric units are also included for historical and reference purposes.

○ Radio and Television

The Metric System of Measurement has been featured in radio and television interviews with the Metric System Board Chairman, Executive Secretary of the Board and Metrication Programming Director.

○ Talks and Personal Contacts

Members of the Board and Staff have been kept busy giving talks to various organizations and institutions.

The Metrication Programming Director and the Staff of the Secretariat discuss and help solve problems on metrication.

○ Press Release

Newspapers were kept well informed of the progress of metrication through press releases by the Board. The application of the metric system has been featured in editorials of leading newspapers.

o Exhibitions

Exhibits and posters on the introduction and use of the metric system was a part of a National Science and Technology Week celebration.

8. Areas of Implementation

Metric conversion has been done in areas where it is readily feasible.

1. The PAGASA and the Bureau of Coast and Geodetic Survey are announcing atmospheric temperature, barometric pressure, tide and rainfall in metric units.
2. Under Presidential Decree No. 4 and in consonance with Presidential Decree No. 187, the National Grains Authority has introduced the sale of all food grains by weight. Food grains were previously sold by the volumetric measure ganta. The bulk packing of food grains has been fixed at 20 kilograms per bag.
3. The fiber industry has adopted kilogram for weight measurement and cubic meter for volume measurement. The commodity is now exported in 125 kg bales instead of the usual 126.5 kg bale.
4. Petroleum products, especially motor fuel, is sold in liters.
5. Textiles are already sold by the meter.
6. Sale of many commodities such as fish, meat, vegetables, and certain fruits are in metric weights.

Industry in the Philippines is willing to comply with the new metric decree. The current President of the Philippine Industry noted "Metrication is like motherhood; we cannot resist it."

Education is likewise moving towards complete use of the metric system, recognizing its benefits. In fact, metric is generally taught in most schools in addition to English units.

The Philippine public, like that of all other nations, is resistant to change. The fact that people have been exposed to metric units in many areas should prove advantageous as the metric system becomes the sole measurement system in the Philippines. In remote areas, people are more uninformed about the metric conversion, its impact and timing.

9. Problem Areas

An important aspect of a successful change to metric in any given area is the availability of reliable information and advice to government, industry and the general public. A more vigorous information drive on proper metric units and symbols and advice on proper ways to change to metric is needed and should be provided by the Government. In addition, the Government should accelerate the conduct of forums for industries to help them plan their changes and also to ensure that its own various departments and agencies (1) do nothing to hinder the changes by industry and (2) make their own changes at a reasonable pace.

The following are specific observations which explain the slow pace of metric conversion:

A. There are many examples of a need for the dissemination of metric information on two levels:

(1) Technical information on correct SI units, symbols, style and usage is not adequately disseminated. Incorrect symbols for SI units are frequently seen in commercial applications.

(2) Practical information on how to convert to metric, especially in industry, would facilitate progress in metrication. For example, industries are assuming machine tools will need to be replaced because they are not made to metric specifications. Others are uncertain as to what metric size standards should be adopted.

B. The general public in some instances is not informed about the changeover to metric and the reasons for the change. One government agency reports resistance to changes it is implementing because the public does not understand the reason for the changes. Key representatives of the faculty for the University of Mindanao claimed to have no knowledge of the Presidential Order on metrication.

C. Some government departments are not taking the changeover seriously. They readily admit that the changeover is necessary but have taken no steps to implement the changes.

10. Possible Solutions to Problems

The Government (if serious about wishing to bring about metrication) might establish, within the Department of Trade, perhaps in the Philippines Bureau of Standards, a full time office to direct the Government's activities with regard to metric conversion. This office would have three main functions:

- 1) Educate the general public to the reasons for the change to metric. An aggressive effort to spread this information to all citizens is needed and might include public service advertising on radio, television, newspapers, and mailings to heads of households.
- 2) Serve as a point of contact for the industry and government agencies concerning proper metric usage and common sense methods of converting to metric.
- 3) Encourage and coordinate activities among industry and the various Government departments. Various departments should not operate independently. An important activity in this area might be a survey of existing laws and regulations in the Philippines. A plan could be developed to ensure prompt and equitable revisions as needed.
- 4) Develop procedures for the dissemination of information to the public. Such activity might include setting up workshops or seminars for various industry groups, developing brochures explaining the reasons for the change to metric, and detailing suggested ways to accomplish the change.
- 5) Enlistment of the services of an expert on metrication programing and implementation should be considered.

11. Additional Comments:

A. The private sector could well be enlisted to aid in publicizing the changeover to metric. Some firms indicated to the Survey Team a willingness to cooperate in such an undertaking. This could include distributing information brochures to the general public and providing additional assistance to employees and their families.

B. The U.S. National Bureau of Standards, through its Metric Information Office, would be pleased to cooperate with the Philippine Metric System Board in sharing examples of public information that might be useful in the Philippines. In addition, the Metric System Board should take every opportunity to share in the experiences of the Australian Metric Conversion Board. This Board is directing probably the most successful of the current metrication efforts.

12. Conclusions

The Philippine Metric System Board has and should continue to learn from dealing with the several problems listed above. There is currently pending a revision of the Presidential Decree, No. 187. This revised version, if approved, will create a full time Metrication Board Director. It further allows each governmental department to appoint an official of their department to serve as Chief Staff Metrication Officer for that department.

The Philippine Government should assess the priority to be given to the changeover. In order to be successful, the program will have to be supported and financed on a modest but significant scale. A full time effort is essential, with a minimum of two persons.

Once a metric office is established under the policy direction of the Metric System Board that office should move forward with a vigorous program of providing information and coordination. Only then will the changeover to metric occur - and occur in an orderly manner.

VI. REPORT OF GROUP C

BUILDING TECHNOLOGY: PRELIMINARY ASSESSMENT

1. Introduction

This report provides the Philippines Bureau of Standards with a preliminary assessment of Philippine building technology and concludes with 16 recommendations. The report was prepared by a four man group. The members were: Mr. Noel J. Raufaste, Jr., Federal Building Program Coordinator, Center for Building Technology, National Bureau of Standards, (served as group leader); Dr. Jamilur R. Choudhury, Associate Professor of Civil Engineering, Bangladesh University of Engineering and Technology. Dacca; Mr. Delfin P. Alesna, Jr., Civil Engineer, Philippines Bureau of Standards; and Mr. Roger Balinong, Building Research Service, University of the Philippines.

The assessment was based on an evaluation of the following building areas:

- o professional community,
- o building regulatory system,
- o building materials,
- o testing,
- o building research, and
- o education

During May 7-15, the group visited over 100 persons representing 20 building design, construction, manufacturing, and regulatory organizations. These organizations are located in the greater metropolitan areas of Manila, Quezon City, Cebu City, Iligan City, and Davao City. In addition, the group participated in other prearranged non-building related meetings with Philippine industry and government, i.e., Cebu Chamber of Export Industries, Durano Sugar Mills, Philippine Chamber of Industries, Philippine Chamber of Commerce and the Department of Trade. These visits provided the group members with a broader view of Philippine trade activities. The building related organizations are as follows:

- o Philippines Bureau of Standards, Manila - Director's Office and professional staff
- o National Science Development Board and Metal Industry Research and Development Center (MIRDC), Bicutan (Laboratory tour)
- o Government Service Insurance System Quezon City - Engineering and Development Projects Department
- o University of the Philippines, Quezon City - Office of the Dean of Engineering and Structures Testing Laboratory

- o National Housing Corporation, Tala - Office of the Executive Vice President
- o Bureau of Public Works, Manila - Office of the Director
- o Department of Public Highways, Manila - Office of the Director
- o Forest Products Research and Industries Development Commission, Los Banos - Commissioner's Office and Testing Facilities
- o Engineer Ambrosio R. Flores, Quezon City - Consulting Civil/Structural Engineer
- o Philippine Institute of Civil Engineers, Quezon City - Office of the Director
- o Land and Housing Development Corporation, Makati - Office of the Vice President
- o Atlantic Gulf and Pacific Company, Makati - Construction Department
- o Manila City Engineer, Manila - City Engineers Office and Materials Testing Laboratory
- o Design, Consulting, Construction, Development, Consulting Engineers, (DCCD), Makati
- o Mariwasa Manufacturing Corporation, Pasig, Rizol - (Plant tour)
- o Philippine Long Distance Telephone Company, Makati - Office of the Director
- o Atlas Consolidated Mining and Development Corporation, Toledo City (Open pit and laboratory tour)
- o Atlas Fertilizer Corporation, Toledo City (Plant tour)
- o National Steel Corporation, Iligan City (Plant tour)
- o L.S. Sarmiento and Company, Panacan (New Davao City) - Plant tour)

The next section presents a review of the building technology areas. This is followed by a review of impressions of the above organizations. Recommendations are found at the end of this report.

2. Evaluation of Philippine Building Technology

From the outset, it was clear that Philippine building practices fall into two groups: city and rural building practices. The city building practices are quite sophisticated both in use of material and methods of construction and generally are akin to those found in the United States and the more modern countries. In the rural areas the practices are less sophisticated and in some places, no systematic practices were recognized.

With the above background, the following provides the reader with an overview of current Philippine building technology.

2.1 Professional Community

The professional community consists of many professional organizations. There exists a Council, the members of which are representatives

of engineering and technological associations. This Council of Technology and Allied Services of the Philippines has nineteen members listed below. Within this Council, there are seven associations having direct impact on building technology. They are shown by an asterisk.

- o Association of Management and Industrial Engineers of the Philippines
- *o Association of Structural Engineers of the Philippines
- o Institution of Electrical and Communications Engineers of the Philippines
- o Kapisanan ng mga Kimiko sa Pilipinas
- *o National Society for Seismology and Earthquake Engineering of the Philippines
- *o Philippine Association of Civil Engineers
- *o Philippine Association of Mechanical and Electrical Engineers
- o Philippine Association of Naval Architects and Marine Engineering
- *o Philippine Air Conditioning and Refrigeration Engineering Society
- o Philippine Sugar Technologists
- o Philippine Institute of Chemical Engineers
- o Philippine Institute of Electrical Engineers
- o Philippine Society of Agricultural Engineers
- o Philippine Society of Electrical Engineers
- o Philippine Society of Mechanical Engineers
- o Philippine Society of Mining, Metalurgical and Geological Engineers
- o Philippine Society of Sanitary Engineers
- *o United Architects of the Philippines
- *o Philippine Institute of Civil Engineers

In addition, the Association of Government Civil Engineers with over 2200 members has an impact on building technology.

The mission and operation of the professional organizations are similar to those in the United States: one of their aims is to maintain high ethical professional standards in the practice and advancement of engineering. Membership is generally open to registered engineers or licensed architects. Additional information may be found in the Philippine Association of Civil Engineers (PACE) Journal "Philippine Civil Engineering", December 1973. The professional community appears to be better organized than in many other developing countries.

2.2 Building Regulatory System

The Philippines have one model code called the National Building Code (NBC). Prior to 1972, every chartered city, district, community, etc., adapted and followed its own building standards. About 30 professionals representing recognized technical organizations, city engineers and fire chiefs under the auspices of the committee on Housing, Urban Development and Resettlement under the Philippine Senate drafted

a bill to institute a national building code. Building Codes from other countries including the Uniform Building Code of USA, 1967 edition, were used as the basis of the Bill which was passed in 1972. The National Building Code is designed to apply to all chartered cities, municipalities and districts with a population of 2,000 or more persons. The Code also applies to dwellings valued at more than ₱ 5,000 (about \$725 U.S.). The Code includes the following sections:

- o General Provisions,
- o Enforcement,
- o Fire Zones and Fire-Resistive Standards,
- o Requirements Based on Occupancy,
- o Types of Construction,
- o Light, Ventilation and Sanitation,
- o Regulations for Use of Public Property,
- o Engineering Regulations,
- o Detailed Regulations,
- o Mechanical and Electrical Regulations, and
- o Special Subjects

Complementary to the NBC, the National Structural Code for Buildings (NSC) was developed in 1972 by the Association of Structural Engineers of the Philippines and the Philippine Association of Civil Engineers. The Structural Code is divided into seven chapters: General Design Requirements; Lateral Forces; Wood; Steel and Iron; Concrete; Masonry; and Excavation, Foundations and Retaining Walls. The code is mostly a compilation of provisions from nationally accepted codes and practices of the American Concrete Institute, Institute of Steel Construction, the Uniform Building Code of the United States and others. The NBC and NSC are deficient in several areas; fire safety, wind and seismic loading, material and live loading.

The building codes are currently undergoing revision to incorporate new technology. For example, Section 2.05 on Wind Pressures of the Philippine National Structural Code for Buildings is scheduled to be revised by September 1975. Selected tests from the AID sponsored NBS high wind project are being incorporated into this code. A revision of Section 2.01 on Earthquake Forces is also scheduled for completion in about one year. In all likelihood, many years will be required to completely revise the Building Code.

Philippine building standards originate by consensus standards and industry specifications. The Philippine Standards Association (PHILSA), Philippine Bureau of Standards, (PBS) and Bureau of Supply Coordination (BSC), develop standards by committee approval. These organizations work closely with each other in developing new standards. The other groups within the Government and private industry adopt standards for their own internal use. The standards

are adopted by each respective technical section proposing the standard. There are no uniform methods for reviewing standards.

The PBS developed over 200 standards (including specifications and methods of test) which pertain to export and domestic trade. Over half of these are for domestic trade. About 16 are related to building technology.

Building inspection and code enforcement is performed by a division of the Office of the City (Province) Engineer. The building inspectors are usually graduate engineers or architects, (licensing is not required).

In order to obtain a building permit, all non-government building owners must submit working drawings to the City Engineer's Office. The drawings must be prepared by a licensed architect or civil engineer. One half of the permit fee is due at this time. After the building plans are reviewed by the City Engineer (for structural aspects), the Fire Department (for fire safety and electrical aspects), the Health Department (for health related aspects), and the Department of Public Service (for plumbing aspects), the remaining 50 percent permit fee is due. Construction may now begin. It appeared to Group C that the plans are reviewed in only a cursory fashion.

The City Engineer's Office is responsible for inspecting (1) privately owned buildings, (2) buildings to be owned or acquired by the city, and (3) school buildings. The Bureau of Public Works inspects buildings owned by the National Government. Lending institutions such as Peoples Homesite and Housing Corporation, Social Security Systems, and Government Services Insurance Systems, provide inspectors for each of their funded housing development projects. The Department of National Defense employs its own inspectors as does the Philippine Veterans Association for their hospital construction.

Architects, engineers, and contractors are liable for building failures (up to 15 years after construction); the regulatory body is not responsible for such failures. This body has responsibility only in assuring that plans and specifications comply with city standards and with codes.

2.3 Buildings

a. Materials

Philippine buildings are classified as permanent, semi-permanent, and temporary. Permanent buildings are usually designed for long life (50 or more years) and are made of steel, masonry, or concrete. Semi-permanent buildings are constructed for concrete and/or lumber usually with galvanized iron sheets for roofing. Temporary buildings are made of lumber, coconut trunks, bamboo and other fibrous plants such as

nipa. Roof covering is made from nipa palm leaves, cogon grass, and galvanized iron sheets.

Approximately 95% of the low-rise buildings use indigenous materials. Some finished hardware materials and asbestos are imported. Since hot rolled steel is totally imported, most high-rise buildings are constructed of concrete. Use of plastics is small. Philippine manufacturers rely on local, as well as on imported, raw materials and machinery. Floor tiles and drain pipes are the two more popular items being produced and their share of the market is minimal. Very little is known about the weathering properties of plastics as compared to the more traditional building materials. Products purchased within the major cities are usually superior to those purchased in the provinces.

A review of the most abundant indigenous Philippine building materials is briefly presented below.

Soil - Natural earth is one of the most common building materials. Adobe (sun-dried earth) is not used to the extent it is in other developing countries nor as it was in the Philippines prior to World War II.

Wood - One of the most abundant Philippine building materials is lumber, which ranks among the best in the world and includes narra, akle, mahogany, rosewood and pine. Lumber, logs, and plywood make up the majority of Philippine forest exports. Bamboo is widely used in home and furniture construction. Rattan, a palm product, is used for furniture, rope and other uses. Nipa, another palm leaf and bark product is used in roofing, house construction and cottage products. There are also several varieties of trees producing resins used for varnishes and oils. Others produce tannin. The processing of lumber, and the manufacture of plywood and veneer is a major source of building materials and source of foreign exchange.

Gypsum and Lime - Gypsum and lime are plentiful in the Philippines. The quality ranges from acceptable to very good which is partly due to the quarry and quality control in mining. These products are used for plastering exterior and interior walls. Filipinos enjoy decorating their buildings with colorful plasters. It also serves to hide defects. Little gypsum is used for manufacturing wall boards. The Atlas Fertilizer Corporation, near Toledo City, Cebu, is experimenting with producing gypsum wall boards, a building component that is not manufactured locally. Cement is used almost exclusively in the building industry. Block construction is very economical for low-rise buildings and reinforced concrete is used in high-rise commercial and industrial building construction.

Stone, Aggregate and Sand - Most are collected from river beds. Others are quarried. With the exception of some ocean sand (because of contamination with calcium silicate which is corrosive), the quality of the above is considered good to excellent.

Metals - The Philippines possess an abundant supply of metals. The common metals used in buildings are copper, zinc, and iron.

Copper - Copper deposits are found in Luzon, Cebu, Negros, Occidental, and Davao provinces. The Atlas Consolidated Mining and Development Corporation in Toledo, Cebu, is the largest single source of copper. The lack of copper smelter and refinery capability results in exporting the ore to Japan and other developed countries for processing. Fabrication of rods and bars is performed locally.

Zinc - Zinc is produced as a by-product of other ores. Small amounts are being produced.

Iron - Iron deposits are found throughout the Philippines. Most are mined through strip mining methods. Most of the high-grade iron ore is exported to Japan due to the lack of appropriate refinery capability (lack of inexpensive sources of power). The National Steel Corporation in Iligan City provides some refinery capability, thus increasing the supply for local use.

b. Low-Cost Housing

While the need for "low-cost housing" (affordable to other than the top one-third income group) is great, the effective demand is low because of high costs. The cost of land is the driving factor in preventing houses from being truly low-cost. The production level cannot be raised high enough to result in a low-cost house. Few government programs provide low-cost housing. There is no accepted standard to distinguish a low-cost house. Designers and planners have their own standards. Planning and constructing low-cost houses is not keeping up with the growth in population. There are no considerations for user needs. Generally, new technology has not reached the housing industry. Little information is exchanged between the Government and private sectors about buildings.

c. Some Observed Construction Practices

Several housing projects were visited during the two week survey. Most of the houses were priced in the mid to upper cost range. The following section is a description of housing construction practices and summarizes building practices as observed in the Philippines. It is taken from the NBS report NBSIR 74-567 titled FY74 Progress Report

on Development of Improved Design Criteria of Low-Rise Buildings to Better Resist Extreme Winds, by Raufaste and Marshall. Houses are constructed typically by excavating a shallow trench around the perimeter of the site. Since most houses are constructed on-grade without basements, the walls are constructed in the trench. Footings are not used, the block walls are laid directly on the ground. Although footings are not required to compensate for freezing and thawing, the placement of the block directly on the ground does not provide an adequate distribution of the wall loads to the soil. High bearing pressures occur under the blocks which eventually result in unequal settlement. Cracking of the walls as a result of this unequal settlement is a possibility. This construction practice does not provide any resistance to uplift forces, for resisting overturning by winds, other than dead weight of the structure. While this is unlikely, small displacements can result in cracking the structure.

The mortar joints are poor. The irregular nature of small pieces of block is apparent. In some cases large voids exist in the mortar joints which severely decreases the strength of the wall. The load distribution for the reaction from the roof beam is very irregular resulting in high local stress. These local stresses cause cracking of the block, settlement of the pier, and very little ability to resist lateral load.

Footings are also not used for the corner columns which are major supporting elements for the roof loads. It was observed that there existed, at times, a lack of a positive connection between the columns. The block does not provide for lateral load; therefore, the two units act independently and the stiffening effect of the walls does not exist.

Minimum anchorage was observed to exist between the supporting columns and the roof members. Long reinforcing bars from the supporting columns are bent over roof members to provide anchorage. This connection provides a very flexible joint which could be subjected to large displacements under lateral or uplift loads encountered during high winds and seismic loading.

Framing details for the window openings appear to lack positive attachment between the window frame lintels and the walls. Irregular filler blocks forming the lintels and large amounts of mortar to hold the blocks together provide very little strength. Wind loads on the windows would cause the entire window unit, including the frame, to fail.

The weaknesses noted above are not apparent following completion of the house. Application of finish material (stucco or plaster)

covers up these defects. Under natural loading, however, the effects of these weaknesses show up.

As another example, when tying the roof material to roof trusses, minimal connections are usually provided between the roof sheeting and the main supporting members. Usually a thin piece of galvanized strap (2 cm. by 20 cm.) connects the sheeting to the wood truss. It is riveted to the underside of the sheeting and nailed to the truss member. The thin strap providing a very flexible connection is subjected to large displacements when under load. In addition, the eccentric attachment causes torsion of the roof beams and localized bending of the roof sheeting in the vicinity of the nails. Nailing through the thin metal strap reduces its strength and increases the possibility of its tearing under load. It was observed at some other housing construction projects, that a "J" bolt replaced the thin strap. While this is an improved connection (rigid connection), the torsion problem remains.

Generally, the Philippine new houses are assembled without adequate regard to good building practices. Applying a cosmetic finish to building surfaces to hide structural and other flaws is prevalent.

d. Architectural Considerations

Most new low-rise buildings are styled after western designs, especially those of the USA. Most of these buildings are single story with total floor area of 30-60 square meters. As mentioned above, the predominant building materials are concrete and masonry for floor and walls, and wood and corrugated galvanized iron for the roof system. The roof overhang ranges from 1 to 2 meters. Asbestos is becoming more popular. It is aesthetically pleasing, possesses improved thermal and accoustical properties, and does not rust. The material, however, cracks easily, is less durable, and more expensive than corrugated galvanized iron.

Included in the low-rise building category, are community centers, libraries, hospitals, schools, health facilities, etc. Many of these buildings lack good workmanship and building practices which is very evident, especially in the pre-war buildings. There is also a lack of technology to prove adequate safety of buildings.

Within the past five years or so the Philippines have placed an increased emphasis on promoting tourism. More and more of the new commercial building designs (apartments, hotels, civic centers, theaters), are becoming more free in design and are more aesthetically pleasing. The local architects and engineers are beginning to emerge as a capable force, with the expertise to design, engineer, and

construct buildings with character, warmth, structural safety, and class. The professional community appears ready to tackle problems associated with quality design.

2.4 Testing

a. Facilities

There are at present five major laboratories recognized to test building materials and products:

1. University of the Philippines (UP), Diliman, Quezon City (Department of Civil Engineering),
2. Metal Industry Research and Development Center (MIRDC),
3. National Institute of Science and Technology (NIST),
4. Department of Public Highways (including the branch attached to the Manila City Engineer's office, and
5. Forest Products Research and Industries Development Commission (FORPRIDECOM), Los Banos (near Manila).

The University of the Philippines laboratory is capable of performing destructive testing on almost all the commonly used building materials. The Metal Industry Research and Development Center is capable of carrying out non-destructive analysis of metals. NIST carries out only routine tests of concrete and steel. The Department of Public Highways laboratories usually perform routine tests on concrete and soil and building structures. FORPRIDECOM is involved primarily in tests on timber, bamboo, and lumber. Although their facilities are somewhat limited, they have improvised some methods for carrying out full scale testing of structures, e.g., trusses, roofs, shells, etc. They are also performing tests on and developing locally produced connectors and fasteners.

b. Methods

In the absence of Philippine specifications for tests, the methods prescribed by the American Society for Testing and Materials (ASTM) are widely used. For concrete tests both cylinders (15.24 x 30.48 cm) and prisms (2.54 x 2.54 x 15.24 cm) are used. Group C members expressed doubt whether some of the specimens tested were representative of the material used. Some moulds used for casting prisms, (usually of plywood), produced specimens with shapes and sizes significantly different from those intended. Timber products are tested either

according to ASTM methods or BS methods. The Bureau of Public Highways refers to the American Association of State Highway Officials (AASHO) methods and specifications.

c. Calibration

The testing machines in almost all the laboratories were said to be calibrated approximately once every six months using standard proving rings. Most of the machines are graduated in Imperial units, so conversion to metric system or SI could be a problem.

d. Testing Personnel

Most of the laboratories appeared to employ engineers to perform tests. Some of these engineers were university graduates who failed to qualify in the Board examination (see section 2.6a below).

Additional information on testing may be found elsewhere in this document. Refer to Group E's Report on Testing Facilities.

2.5 Building Research

Minimum building research is being performed toward developing improved building technology and for better and wider use of indigenous materials. The degree of government participation in building technology is minimal. No one government agency has the responsibility for building research. Little emphasis is placed on research efforts directed toward developing local building technology. With the exception of FORPRIDECOM, almost no research is conducted on the use of local materials such as coconut tree, bamboo, timber, reeds, etc. The large and well-known manufacturers have reached a satisfactory level of innovative research, and their standards establish the quality of their products. They are thus reluctant to submit their products to a standardization or testing agency.

2.6 Education

a. Education and Training

There are 53 engineering schools in the country. As in the United States, approximately 30 percent of the incoming freshman students graduate. The graduates must pass a Board of Examinations before they are licensed to practice as professional engineers. About 1400 engineering students take the examinations annually. No statistics were available on the passing percentages.

The education standards among the 53 schools differ significantly. There is talk of initiating a pilot program consisting of five colleges and universities to evaluate themselves for accreditation.

Post-graduate education at Philippine universities is not popular and most Filipino engineers prefer going to the United States, Australia and to other foreign universities.

Manufacturers usually do not provide their employees with incentives to register for off-site courses of further professional or trade education. Some government departments and building component manufacturers however, hold in-house training programs. For example, in-house short courses are taught by university personnel and some specialized training is provided by the management staff.

b. Curriculum

Most of the courses at the University of the Philippines (considered one of the best engineering schools in the Philippines), are similar to those in the United States, both in format and content. However, there is a lack of emphasis on advanced engineering courses; thus the graduate is deficient in certain basic knowledge. There is also a lack of emphasis on developing local building technology and maximizing the use of indigenous materials. A review of one engineering university catalogue suggested that building construction, the only course dealing with materials and methods of construction, is offered only as an elective to final year students.

3. Additional Background Information Gathered During Visits

The following provides the reader with additional understanding about Philippine building technology.

3.1 Metals Industry Research and Development Center (MIRDC)

MIRDC was founded in 1966 as a semi-private organization to provide metals research and testing. The Center is divided into five departments: training, testing, research and development, industrial economics, and special projects. Their laboratory facilities are located in the new science complex in Bicutan, south of Manila. A review of their testing capability was given previously.

They provide some non-destructive tests on metal building components. Their standards group is performing basic tasks. They appear to have an adequate number of staff, yet, all are somewhat under-utilized. It appears that much of the testing equipment is not often used. This may be due to other government agencies which also perform similar research and testing programs, or because not enough tests are carried out.

3.2 Government Service Insurance System (GSIS)

The GSIS is a government agency concerned with building houses. The agency is a lending institute to building contractors. They have many financial housing projects scattered throughout Central Luzon. Most of their buildings are one-story with 3 bedrooms. They are usually constructed of hollow concrete block, wood truss, concrete with corrugated galvanized iron roofing. Asbestos sheets (material usually imported from West Germany) are becoming more competitive. The roofing is connected to the truss by straps (riveted sheeting and nailed to truss). They are beginning to standardize all buildings.

3.3 University of the Philippines (UP), Diliman, Quezon City

The following are impressions gained from discussions with UP staff, professors, Dean of Engineering and the Assistant Dean of Engineering:

1. There are 53 engineering schools in the country.
2. Roughly 1400 students take the Board examinations every year (conducted annually).
3. Most of the graduates (engineering and architectural) are employed by the private sector.
4. The UP produces 4% of all engineering graduates in the country.
5. There appears to be a necessity of intermediate level professionals to lead to better utilization of the engineering manpower.
6. Only ₱ 6000 (\$850 U.S.)/year is spent on building research. A National Science Development Board grant of ₱ 12,000 (about \$1700 U.S.) per year has been furnished. Presently, there is no full-time research staff.
7. The UP Industrial Research Center provides testing facilities and services to industry.

3.4 National Housing Corporation (NHC)

The National Housing Corporation, a semi-government housing manufacturer, produces porous concrete panels, chip board, PVC pipe and floor tiles, doors and windows and fabricates building components. The NHC plant has a rated capacity of about 1000 housing units per month. Presently, the plant averages less than 250 per month. The units have an area of 47.5sq.m. Their costs are about ₱ 28,000 (\$ 4000 U.S.).

A lightweight aggregate is being used to produce blocks or panels for low-cost housing. Lime, cement, sand, and aluminum powder are combined to produce FOAMCRETE. This product was patented in the United States but the inventor could not find a market. The manufacturing method was transferred to the Philippines where it has shown promise for producing housing components. NHC develops tests for their material as it is needed, (no acceptance tests are performed).

Other companies producing similar products to those at NHC are:

- a. Prestress (concrete panels)
- b. Constress (concrete panels)
- c. CDCP (concrete panels)
- d. PACWOOD (roof trusses)

There is nominal government participation in developing new technology.

For a conventional house, about 70-75% of the costs are attributed to material and the remainder to labor. NHC claims for their factory-produced houses, that material cost represents 85% and labor costs are 15%. Building costs have doubled in the last three years.

NHC management has a concern for employees and their families. Since the factory is located more than 30 km from downtown Manila, a housing community was erected for workers and their families. The houses are the same as those sold on the open market. Volunteer housewives are trained and employed to assemble wood floor tiles for some of the manufactured houses.

In addition to producing and selling single family buildings, NHC is experimenting with duplex, triplex and quadplex houses. A duplex costs NHC about the same as a single family detached house. The NHC management is in the process of educating prospective buyers that they may save 50% by purchasing a duplex. Currently, these buildings are more appealing to the low-income family.

NHC accepts orders from individual clients; however, construction does not begin until a minimum of 50 units are on order.

3.5 Bureau of Public Works (BPW)

BPW designs and constructs all national government buildings. Since 1970, BPW has been responsible for designing and constructing school buildings to replace those which were damaged and destroyed by

the disastrous typhoons of 1970. It has its own construction work force; at times work is contracted out. It provides a fairly complete laboratory for testing building products. BPW is becoming more aware of construction management technique. It is very concerned about improving scheduling prior to any construction award. BPW is concerned about Philippine building practices and is trying to improve its practices. It claims to be following appropriate work safety regulations established by the U.S. Department of Labor.

The Bureau follows ASTM standards. As new Philippine codes are developed, BPW informed the group that it will implement them. During construction, the Bureau assigns engineers permanently to the building. The engineers are trained in all aspects of building construction.

3.6 Department of Public Highways

Discussions were conducted with about 12 engineers, including the Director of Special Projects. The Department is responsible for planning, designing, constructing, and maintaining all national highways, bridges, and airports. The following are impressions gathered during the meeting:

- o AASHO (American Association of State Highway Officials) specifications are followed in the design of bridges.
- o A departmental code, popularly known as the "Red Book" is extensively used.
- o Design methods developed at the Portland Cement Association (PCA) U.S.A., are used for pavement design.
 - o Asphalt used in flexible pavements are obtained from local refineries (e.g., PETROFIL).
- o Testing facilities exist for testing steel, concrete and soil. A 400,000 pound capacity Tate-Energy Universal Testing Machine (made in U.S.A.) is used for tension, compression and other tests. The departmental laboratories are used not only by other Government departments, but also by private organizations.
- o Materials are tested before acceptance. AASHO method of sampling is used.
- o Standard precast prestressed beams are used for bridge spans 50 ft. to 100 ft.
- o New graduates undergo departmental training for two months. No in-service technical training program exists but management training is given under "Career Executive Branch".
- o More engineering graduates now join the private sector because of higher salaries. The department is losing young engineers to private sectors.
- o Computer programs are used for the planning of highways, e.g., origin-destination studies. The National Computer Center provides the facilities. The Bureau of Telecommunication Computing facilities are also used. The computer is not used for structural design.

- o Steel is more popular for long-span bridges and reinforced/pre-stressed concrete for short and medium-span bridges.
- o The department employs about 1000 graduate engineers.
- o Graduate engineer inspectors perform regular inspection at all stages of work. They have the power to stop work when specifications are not followed.

3.7 Forest Products Research and Industries Development Commission (FORPRIDECOM)

FORPRIDECOM has considerable expertise in timber products. They were formed with the assistance of the U.S. Department of Agriculture. They are providing technical support in developing timber related specifications, including plywood, and developing test methods for connectors and fasteners. Also research is being carried out in wood waste utilization and they have been studying the use of plant fibers for building products. FORPRIDECOM has constructed several experimental buildings using various building block materials and material combinations for possible use for mass production.

3.8 Ambrosio R. Flores - Consulting Engineer

Mr. Flores, a practicing civil engineer and past president of various prestigious professional associations including PHILSA, provided much useful information which was used in developing this report. During his forty-seven years as a civil engineer, he served in many capacities, from university professor to author and consulting engineer. His background includes over 100 individual buildings including churches, theaters, offices, banks, and industrial facilities. He played a major role in developing the National Building Code and National Structural Code for Buildings, and is responsible for updating portions of the Structural Code.

3.9 Philippine Institute of Civil Engineer (PICE)

The Institute represents the merging, in 1973, of two major civil engineering societies; the Philippine Association of Civil Engineers and the Philippine Society of Civil Engineers. The Constitution and By-Laws of PICE are similar to counterpart U.S. societies and associations. PICE is a very strong professional association with a fairly large membership roster covering the entire Philippine Islands. Its president, Cesar Caliwara, has taken strong leadership since his term commenced in 1971. The PICE members interviewed during this Survey were not familiar with the Philippines Bureau of Standards. They have little appreciation for what PBS can do to assist the building industry.

3.10 Land and Housing Development Corporation (LHDC)

LHDC is a private housing development organization which designs and provides construction services primarily for the middle income individual. They are also designing townhouses and other low-rise structures such as churches and community facilities. Their building practices appear to be quite good.

3.11 Atlantic, Gulf and Pacific Company of Manila, Inc. (AG and P)

The AG and P Company is engaged in engineering, construction, metals, fabrications, manufacturing, sales, offshore and marine structures. They provide services and products in the Philippines and to most of Southeast Asia. The company, established in 1900, was organized in the United States. In 1901, a Philippine branch was opened. The company has grown into a highly diversified business organization. Their professional staff number over 600 persons; approximately one-third are civil engineers. Others include architects, mechanical, electrical and marine engineers.

Their construction group provides engineering services for large construction jobs ranging from fractionating towers, to sugar mills and refineries, cement plants, electric generating stations and high-rise office buildings.

Since most of their activities are on a contract basis (as are other similar organizations), they have little impact toward improving product standardization, or building technology, other than providing good building practices.

3.12 Materials Testing Laboratory (Manila City Engineers Office)

The laboratory is equipped to perform routine tests on concrete, soil and highway materials. The testing personnel employed were civil and chemical engineering graduates.

In general, every six months the testing machines were calibrated. It appeared that the sizes of concrete specimens tested varied widely, e.g., 15.24 cm cubes undergoing tests were found to have sides as great as 16.51 cm. This is because non-standardized plywood moulds were used at the site.

3.13 Design Construction Consulting Development Corporation (DCCD)

DCCD is typical of many architectural/engineering firms within the U.S. They provide engineering, design and construction services. The vast majority of their involvement is in the commercial and industrial area. DCCD provides total services such as; architectural, structural, mechanical, plumbing, electrical and construction. This firm appears to

be very well qualified and to follow good building practices.

3.14 Mariwasa Manufacturing Company

This company, using standards from Italy, manufactures ceramic tiles, vitrified flooring tiles, and refractory materials. Twenty million tiles are produced monthly under three grades:

- Grade I - used for export, represents 60-65% of total
- Grade II - used for local consumption - 30% of total
- Grade III - used for low-cost housing - 5-10% of total

The quality control methods appear to rely solely on the workers who usually inspect, during its production, almost 100 % of the manufactured items at several stages in production. About 5% of the product is rejected which by observation would be a low-estimate on the day we visited. Raw material is recovered from rejected tiles. It was observed during the plant tour that there is an absence of adequate safety practices for the workers when judged by U.S. standards. For example, workers are not provided basic personal safety devices (goggles, dust mask) or occupational safety protection (guard rails, marked walkways, fans, dust removal equipment). In addition, many workers must walk over conveyor belts when leaving their work station, are exposed to frayed wiring, and are confronted with hot and humid conditions, to name but a few of their unsafe and unpleasant conditions.

3.15 Philippine Long Distance Telephone Company, Makati, Manila

The building/construction related activities of the organization are:

- o Design, erection and maintenance of steel towers for microwave antennas in various locations of the country
- o Design, construction, and maintenance of telephone exchange buildings (16 in Greater Manila and 14 in Provincial towns).

The following are impressions gathered from discussions with company representatives:

- o The tallest tower is 306 feet high; the majority of towers are around 100 feet high. Most are self-supporting; guyed towers appear to be economical for heights greater than 120 feet.
- o Steel for the towers is imported - mostly from Japan
- o The UP testing facilities are extensively used - usually for testing concrete and steel. ASTM standards are used.
- o Design of towers must get approval from the City Engineer's office.
- o In the absence of a reliable wind code, a 200 miles/hour wind

- is assumed in design - for all parts of the country.
- o 'National Building Code' recommendations are usually followed.
 - o It appears that inspection (by qualified graduate civil engineers) is carried out in case of steel structures but this may be relaxed for concrete designs. All their structures are insured, thus the insuring company also arranges an inspection.
 - o 'National Safety Standards' are followed. Compensation arrangements exist for injuries to construction workers, as provided for in the "Workman's Compensation Act".
 - o It appears that "fire safety" provisions are not explicitly mentioned in the National Building Code. However, in view of the extremely strategic importance of the telephone exchange buildings, various types of fire safety provisions (e.g., smoke detectors) have been installed. The City Fire Department is consulted in such cases.
 - o Conversion to the metric system is posing some problems. At present 'soft conversion' is used only in 'length'. Next to be converted would be the gauge of the cables.
 - o The engineers, in general, felt the necessity of a more comprehensive national building code and a better mechanism for enforcement of standards.

3.16 Atlas Consolidated Mining and Development Corporation

The entire survey team toured copper strip mines near Toledo City, Cebu. A laboratory visit followed. The copper is refined to about 27% pure. It is then sold to highly industrialized countries with capability to process the copper to 99.5 percent.

3.17 Atlas Fertilizer Corporation

The entire survey team was hosted for lunch by the Atlas Fertilizer Corporation. A short briefing on the production of fertilizer and chemicals was made by key staff members. There was a discussion about expanding their plant capacity to include production of gypsum board wall panels. Little or no production of gypsum panels exists in the Philippines, since most building interiors are finished in plaster or wood. A very brief tour of their plant was provided after lunch.

3.18 L. S. Sarmiento and Company

A visit with L.S.Sarmiento and Company, (wood paneling), Panacan, near Davao City, was scheduled for the building technology team. Although both Mr. Raufaste and Professor Choudhury had returned to Manila, Mr. Peiser accompanied the Philippine members of the group from PBS and the UP, Messrs. Delfin Alesna, Jr. and Roger Balinong.

Sarmiento is an important producer of high quality plywood, veneer,

and very attractive narra paneling, with some expansion into furniture, paint manufacture, etc. The plant manager, Mr. Luisito Lopez guided the tour. Discussions and a luncheon were chaired by the Vice-President.

Worldwide recession in building activities has created problems for this company, affecting possibly even its survival. Technical problems generally concern economically dictated measures. Savings in raw materials have to be made, yet the grading of the product quality demands a high percentage of highly perfect products. Waste and reject material are used as fuel for the steam plant.

The firm is rightly proud of its pre-finished panels which are used, for example, in mobile homes in the U.S.A. The organic solvent paints no longer have a cost advantage over water-based latex paints. The company will switch its output to water-based paints with resulting improvements to the health of workers and to fire safety. The laboratory is equipped to handle the standards requirements of the American Hardwood Plywood Association. In paint testing, there is no advanced measurements technology, so that for titania paints, for example, there is no way to check the rutile/anatase ratio. Glues have not given trouble; paper lining with very small holes for glue penetration comes mostly from Taiwan.

The Philippine mahogany reserves are being gradually depleted. This trend is even more serious for narra wood with a replacement time of about a century. Clearly this was not the place or indeed the right survey to look into the reforestation policies of the Philippine Government. Sarmiento is more concerned with employing its production facilities closer to capacity. Use of rejected shavings by pulping, processing, and compounding, into, say doors, suggests itself, but the company is perhaps too short of capital to try new ventures.

It is Mr. Peiser's personal impression that we were entertained more out of courtesy to PBS than for reasons of needed advice or technical exchanges. The company is well organized, with good working conditions.

Recommendations

Sixteen provisional recommendations classified in five groups were developed by Group C. They are based on the above discussions and are suggested for implementation. They are not rank ordered since the PBS is in a better position to make those judgments. The following recommendations are presented as an aid to help PBS shed its current lack of an image; characterized by people asking such questions as "who are they and what do they do"? and to help PBS become more responsive to the building needs of the Philippines. Several of the recommendations may be implemented immediately while others will

require coordination between PBS, other government agencies, private organizations and the professional building community.

Institution Building

- o A dialogue should be maintained between the Philippines Bureau of Product Standards, the National Bureau of Standards and the Agency for International Development to provide survey feedback to all parties for coordinating local responses to the project report and recommendations, for assessing impact of the survey on Philippine building technology and for identifying additional local technical needs.
- o Communications about building technology between Philippine Government agencies, professional societies and the private sector should be improved. One of the means of achieving this would be by holding periodic workshops on different subjects.

Application of Codes and Standards

- o Codes and standards should be upgraded by inclusion of provisions for more comprehensive fire safety regulations, wind and seismic forces and other live loading. This will lead to an improvement in the quality and safety of buildings and would minimize the loss of life and property due to natural calamities and fires.
- o The enforcement of codes and standards should be improved, harmonization with the NBC should be favored with a minimum of local departures. Zoning practices should be more widely adopted.
- o A wider dissemination of building standards and specifications to the professional community, government agencies and private industry is needed.

Laboratory Services

- o An accepted uniform laboratory accreditation program should be developed for use by all government and private organizations. This will lead to a better enforcement of test methods and standards.
- o There is a need for developing standard methods of test for indigenous products such as bamboo, coconut, lumber, aggregates, cement, sand, etc.
- o In order to ensure better quality control of building products, the facilities at testing laboratories should be expanded.

- o Facilities for full-scale testing of building components should be available, at one laboratory facility.
- o Sampling methods - particularly of concrete - should be better enforced at the construction site.

Education

- o An accreditation system for engineering schools should be introduced. This will ultimately lead to more uniformity in the quality of graduates.
- o Undergraduates should receive more exposure to current building practices and building technology; this should lead to an improvement in building practices.
- o An intermediate level of education (para-professional) should be provided to produce specialists to perform certain functions like inspection and supervision of construction and testing of materials. Releasing the engineers, who currently perform the above jobs, for more vital ones, will lead to better utilization of engineering manpower.

Research

- o Collaboration between PBS and government, manufacturers and the building community toward establishing a national building research program would be beneficial to all parties concerned with improving buildings. For this to occur, some form of government subsidy would be needed to finance the high cost of research.
- o Research efforts should be directed towards developing a safe shelter which is truly low-cost for transients, displaced families and the poor. This will necessarily mean a further use of the local natural resources.
- o Develop and standardize simple prefabrication systems for use in various building types. Such a system could offer a savings in material costs as well as in future maintenance costs. It would also lead to a better enforcement of codes and standards.

VII REPORT OF GROUP D

TECHNICAL DATA HANDLING IN THE PHILIPPINES OBSERVATIONS AND RECOMMENDATIONS

I. Introduction

Progress in scientific and industrial development depends in large measure on the development of techniques and systems for collecting and disseminating scientific and technical data arising from original experiments or derived from published reports of such experiments.

Until the last few decades, the systematic codification, collection, and dissemination (publication) of technical data was supported either by professional societies, by large industrial organizations, or by trade associations. More recently technical information and data have been recognized as important national assets and governments have taken on more responsibility for improving the flow of information and data to the technical community.

In the U.S. even large companies have found a need to band together to support projects for data acquisition and dissemination. The American Petroleum Institute, the Copper Development Association, the American Gas Association, etc. are examples of trade organizations which have for a long time supported data collection and dissemination projects. Corresponding efforts exist in Germany, Japan, France and other highly industrialized countries where these patterns of industrial cooperation have emerged over the last 40 or so years.

In today's faster-paced world a developing country cannot wait until such patterns of cooperation emerge. Today governments must take positive action to encourage and foster more effective systems for handling scientific and technical data.

Governmental assistance in this area would seem particularly crucial in the Philippines because, we understand, the Philippine Government and people have mapped for themselves a plan to develop local industry, locally financed and managed, to produce products to compete in world trade. Frequent consultation and license agreements will be required from abroad, but most of the technical knowledge needed is buried in about 15,000 technical journals, totalling several million pages a year. Without help, the individual, or even the local company, simply cannot manage its input data problems. Only the Government of the Philippines has the resources to help, and this would appear to be a duty if its industrialization program is to succeed on a reasonable scale.

Technical data handling has both a classical and a modern aspect. While the modern aspect involves the use of computers and is the subject of much discussion here and abroad, the resolution of problems associated with classical librarianship is still essential and even crucial to progress in the modern world. Thus, this report will address itself to both aspects of the technical data handling problem. In our numerous visits we found organizations with strengths in each of the fields. We also found a number of pockets of excellence in both library and computer operations.

2. Libraries Visited in the Manila Area

We visited nine libraries and examined their cataloging of certain well known NBS and other publications as a crude measure of the accessibility of important technical data to persons in the Manila area.

Among the libraries we visited were those at the following institutions:

- a) Philippines Bureau of Standards
- b) Philippine Chamber of Industries
- c) Philippine Textile Research Institute
- d) Bureau of Supply Coordination
- e) Board of Investments (Chemical Industries Library)
- f) Board of Investments (MIRDC Library)
- g) National Institute of Science and Technology
- h) Central Bank of the Philippines
- i) University of the Philippines

Later in this section we record some comments and observations on the libraries we visited. Here, we wish to draw attention to a troublesome aspect of library practice in standards organizations. It seems to be a common practice for standards organizations in the Philippines and in other countries to acquire collections of published standards from sister institutions throughout the world. It is, therefore, not unusual to find a standards library burdened with literally thousands of standards. We use the word burdened advisedly because even the most rudimentary control of such a collection forces the usually limited library staff to spend effort on documents they may never have a need for. It is also difficult to be certain that the standards on the shelf are the most current. Often too, they are in languages which the staff cannot easily read.

The practice of distributing or exchanging standards on a wholesale basis is a burden for all parties. A more rational plan would be to

request from sister institutions only those standards which are required for the problem at hand. Thus, if it is on the schedule to prepare a new standard on a particular commodity, then requests can be made via correspondence or Telex to sister institutions to furnish copies of their most current standards that bear upon the subject at hand. Such a practice, it seems to us, would greatly increase the overall efficiency of both the requesting and the granting institutions.

We recognize that foreign standards are needed for purposes other than the writing of local standards. If foreign standards are required to perfect a manufacturer's process or for control of export products, it would seem better to request them, one by one, as needed than to depend upon a collection acquired 5 or more years ago.

As a result of this survey, we have established valuable personal connections with the librarians at the Central Bank, at the University of the Philippines, at NIST, and at the Board of Investment, as well as the Philippines Bureau of Standards. We found the librarians cognizant of many of the current bibliographic aids and observed only one troublesome problem --the inadequate cataloging of the NBS collection at the NIST Library.

For some years now, the NIST Library has been receiving all of the NBS publications without cost. They are shelved in a special section in the library and are, of course, available to persons who have the privilege of entering the stacks. Even if one knows of the existence of the various series of NBS publications, it would be very difficult to find a specific NBS Technical Note, Monograph, Circular, or Handbook since none of the publications are cataloged individually. We can appreciate the reason for this state of affairs as we have observed similar conditions at depository libraries in the U.S. This does not, however, change the fact that the utility of this extensive and expensive NBS collection is seriously compromised by the inadequate cataloging. That situation is more serious in the Philippines than elsewhere because there is a scarcity of other announcement and abstract mechanisms as well. We offer no solution to this problem at present. There is a possibility, since the problem is more universal, that the solution to it can best be handled at NBS. The details of how NBS might itself remedy this situation will be the subject of further study.

3. The Need for Computerized Selective Dissemination of Bibliographic Information (SDI)

In the past, progress in science and technology depended heavily upon published abstract bulletins. Among the more important of these, one

finds Chemical Abstracts, Science Abstracts, Engineering Index, Biological Abstracts, etc. As the volume of the published literature has increased so has the bulk of the abstract bulletins and their cost to the user. A full subscription to the published version of Chemical Abstracts now costs \$3000 per year. At that price, it is understandable that universities find it harder and harder to justify multiple subscriptions. This situation is especially serious in countries where dollar exchange is a problem.

In the entire Philippines, there are only 4 subscriptions to Chemical Abstracts, and 3 of these are in Manila. In the case of Engineering Index, the U.P. Library does not subscribe to the monthly issues. It receives only the annual volumes and no one else gets Engineering Index. In the case of Biological Abstracts, there is a total of 4 subscriptions in the entire country.

This state of affairs argues strongly for the establishment of a computerized SDI (Selective Dissemination of Information) system in the Philippines. Such a system makes use of magnetic tape versions of the major abstract journals which are searched to agree with a user's interest profile. These tapes are made available under a variety of leasing arrangements in which the payment depends upon the extent of use. It is our view in the case of Chemical Condensates (the computerized version of Chemical Abstracts), that an SDI system serving 100 or so chemists or chemical technologists would cost little more than the cost of 3 or 4 additional subscriptions of the printed version.

For industrial development, an SDI system based on COMPENDEX (the computerized version of Engineering Index) should receive high priority. In view of the priority given to industrial development, it seems reasonable for such an SDI project to be funded by the Board of Investments and/or other agencies concerned with the industrial and technical development of the country.

We are strongly inclined to nominate a University with a strong tradition of library service and with a computer center that can easily be upgraded. Other organizations which we visited could handle an SDI system also, but we feel that they have broader missions under which an SDI system might get lost. It seems better to assign this project to a group for whom it will represent a major long-term undertaking and where interest in such service already exists. The University of the Philippines seems to us to be the most likely candidate for operating an SDI system for Scientific and Technical Information.

4. Computer Facilities in the Manila Area

We visited computer centers at the following institutions:

1. Central Bank of the Philippines (CB)
2. The National Computer Center (NCC)
3. The University of the Philippines (UP)

In addition, we visited with the staff of the Development Academy of the Philippines (DAP) concerned with designing and building information systems. Though they have no computer of their own, they are heavily engaged in assisting government agencies who need to introduce computers to solve their data handling problems. We say "need to use" rather than "wish to use" because the DAP charges for its services. Only those agencies that recognize a need sufficient to budget for it can avail themselves of DAP Services. The DAP group uses computers at MERALCO, at NCC and sometimes at the IBM service bureau.

Assistance from the National Computer Center also entails a financial commitment. We also visited the responsible individuals at IBM Philippines to round out the picture viz-a-viz existing computer facilities and the status of teleprocessing.

At the National Computer Center we saw the beginnings of remote use of computers over telephone lines. They now have six terminals located in important government offices including: the Office of the President, National Economic Development Authority, Bureau of the Treasury, Budget Commission, etc. These are used over leased lines. The computer hardware has room for a dozen terminals, but the demand for them is not yet strong as they require leased lines. There is no immediate prospect of dial-up service. That must wait until improvements are made in the telephone system.

In the Manila area at least, it is our observation that enough computer hardware exists, or will soon be installed, and that internal staffing and external training programs are being pushed vigorously enough by both DAP and NCC to serve any agency with its serious data handling problems. Both the Development Academy and the National Computer Center have taken on country-wide responsibilities in promoting the proper use of computers. Plans have also been laid to provide regional centers to help users in the more remote locations.

5. Recommendations

Time did not permit an exhaustive inquiry into the extent to which the existing libraries in the Manila area are used by industrial and governmental personnel outside of the organization in which the library is situated, nor the extent to which the libraries provide services to outlying regions. The impression one gets even from casual observations is that whatever service is being offered to outlying regions now, it is a small fraction of what is needed to meet the information needs of an expanded industrialization and development program.

We therefore concur in recommendation six made by Group A that it is very important to "expand library and technical information services to industries and other technical and scientific organizations".

For a variety of reasons (financial, hard currency posture, urgency, cost/benefit ratio, etc.) we would give the highest priority to the initiation of a computer-based Selective Dissemination of Information system (SDI) in an institution which has a long tradition in classical library service and has access to a computer of reasonable capability. For reasons stated in item 3 above we favor the University of the Philippines over other organizations we visited in this survey.

VIII. REPORT OF GROUP E

TESTING FACILITIES

1. Introduction

The mission of Group E was to survey and assess the current status of the testing facilities in the Philippines. The membership of Group E consisted of the following:

Mr. Arnold Wexler - Group Leader
Chief, Humidity Section
National Bureau of Standards
U.S.A.

Ing. Orlando Donoso T.,
General Director for Standards and Technology
Ministry of Industry and Commerce,
La Paz, Bolivia

Mr. Napoleon F. Manalo,
Science Research Associate IV
Tests and Standards Division
National Institute of Science and Technology
Philippines

Mr. Rodrigo S. de Costo
Master Sergeant, Philippine Air Force
Philippines

Mrs. Elsie L. Griarte
Chief Chemist
Philippines Bureau of Standards
Philippines.

Unfortunately, Ing. Orlando Donoso T. could not join us in the Philippines. Visits were made to typical government, educational, industrial, and commercial establishments which possess physical and/or chemical laboratories for testing materials, products or commodities, engage in quality control operations, have instrument maintenance and repair shops, perform inspections or provide measurement services. These visits were augmented by discussions with public officials, industrial and commercial plant managers, scientists, technicians and university personnel. This report presents some of our major observations and conclusions and offers recommendations on improvements in facilities and services which we believe may assist and accelerate technological development within the country.

2. Key Testing Facilities in the Philippines

There are a number of government agencies which have facilities for supplying testing and measurement services. In general, these facilities are mission oriented, that is, they are dedicated to fulfilling specific objectives of the parent organization. Most, however, also provide services to other agencies within the government as well as to the private sector. Not all of the facilities were visited by Group E.

The Tests and Standards Laboratory (TSL) of the National Institute of Science and Technology (NIST) conducts tests of products and materials and performs limited calibrations of weights and measures. In accordance with the decision of the Metric System Board, NIST was assigned the responsibility for maintaining and disseminating the physical standards for five of the seven base units of the S.I. system of units: length, mass, electric current, temperature and luminous intensity. TSL has just transferred (in 1976) to a new building of their own located at the Science Center in Rizal.

The Metals Industry Research and Development Center (MIRDC) has laboratories which perform chemical analyses, surface treatment and corrosion testing, metallographic tests and analyses, mechanical tests of physical properties, and non-destructive tests of metallic materials. MIRDC also has inspection and dimensional metrology laboratories as well as an instrumentation shop for the repair and calibration of optical pyrometers, temperature indicators and recorders.

The Philippine Textile Research Institute (PTRI) is an agency under the National Science and Development Board (NSDB) with laboratories for testing textiles and textile products. It has considerable facilities and equipment for conducting both chemical and physical tests.

The Philippine Air Force maintains a Precision Measurement Equipment Laboratory (PMEL) for servicing, repairing and calibrating aeronautical instruments and equipment, especially of an electronic nature. This laboratory maintains close liaison with Clarke Air Force Base (U.S.A.), the latter providing back-up service and standards traceable to the U.S.A.. The Civil Aeronautics Administration (CAA) maintains a well equipped laboratory for the testing and calibration of aircraft instruments and equipment. CAA works in close collaboration with the Philippine Airlines which maintains a similar laboratory.

The Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) has the responsibility for meteorological

observations and weather forecasting as well as the responsibility for maintaining and disseminating time and frequency standards.

The Forest Products Research and Industries Development Commission (FORPRIDECOM) maintains a laboratory at College, Laguna with facilities for testing wood and wood products.

The Food and Drug Administration (FDA) is an agency of the Government charged with the responsibility for setting standards on foods and drugs. It is equipped with chemical and microbiological laboratories for conducting research and tests on food, drugs and cosmetics.

The Bureau of Public Highways (BPH) has cognizance over highways and bridges for which it sets standards and specifications. It is equipped with facilities for making tests on engineering materials and structures.

The National Grains Authority (NGA) is an agency, established in 1972 by Presidential Decree No. 4, with the mission of providing an adequate and continuous supply of cereal grains to the nation. To assist it in safeguarding the quality of cereal stocks and in checking grains for conformance to standards, NGA maintains a laboratory for analysis, inspection and testing of grains.

Food Terminals Inc. (FTI) is a project of the Development Bank of the Philippines with the broad objectives of increasing farm incomes, improving the quality of farm products and stabilizing food supply and prices. Among its extensive facilities is a large central refrigeration warehouse. FTI has a Food Research and Processing Department with chemical and microbiological laboratories for performing research and testing of food and food products.

The Weights and Measures Division of the Bureau of Internal Revenue (BIR) has cognizance over the standards employed by municipal governments for checking the weights and measures used in trade and commerce. Such testing facilities as exist are operated by the local jurisdictions.

Within the private sector, testing facilities generally are found in such large industrial and commercial companies as automobile assembly plants, plants for the manufacture and assembly of small appliances, steel mills, textile mills, electric power plants, and telephone and radio communications systems. Food processing plants, mining companies, oil refineries, pharmaceutical firms, sugar mills, fertilizer manufacturing plants, and cement mills also are among the technologically oriented companies that perform such operations as inspection, quality control, chemical analysis, and product testing. Often these companies are affiliated with parent organizations in

highly developed countries. A common pattern appears to be one in which the parent organization has transferred its technology to the affiliate in the Philippines, including the establishment of quality control and testing laboratories and the training of personnel. Often the parent organization monitors the quality of the product by testing samples shipped to its home laboratory. For example, the Philippine Packing Co. daily ships samples by air freight to California for additional quality control tests over and above those performed in its own plant. Small establishments, especially the cottage industries, are essentially devoid of resources for physical testing and quality control. Some medium-sized companies avail themselves of the limited services supplied by government agencies such as TSL of NIST. A few universities attempt to fill the void by making their scientific and engineering laboratories available to the industrial community. Thus, members of the staff at the University of the Philippines have established an independent organization called Technics, Evaluation, Simulation and Testing (TEST) to supply testing services and consultation, using the facilities of UP when the latter are not employed for teaching purposes. Similarly, members of the chemistry faculty of the Ateneo de Manila University have set up an organization which offers analytical/chemical services for a fee. The faculty also runs workshops on the use of modern physical (instrumental) methods of measurements.

3. Philippines Bureau of Standards

The Philippines Bureau of Standards (PBS) was established in 1964 by Republic Act 4109 and assigned the responsibility for issuing mandatory commodity and product standards for both export trade and domestic use. This law provides that "Physical biological and/or chemical tests or analyses necessary for the examination of products under the provisions of this Act may be undertaken in any branch of the Government having facilities for the purpose until such time as the Bureau may have its own facilities." To date PBS is in the process of establishing testing facilities of its own, simultaneously utilizing the laboratories of other Government agencies and, to some extent, those in the private sector. The following is a list of the organizations whose testing facilities are being utilized by PBS and the corresponding types of tests they perform:

NIST	-	chemical analyses of resins, soap detergents, fertilizers, cement, plywood
MIRDC	-	mechanical tests on reinforcing bars
BPH	-	tests on cement, concrete products, hollow blocks
PRTI	-	tests on textile materials

- FORPRIDECOM - tests on paper, paper board, plywood
- PETROLEUM COMPANIES - tests on petroleum products

PBS has taken steps to set up its own laboratory. It is obvious that an organization with a legal mandate to establish obligatory material commodity and product standards must have access to high quality testing facilities not only for ascertaining compliance with the standards but also for doing the necessary research and tests on which the test methods and specification requirements in the standards are based. However, the question arises as to whether the great diversity of equipment, instruments, scientific skills and trained technical staff for doing this type of work could or should be encompassed in one laboratory. It can also be asked whether there are adequate financial resources for establishing such a laboratory. These are questions which only the Philippine Government can resolve. Whatever the decision, for PBS to function effectively, its capability for obtaining analyses, tests and measurements on a broad spectrum of materials, products, and commodities must be significantly strengthened. PBS would profit from a study by a USAID or UN consultant on its specific needs for testing facilities, equipment and scientific staff. Such an expert could help PBS plan a laboratory, if that is the course the Government wishes to pursue, or to help PBS work out a more effective arrangement with other government agencies for prompt testing, measurement and research services. It should be noted that PBS has 19 field stations scattered throughout the country. The proposed study should include the testing needs of these field stations. It should examine whether testing facilities located in Manila can adequately serve the needs of the field stations or whether local or regional facilities for testing are required.

4. Tests and Standards Laboratory

Every industrial nation has a measurement system that enables it to engage in scientific investigations, to perform engineering work, to manufacture a broad range of products and to participate in commerce and trade. A developing country likewise must have a measurement system, although the sophistication and precision requirements are necessarily on a more modest scale. At the apex of this measurement system generally there is an organization that has the responsibility for establishing, maintaining and disseminating the national standards of measurement throughout the country and for insuring that these national standards are consistent with the international standards maintained by the Bureau International des Poids et Mesures (BIPM). In the Philippines, the legal responsibilities for the national standards (except for time and frequency) have been assigned to NIST

and, by the latter to one of its divisions, the Tests and Standard Laboratory (TSL).

Unfortunately, TSL currently has no national standards and therefore provides little in the way of calibration services. Such instrumentation as exists in the Philippines - whether for scientific measurements, process control or engineering metrology - is imported. Precision instruments initially are supplied with calibrations by the manufacturers so that these instruments often show traceability to the national standards of an industrially developed foreign country and, through the latter, to BIPM. Once delivered, such instruments are seldom, if ever, recalibrated. In fact, if an instrument malfunctions or requires a replacement part, it is seldom repaired. The cost of shipping an instrument back to the manufacturer is prohibitively high. Limited repair service is available from the Scientific Instrumentation Division of NIST in such areas as glassblowing, optics, electrical instruments and fine mechanics and from MIRDC for optical pyrometers, temperature indicators and recorders. Large manufacturing concerns that are affiliated with parent companies in industrialized countries often obtain calibration and repair services through the parent organization. Some of these concerns have built up an in-house capability for the maintenance, repair and calibration of process instruments. Here again, the calibration depends on traceability to national standards of foreign countries. Concerns occasionally send some of their staff abroad for training in instrumentation and calibration. It is this tenuous connection of the measurement system in the Philippines with those of the developed countries that has sustained the industrial technology of the country thus far.

Starting in 1962, a succession of UN missions (see references) has assisted the Philippine Government in developing plans for improving its national measurement system, particularly for establishing national standards and calibration services. It is encouraging to see that a new laboratory has been constructed for TSL for the custody of such national standards as the country will eventually acquire and for providing calibration and testing services. Group E visited the site but did not tour the new facility. It is important that the plans for equipping this laboratory, for utilizing foreign consultants and experts, for sending staff to national laboratories in developed countries for training and for upgrading the professional staff to a high technical level be implemented expeditiously. The absence of air conditioning for this laboratory is a serious deficiency which should be rectified. It cannot be stressed too strongly that one of several prerequisites for the industrial development and growth of a country is an effective national measurement system and that the linch pin in such a system is a competent physical standards laboratory.

5. Additional Observations and Recommendations

The following additional observations were made in the course of this survey:

1. Although there are a number of government agencies to assist the private sector, this is not well known especially in the remote provinces. As mentioned earlier, the Scientific Instrumentation Division of NIST and the Instrumentation Shop of MIRDC can provide instrument repair service. Small-scale and cottage industries can obtain assistance from the National Cottage Industries Development Authority (NACIDA), the Design Center of the Philippines, Cottage Industries Development Enterprise (CIDE) and the University of the Philippines Small Scale Industries Institute. Some means should be devised for publicizing the availability of these services.
2. Modern electronic equipment is not very prevalent either in industrial companies or in government laboratories. Selected procurement and use of such equipment would be beneficial in upgrading the country's scientific and technological base.
3. There is a dearth of institutions capable of training technicians and instrument repair men. In the Government this type of training is available in selected areas from NIST, MIRDC and PAF. Better publicity in these training programs would be beneficial to the country.
4. Residual chemicals on bananas is looming as a serious problem for banana growers. Importers, e.g., Japan, are becoming sensitive to the presence of any residuals. It is quite clear that assistance could be given to the growers in solving this problem. There are known measurement techniques for detecting one or more of the insecticides, fumigants, and similar contaminants which are applied during the growing or harvesting of the fruit. The detection could be made during the packing operation.
5. A number of companies, institutions and agencies have indicated that the acquisition of instruments and spare parts is a serious problem. For some organizations the long delay is critical; for others, it is the availability of foreign currency.
6. The Philippine Chamber of Industries stated that the Government does not have adequate facilities to do all required testing. Industry has offered its testing facilities for inspection and certification but this offer has been declined.
7. Scientific organizations (e.g., Manila Observatory) need precision standards for their work. In the absence of any government calibration services, these organizations try to maintain their own physical standards. Unfortunately, without national standards, compatibility between institutions cannot be assured.

ANNEX

Visits by Group E.

1. Hon. Troadio T. Quiazon, Jr., Secretary of Trade. Courtesy call.
2. Pedro Afable, Vice Chairman, National Science and Development Board. Courtesy call and discussion.
3. Philippine Textile and Research Institute. Tour of the laboratories, pilot plant spinning mill and weaving section.
4. Metals Industry Research and Development Center. Tour of tool and die workshop, inspection laboratory, metrology laboratory, mechanical testing laboratory, instrumentation laboratory, metallographic laboratory and chemical laboratory.
5. Test and Standards Laboratory of NIST. Visit to site of new building.
6. Philippine Chamber of Industries. Round-table discussion.
Philippine Chamber of Commerce. Round-table discussion.
7. Mariwasa Mfg. Corp. Tour of plant to see manufacturing of tile and ceramics. Visit to laboratory.
8. Ateneo de Manila University. Tours of the Manila Observatory with Fr. James Hennessey, Director Research in seismology and sun-earth relationships. Discussion with members of the chemistry faculty. Dr. Modesto Chua, Dr. Amando Kapauan, Dr. Ana Maria Javellana, Dr. Antonio Samson and Dr. Wm. J. Schmitt, Chairman.
9. National Grains Authority. Discussion with officials. Visit to laboratory. Pablo V. Pablo, Jr., Director Grains Business Regulations, Frank L. Tua, Director, Tech. Research & Services Dept., Atty. Antonio Bello, Manager, Inspection & Investigation Office, Maximo T. Ramos, Asst. Director, Technical Research & Services Dept., Roberto E. Fronda, Deputy Administrator, Teofilo Vergara, Chief, Standard & Quality Control Division, Jaeson Romeo, Director, Marketing Operations, Jesus E. Tanchanco, Administrator, NGA.
10. Food Terminal Market, Inc. Tour of warehouse, laboratories and instrument control room. Col. Jeremias Carolino, Exec. Officer and Col. Orlando Bautista, Mgr. Trading Dept., Araceli L. Dolendo, Mgr. Food Research & Processing Dept. and Alicia O. Lustre, Asst. Mgr.

11. Forest Products Research and Industries Development Commission. Tour of laboratory facilities. Discussions with Joaquin O. Scopingco, Felipe R. Lopez, Pancracio V. Bawager, Rodrigo R. Valbuena, Dr. Francisco N. Tamolang, Commissioner, Mario A. Eusebio, Leonides A. Barcenas, Recardo T. Casin.
12. Durano Sugar Mill. Tour of mill and laboratory.
13. Chamber of Export Industries, Cebu. Discussion.
14. Philippine Packing Corp., Cagayan de Oro. Tour of plant, laboratory, and instrumentation laboratory. Wesley J. Anderson, Plant Manager; James S. Reyes, Plant Operations Superintendent; Guido R. Ongpin Asst. Personnel Supr't. and Mr. Hernandez, Personnel Supr't.
15. University of the Philippines, Los Banos. Discussion. Vice-chancellor D. M. Lantican, Engineer Herminio Benaza, Dr. Armando Villaflor, A. S. Paris, Jr., V. V. Garcia and A. E. Urtula.
16. Atlas Consolidated Mining and Development Corp. Tour of open pit copper mining operation and laboratories.
17. Atlas Fertilizer Corp., Toledo City. Tour of plant and laboratory.
18. Ateneo de Davao University. Discussion with Dr. Josephine G. Flores, Head, Science Department. Tour of laboratories and library.
19. Davao Fruit Corp. Tour of banana plantation and packing operations. Mr. Emilio Arenata, Plantation Manager, George Whittmen, Sr. Supervisor Plantation 2A and Gabriel Macabua, Supervisor of Shipping.
20. Association of Banana Growers. Discussion.
21. Philippine Air Force, Nichols Air Base. Tour of Precision Measuring Equipment Laboratory. Col. Aquino Jr. and Col. Emilio Barroga., 410th AMW.

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THE PHILIPPINE ECONOMY: 1973 - 1974

1973-1974 WERE YEARS OF SIGNIFICANT ADVANCES
AND CHALLENGES FOR THE R. P. ECONOMY, GAINS
WHICH MUST BE PRESERVED AND CONVERTED INTO
A SOLID BASE FOR NEW EXPANSION.

1973-1974 were years of significant advances for the Philippine economy. Our gains during the two years were both numerous and extensive in character, ranging from a recovering agricultural sector to vigorous industrial expansion and improved development activities.

These advances were in immediate contrast with the sluggish growth registered in 1972. They were a bright result of the enormous socio-economic reforms ensuing since the institution of the new order and dramatically transforming the economy into a foundation of continued dynamism. They were, additionally, a product of attractive price trends and responsive display of Filipino energy and productivity during the two years.

Economic Gains

In overview, the national economy expanded impressively in 1973 and 1974 amidst the difficulties imposed by worldwide shortages in basic consumer items and in critical raw material inputs. The Gross National Products (GNP), which is the aggregate value of final goods and services produced during the year expanded remarkably from ₱55.8 billion (about US \$ 8 B) in 1972 to ₱94.8 billion (US \$ 13.5 B) in 1974. In real terms, the GNP grew by 16.5 per cent - a growth which can be considered a breakthrough in Philippine economic history. Per capita GNP increased from ₱1,433 (US \$ 205) in 1972 to ₱2,296 (US \$ 328) in 1974.

The performance during the two years surpassed general targets and essentially benefited from a combination of well-timed economic reforms and price incentives in the world market. Substantial gains were made in all productive sectors and demand conditions were much improved compared to those prevailing in 1972.

Thus, agriculture recovered vigorously during the two years with the gains coming mainly from accelerated crop production and broad advances in forestry. In addition, poultry, fishery and other agricultural activities grew considerably to bring the aggregate growth of the sector to as much as 11 per cent.

These gains in production can be related to the different production drives of the Government during the year, notably the Masagana 99 Rice Program, the Palayan ng Bayan, and the expanded Green Revolution campaign. At the same time, it will be noted that agrarian improvements like land reform, cooperative strategies, and better credit and marketing facilities, actively enhanced agricultural capacity during the two years.

Industrial Expansion

The industrial sector, including manufacturing, mining and construction, also turned in a very strong performance in the past 2 years. This resulted not only by virtue of the sector's linages with an accelerating agriculture but also from the various price and policy inducements obtaining in 1973 and 1974.

Manufacturing growth, in particular, was most pronounced in the areas of non-metallic products, metal products and food manufacturers. Important increases were similarly made in textiles, footwear, paper, rubber, electrical and non-electrical machinery and transport equipment industries which moved very slowly prior to the new order.

In mining, production picked up by 8.7 per cent as the export-oriented sector posted resurging advances in major mineral exports. Such advancing exports included gold, iron ore, chromium ore, and non-metal products, whose market prices literally soared during the year.

Likewise, construction efforts improved as infrastructure provision in the form of transportation, water resources, power and rural electrification, and schools, hospitals and national building, received accent and stepped-up implementation. Private participation in this area was also extensive and characterized industrial acceleration during the year.

Other Contributing Sectors

The other major productive sectors of transportation-communication-storage-and-utilities, commerce, and services grew by supportive rates of 7 per cent during the years 1973 and 1974. Specifically, the transportation group invited close attention because of the direct economic effects of the oil problem while commerce expanded as a result of the operational changes in banks and insurance companies during the year.

The consolidation of all these gains resulted in a national production picture of gainful strides and sectoral rejuvenation in 1973 and 1974. Such picture was importantly reinforced by redirected spending and buoyant demand factors during the year.

Government and Household Expenditures

Thus, public spending was clearly development-oriented in 1973 and 1974 compared to the consumption-oriented expenditures of the past. Government finances were considered strengthened by the rise in national revenues and the host of fiscal reforms of the new order.

These patterns were complemented by increases in household or personal spending, which was in turn influenced by generally rising income levels in 1973 and 1974. They reflected improved economic conditions and formed a wider source of continued expansion in the years ahead.

Investments

In relation to business demand, investments picked up very rapidly during the two years. This resulted from a more invigorating climate for both domestic and foreign investors, provided not only by the liberalized investment laws but also by the capital-inducing campaigns in several development ventures in both years. Total paid-in capital investments of newly organized enterprises rose by 70 per cent, slightly higher than the 64 per cent increase from 1972 to 1973. Foreign paid-in capital of newly registered firms grew by about 300 per cent from ₱37.0 million in 1973 to ₱147.5 million in 1974 after a 40 per cent increase from 1972 to 1973. Fifty per cent of the total foreign investments went to manufacturing, while 25 per cent went to banks and other financial institutions.

The rise in capital formation was highest in durable equipment expenditures and in increases in stocks. In addition, government and private construction grew substantially to pull up aggregate investment flows and fuel the spurt in industrial activity during the year.

It may also be noted that generous incentives attracted strong participation in certain targets of expansion during the two years, e.g., progressive car manufacturing, oil and mineral exploration, export activities, banking and finance, and tourism. At the same time, reforms in tax and tariff and in the monetary structure were of supportive character in the two years passed.

Exports and Imports

On the external front, exports of goods rose by 59 per cent in real terms in 1973 - 1974 from US \$1709 million to US \$2725 million constituting 23 per cent of the gross domestic products in 1974. This acceleration was set by intensified promotional efforts, highly rewarding prices, and subsequent production gains in many areas during the year.

Tremendous gains were realized in principal exports like logs, lumber, and plywood, sugar, copper and the various coconut products. Among new or non-traditional items, a number continued to grow rapidly, including textiles and clothing, cement, wood manufactures, paper products, fish exports and other manufactures. These areas represented significant sources of growth in 1973 - 1974.

Relatedly, tourism receipts increased enormously and underscored external confidence on the economy under the new order. This was essentially induced by highly-changed peace and order and economic conditions during the two years.

With respect to imports, heavier payments in 1973 - 1974 flowed in the direction of essential consumer items like rice and important producer goods like raw materials and machinery. This import momentum was mainly brought about by the expanded productive activity during the year. Industry, especially the accelerating sectors, had to be freed from the input constraints of the past and continuous support via the increased utilization of both domestically-produced and imported raw materials, had to be undertaken.

On the whole, the surpluses in trade were reinforced by favorable balances in other transactions so that a very buoyant external position emerged in 1973-1974. The international reserve rose from US \$ 876 million at the end of 1973 to US \$ 1,165 million at the end of 1974, or 33 per cent increase. Comparing with the 1972 figure of US \$ 282 million, in a two-year period, international reserves grew more than four fold.

APPENDIX II

LIST OF

AGENCIES ESTABLISHING STANDARDS AND/OR ENFORCING STANDARDS

1. Bureau of Supply Coordination - undertakes standardization of commodities for government use.
2. Food and Drug Administration - undertakes standardization of foods, drugs and cosmetics.
3. Philippine Fisheries Commission - undertake formulation (standardization) of standards for fish, fishery products and codes of practice for fishery establishment.
4. Bureau of Labor Standards - undertakes formulation of safety control orders or regulations for work places including its operating procedures and operation of equipment and machineries.
5. Bureau of Construction and Maintenance, Dept. of Public Highways - undertakes standardization of construction materials and specification for construction of highways, bridges and airports.
6. National Grains Authority - undertakes standardization of grains, flour and bakery products.
7. Bureau of Animal Industry - undertakes standardization and inspection of poultry, hogs and livestock feeds; conducts inspection.
8. Bureau of Fiber Development and Inspection Services - formulates and enforces a uniform standard classification of abaca and other Philippine fibers intended for export or for domestic consumption.
9. Philippine Tobacco Administration - sets classification and grading standards of native tobacco leaves for its trading purposes.
10. Philippine Coconut Authority - sets qualification standards of and inspects copra, coconut oil, dessicated coconut, coconut shell charcoal, coconut coir and other coconut products for export and domestic consumption.

11. Board of Transportation - sets standards of and regulates the operation of public utilities and transport except air transport and issues certificates thereof, Communications, sets standards of and regulates the operation of telephone, telegraph, telex and other wireless means of communications and issues certificates thereof, Powers and Waterworks - sets standards of and regulates the operation of electric plants and water systems; issues certificates of public convenience and necessity for its installation, operation and maintenance.
12. Bureau of Forest Development - sets grading standards for logs and lumber for export and undertakes its inspection.
13. National Irrigation Administration - sets standards or criteria specifications for the investigation, design, construction, operation and maintenance of irrigation systems.
14. Human Settlements Program, Development Academy of the Philippines - sets standards for the design and construction of human settlements.
15. National Pollution Control Commission - sets standard limits of pollutants from industrial discharge.
16. Philippine Atomic Energy Commission - sets standards for radiation protection of human, animal and plant lives.
17. Civil Aeronautics Administration - sets safety standards for aircrafts and equipment abroad.
18. Philippine Standards Association - a private agency sponsored by manufacturers and producers which undertakes standardization of commodities.
19. Metals Industry Research and Development Center - a non-profit research and technological institution which undertakes researches on metals and metal products. It gives recommendations to and assists the Bureau of Standards in the formulation and implementation of national standards for materials and products of the metals and allied industries.
20. Philippine Textile Research Institute - a semi-government agency subsidized by textile industries which undertakes standardization of textiles including its test methods.
21. Bureau of Public Works - a government authority responsible for establishing building by-laws and regulations.

22. National Institute of Science and Technology - operates a Test and Standard Laboratory which is intended to serve the needs of a number of authorities and private interests for testing of goods and chemical analyses of products.

LIST OF GOVERNMENT AND PRIVATE AGENCIES WITH METROLOGICAL LABORATORIES

1. Philippine Air Force. The organization maintains a Precision Measurement Equipment Laboratory (PMEL) for assuring accuracy of measurement of air navigation equipment. The laboratory performs calibration and repair services for the Philippine Air Force as well as other government and private agencies. Atmospheric conditions at the Laboratory are strictly maintained and the personnel are subjected to yearly evaluation of their technical ability to ensure high standards of service.
2. Civil Aeronautics Administration. The government agency maintains a well-equipped laboratory for the testing and calibration of aircraft equipment and instruments. CAA works in close collaboration with the Philippine Airlines. The CAA facilities are available to other government as well as private entities.
3. Philippine Airlines. The Philippine Airlines maintains a laboratory similar to the CAA which may also be utilized by government as well as other private companies.
4. National Institute of Science and Technology. An agency of the National Science Development Board which operates a Test and Standards Laboratory intended to serve the testing needs of other government offices and private interests. At present, testing facilities of the Laboratory for the engineering and construction industries are limited, however, the agency has recently established an Instrument Repair Unit with assistance from the UNESCO. The facilities of the new unit is available for use by the Tests and Standards Laboratory.
5. Metals Industry Research and Development Center. The laboratories of the Center are equipped with new and modern instruments for chemical analysis of metallic materials (semi-finished and finished products), metallographic analysis, micro and macro photography, mechanical and non-destructive testing of metallic materials and products, and standardization of metallurgical laboratory equipment. The laboratories are manned by well-trained metal technocrats to better foster the advancement of the metals, engineering and allied industries in the Country.
6. Philippine Textile Research Institute. An agency under the National Science Development Board, with a laboratory for the testing of textiles and textile products.

7. Philippine Atomic Research Center. The agency maintains a laboratory for research on the beneficial use of nuclear energy and the detection of radiation for protection of humans, animals and plants.
8. The Philippine Atmospheric, Geophysical and Astronomical Services Administration. (PAGASA). A government agency, charged with weather forecasting as well as the maintenance of time and frequency standards.
9. Municipal Governments (under the supervision of the Weights and Measures Division of the Bureau of Internal Revenue) are responsible for checking the weights and measures used in trade and commerce.

FIFTH CONGRESS OF THE REPUBLIC)
OF THE PHILIPPINES)
Third Session)

S. No. 202

(REPUBLIC ACT NO. 4109)

AN ACT TO CONVERT THE DIVISION OF STANDARDS
UNDER THE BUREAU OF COMMERCE INTO A
BUREAU OF STANDARDS, TO PROVIDE FOR THE
STANDARDIZATION AND/OR INSPECTION OF PRODUCTS
AND IMPORTS OF THE PHILIPPINES AND FOR OTHER
PURPOSES.

Be it enacted by the Senate and House of Representatives
of the Philippines in Congress assembled:

SECTION 1. The Division of Standards under the Bureau of Commerce is hereby converted into a Bureau of Standards under the Department of Commerce and Industry.

SECTION 2. The Bureau shall have as its head a Director of Standards and two Assistant Directors, one for technical matters and the other for administrative matters, who shall be appointed by the President of the Philippines with the consent of the Commission on Appointments. There shall be in the Bureau such officials and employees to be appointed by the Secretary of Commerce and Industry as may be necessary to carry out the purpose of this Act: Provided, that personnel of the Bureau whose duties and functions are technical in nature shall be exempted from the operation of the Wage and Position Classification Office.

SECTION 3. The Bureau shall have charge of the establishment of standards for, and inspection of, all agricultural, forest, mineral, fish, industrial and all other products of the Philippines for which no standards have as yet been fixed by law, executive order, rules and regulations; and the inspection and certification of the quality of commodities imported into the Philippines, to determine the country of origin of the articles which are the growth, raw materials, manufacture, process, or produce, and to determine if they satisfy the buyer's or importer's requirements or specifications for domestic consumption; and to prohibit the discharge and/or release of any article which are the growth, raw materials, manufacture, process, or produce of countries without trade relations with the Philippine government. Physical, biological and/or chemical tests or analyses

necessary for the examination of products under the provisions of this Act may be undertaken in any branch of the Government having facilities for the purpose until such time as the Bureau may have its own facilities.

SECTION 4. Subject to the general supervision and control of the Secretary of Commerce and Industry, the Director of Standards shall possess the general powers conferred by law upon Bureau Chiefs, and the following specific powers and duties which he may perform personally or through his duly authorized representatives:

(a) Under such rules and regulations as the Director of Standards may promulgate which the Secretary of Commerce and Industry must approve within one year, to establish standards for the products within the purview of Section three of this Act; to inspect in order to sample and determine the standards of said products, and to certify the inspection and standard thereof:

(b) Before the government, including government owned or controlled corporation, make any purchase of any of the products within the purview of Section three of this Act, and/or the producer, manufacturer and/or dealer offers for sale any commodity which affects the life, health and property of the people, to inspect and sample in order to determine if, and to certify that the products satisfy the requirements as to kind, class, grade, quality or standard in accordance with the provisions of sub-section (a) above;

(c) Before the exportation or shipment abroad of any of the products within the purview of Section three of this Act, for which no standard has or shall have, as yet, been established in accordance with the provisions of sub-section (a) above, to inspect and sample in order to determine if, and to certify that, the whole shipment satisfies the buyer's or importer's requirements as to kind, class, grade, quality or standard: Provided, however, that shipments which are not standardized but conform to buyer's or importer's requirements shall have their corresponding customs or shipping papers or documents stamped conspicuously with the caption "not under government commodity standardization" and may be released by the Collector of Customs in accordance with the existing Tariff and Customs Laws.

(d) Before any commodity imported into the Philippines is discharged and/or released by the Bureau of Customs, to inspect such commodity in order to sample and determine the country of origin where the articles are the growth, raw materials, manufacture, process or produce, and to certify that, the whole shipment satisfies local buyer's or importer's requirements as to kind, class, grade, quality or standard which may be indicated on the corresponding customs or shipping papers or commercial documents: Provided, however, that imports which are not

shown to be covered by, or do not conform to, buyer's or importer's requirements, shall be labelled or stamped conspicuously with the caption "do not conform to buyer's or importer's specifications"; Provided, further That imports of any article which are the growth, raw materials, manufacture, process or produce of countries wherein the Philippines has not trade agreement shall be confiscated and/or seized at the disposal of the government.

(e) To fix and collect fees for the services of inspection and certification of inspection and standard, and/or testing or analyzing samples and certification of tests or analyses, and other services, the nature of which require scientific and/or technological knowledge skill.

(f) To take testimony or evidence on matters of official business relating to the exercise of his powers, the performance of his duties and the accomplishment of the purpose of this Act or any of the rules and regulations promulgated in accordance therewith.

(g) To initiate and undertake official investigation to determine the nature of organization and business methods of any entrepreneur, person, corporation, association, partnership or firm engaged in the manufacture, marketing and distribution of the products within the purview of Section three of this Act: Provided, however, That this power shall be exercised only in connection with any known or reported violation any provision of this Act, or non-compliance with any rule of regulation promulgated in accordance therewith.

SECTION 5. Any person who fails or refuses to comply with a legal summon, or subpoena, or subpoena duces tecum, of the Director of Standards or his duly authorized agent or representative, or refuses to be sworn to, prior to giving testimony or refuses to answer pertinent questions, or gives false or misleading data or information or willful concealment of a material fact, in any investigation made pursuant to subsection (c), (d), (e), (f), and (g) of Section four of this Act, shall be punished by imprisonment of not less than two nor more than six months, and by a fine of not less than five hundred nor more than one thousand pesos and deportation if he is an alien after serving the entire period of his imprisonment: Provided, however, That, if the false or misleading data or information shall have been given under oath, the maximum penalty for giving false (sic) shall be imposed.

SECTION 6. No customs export entry, import entry, declaration, release certificate, manifest, clearance, import permit, or permit to ship abroad and/or discharge shall be issued for any of the products within the purview of Section three of this Act and/or imported commodity, unless it is first inspected in accordance with provisions

of sub-sections (b), (c), (d), and/or (e) of Section four of this Act: Provided, however, That no product of the Philippines for which a Standard has been established and promulgated by virtue of this Act shall be sold and/or disposed of in any manner and/or exported unless and until its standard shall have been certified by the Director of Standards or his duly authorized representatives as conforming to the standard set for, either for local distribution and/or for export: Provided, further, That no such certification shall be required upon application under oath by the manufacturer and/or exporter to the Director of Standards that the shipment is in small quantity and the product is not for sale but for private use of consumption only. It shall be the duty and the responsibility of all collectors of customs to enforce the prohibition on the exportation and/or importation of any product herein above referred to.

SECTION 7. Any public official, employee, individual, corporation, association, partnership, or firm effecting or abetting the shipment abroad and/or facilities [sic]* the discharge or distribution and/or sale for domestic consumption of any product in violation of any of the provisions of Section six of this Act or any rules or regulations issued therewith, shall be punished by imprisonment of not less than six months nor more than two years and by a fine if not less than one thousand nor more than five thousand pesos, and deportation if he is an alien after serving the entire period of his imprisonment.

Whenever the violation is committed by a corporation, association, partnership, or firm, the President and each one of the directors or managers of said corporation, association, partnership or firm who shall have knowingly permitted or failed to prevent the commission of said violation shall be held liable as principles thereof.

In case the offender is a naturalized citizen he shall, in addition to the penalty prescribed herein, suffer the penalty of cancellation of his naturalization certificates and such registration in the civil registry and immediate deportation.

In case the violation is committed by, or in the interest of a foreign juridical person duly licensed to engage in business in the Philippines, such license to engage in business in the Philippines shall immediately be revoked.

If the offender is a public officer or employee, he shall, in addition to the penalty of imprisonment and fine prescribed herein, be dismissed from office and perpetually disqualified from holding public office.

SECTION 8. The Division of Standards under the Bureau of Commerce is hereby converted and its personnel, appropriations, and share in the

*Presumably "facilitating" would reflect the intended meaning.

appropriations of the Bureau of Commerce, funds, furniture, equipment, properties, supplies, records, assets and liabilities are hereby constituted to the Bureau: and all powers conferred upon, and all duties, functions, and activities assigned to the said division and to the Director of Commerce by virtue of the provisions of Sections one hundred fifty-five, one hundred fifty-six and one hundred fifty-seven of Executive Order Numbered ninety-four, series of nineteen hundred and forty-seven, together with the execution and enforcement of Commerce Administrative Orders on Standardization and inspection of Philippine products already promulgated in accordance with the provisions of the said sections of the executive order, are hereby transferred to the director of standards.

SECTION 9. In addition to such funds and appropriation as may be transferred to the Bureau as provided in Section eight of this Act, there is hereby appropriated, out of any funds in the National Treasury not otherwise appropriated, the amount of one million pesos for the salaries, wages, sundry and other expenses, furniture, and equipment of such personnel of the Bureau as will be needed and required to carry out the purpose of this Act.

SECTION 10. Twenty-five per centum of all receipts and collections accruing from the enforcement of this Act and the rules and regulations on inspection and certificate of inspection and standard shall be set aside and be available for disbursement for salaries, wages, sundry and other expenses, furniture, and equipment of such additional personnel as may be needed and required to intensify or extend the activities and services of the Bureau. Any amount thus set aside or so much thereof as may be needed for the intensification or extension of activities and services, shall be itemized in special budget to be approved by the President upon recommendation of the Secretary of Commerce and Industry; and any such special budget thus approved shall be incorporated in the draft of the regular budget for the ensuing fiscal year for the consideration of the Congress in its regular or special session. Unitemized and unexpended balances of amounts thus set aside shall be cumulative from year to year, and shall constitute, a special fund to be called "Philippine Standardization and Inspection Funds" to be used for the purposes herein stated, and for such other aims and projects as may render the services of the Bureau efficient and effective.

SECTION 11. All Acts, executive orders, administrative orders and proclamations or parts thereof inconsistent with any of the provisions of this Act are hereby repealed or modified accordingly. If any part of this Act shall, for any reason, be adjudged by any court of competent jurisdiction to be invalid, such judgment shall not affect the remainder thereof, but shall be confined in its operation to the

part directly involved on the controversy in which such judgment shall have been rendered.

SECTION 12. EFFECTIVITY - This Act shall take effect upon its approval.

Approved, June 20, 1964

MALACANANG
Manila

PRESIDENTIAL DECREE NO. 187

PREScribing THE USE OF THE METRIC SYSTEM OF WEIGHTS AND MEASURES AS THE STANDARD MEASUREMENT FOR ALL PRODUCTS, COMMODITIES, MATERIALS, UTILITIES AND SERVICES AND IN ALL BUSINESS AND LEGAL TRANSACTIONS.

WHEREAS, the concurrent usage of different standards of weights and measures in the Philippines abets confusion, waste of time in computations and diversity;

WHEREAS, although the Revised Administrative Code specifies the metric system as the national standard, the use of other weights and measures is allowed by law in certain cases, compounded by customary weights and measures;

WHEREAS, the metric system, which employs decimals, is officially adopted by many countries and even the United Kingdom and the United States are planning to gradually adopt it in lieu of the English system;

WHEREAS, several bills to adopt the metric system exclusively were filed in Congress but they failed to be enacted;

NOW, THEREFORE, I, FERDINAND E. MARCOS, President of the Philippines, by virtue of the powers vested in me by the Constitution as Commander-in-Chief of all the Armed Forces of the Philippines, and pursuant to Proclamation No. 1081 dated September 21, 1972, as amended, in order to effect the desired changes and reforms in the social, economic and political structure of our society, do hereby order and decree:

SECTION 1. Official use of metric system.-
The system of weights and measures to be used in the Philippines for all products, commodities, materials,

utilities, services, and commercial transactions in all contracts, deeds and other legal instruments publicly and officially attested; and in all official documents shall be the metric system, in accordance with the provisions of this decree and its implementing rules and regulations.

SECTION 2. Creation of Metric System Board.-

In order to effect the orderly change from the English and other systems of weights and measures to the metric system, a Metric System Board, hereinafter referred to as Board, is hereby created, which shall be composed of the Secretary of Trade and Tourism as Chairman, and the Secretary of Finance, the Secretary of Agriculture and Natural Resources, the Secretary of Public Works, Transportation and Communications, the Secretary of Education, the Secretary of Justice and the Chairman of the National Science Development Board as members. The Department undersecretaries and the board vice-chairman concerned shall serve as alternates.

SECTION 3. Powers and functions. The powers and functions of the Board shall be as follows:

a. Cause the conversion of all weights and measures to their equivalents in the metric system subject to the approval of the President of the Philippines;

b. Draw up a program, after consultation with the private sector subject to the approval of the President of the Philippines, for the nationwide use of the metric system, including the respective starting dates, in the different agricultural, commercial, industrial utilities, scientific, services and other sectors; Provided, That the metric system shall be fully adopted in all sectors throughout the Philippines by January first, nineteen hundred and seventy-five. The Board shall consider the need to provide adequate time for the modification of existing devices or acquiring new devices in conformity with the standard weights and measures in the metric system and the need to disseminate widely the official equivalents in the metric system of other weights and measures, the starting dates of their use in the various sectors and the other implementing rules and regulations;

c. Promulgate rules and regulations for the implementation hereof, and, after approval thereof by the President of the Philippines, widely disseminate the same to all government offices and instrumentalities and the general public, including publication once for three consecutive weeks in at least three newspapers of general circulation in the Philippines;

d. Appoint such personnel as may be necessary, preference to be given to qualified persons who were laid-off from the government service as a result of the government reorganization; and

e. Create advisory and technical committees from the public and private sectors and call upon any government office, agency or instrumentality and upon any government official or employee for assistance in the effective performance of its functions.

SECTION 4. Secretariat.- The Director of the Bureau of Standards shall serve as Executive Secretary of the Board. Initially and until such time as funds become available, the personnel of the Board may be detailed from other government offices and instrumentalities.

SECTION 5. Appropriation.- The sum of Fifty thousand pesos (₱50 000.00) is hereby appropriated out of any funds in the National Treasury not otherwise appropriated, for the expenses of the Board for fiscal year nineteen hundred and seventy-four. The same amount shall be included in the national budget for fiscal year nineteen hundred and seventy-five.

SECTION 6. Penalties.- Any violation of the provisions hereof, or the rules and regulations promulgated pursuant hereto, shall, upon conviction, subject the offender to a fine of not more than one thousand pesos or imprisonment for a term of not more than one year, or both, upon the discretion of the Court. If the violation was committed by a juridical person, the manager, representative, director, agent or employee of said juridical person responsible for the act shall also be liable to the penalties provided

herein. If the offender is an alien, he shall be deported after serving the sentence, without need for further proceedings for deportation.

SECTION 7. Effectivity.- This decree shall take effect upon its approval but persons or entities allowed under existing laws to use the English system or other standards of weights and measures are given until the dates fixed for them to use the metric system pursuant hereto. The Board shall cease to exist by June thirty, nineteen hundred and seventy-five.

SECTION 8. Repealing Clause.- The provisions of the Revised Administrative Code and of all other laws and rules and regulations inconsistent herewith are hereby repealed or amended accordingly.

Done in the City of Manila, this 10th day of May, in the year of Our Lord, nineteen hundred and seventy-three.

(SGD.) FERDINAND E. MARCOS
President
Republic of the Philippines

By the President:

(SGD.) ROBERTO V. REYES
Assistant Executive Secretary

A DECADE OF STANDARDIZATION AND A
YEAR OF METRICATION IN THE PHILIPPINES

Vidalito F. Rañoa
Director
Philippines Bureau of Standards
Manila, Philippines

NBS/AID/OAS Workshop
on Standardization and Measurement
Services in Industrializing Economies

National Bureau of Standards

November 4, 1974

First of all, I would like to congratulate the NBS for conducting this Special Workshop on Standardization and Measurement. I also want to take this opportunity to express my profound thanks to Dr. Richard W. Roberts for his kindness in inviting me to this special occasion.

You may be interested to learn of our experience on standardization in the Philippines. Since we are so new in this field, you will certainly not so much profit by our experience as you can help solve standardization problems encountered in our country.

1. Introduction

Despite a decade of efforts directed along this line, standardization and metrication, strictly speaking, have not yet made their full impact in the Philippines today. Neither their advantages nor the benefits derived from their adoption have been realized. To hasten the achievement of our goals, we are at present in the process of reorganizing the governmental machinery to make it more effective and responsive under the demands of the New Society in my country.

2. Standardization

The Philippines Bureau of Standards was created in 1964 by Republic Act No. 4109 with the main objective of promoting and protecting the quality of commodities for both local and international consumption. Responsibilities and powers are defined and entrusted by that legislative measure.

Essentially, Republic Act 4109 enjoins compulsory standardization and inspection of commodities so as to ensure quality acceptability for all goods offered for sale, particularly those for export. For all

standardized products, it is mandatory for the Bureau "to inspect in order to sample and determine the standards of said product, and to certify on the inspection and standard thereof".

This law, together with its implementing rules and regulations, requires that the Bureau shall:

1. Establish standards for all
 - a) agricultural,
 - b) forest,
 - c) mineral,
 - d) fish,
 - e) industrial, and,
 - f) other products of the Philippines for which no standard has as yet been fixed by law, executive order, rules and regulations.
2. sample, inspect and certify the quality of;
 - a) all standardized commodities and prevent the sale of all commodities which do not comply with the requirements of the Philippines Standards Law.
 - b) all products, standardized and not standardized, offered to Government or Government-owned or -controlled corporations which affect life, health or property of the people.
 - c) all shipments for export prior to release by the Collector of Customs.
 - d) all commodities being imported prior to release by the Bureau of Customs. (The Bureau until a few years ago had confiscated all articles originating in countries with which the Philippines has no trade agreements.)
3. Fix and collect fees for:
 - a) inspection,

- b) certification,
 - c) testing or analysis,
 - d) other services rendered.
4. Make rules and regulations to enable these duties to be performed efficiently.
5. Grant licenses to manufacturers to operate under the Philippine Trade Standard (PTS) Mark Scheme when the Bureau is satisfied that the manufacturer:
- a) can consistently produce goods of the required quality.
 - b) has adequate testing facilities to measure the quality produced.
 - c) maintains records of the routine quality tests performed.
 - d) permits a Bureau inspector to visit the plant at any time to verify that the above-stated conditions are satisfied.
 - e) provides the Bureau inspector with any sample product he requires which can be tested by an independent authority in order to verify that the routine records truly represent the quality sold in the market.
6. Grant commodity clearances to exporters registered with the Board of Investments (BOI).

The present organizational set-up of the Bureau of Standards consists of four (4) main divisions, namely: Technical, Standards Control, Field Services, and Administrative. The Technical Division is manned by technical personnel who are charged with the preparation of standards, while the Standards Control Division, together with seven (7) Field Service Units distributed in various parts of the country, is concerned with the control of quality of export and local products covered by the standards promulgated by the Bureau or the buyer-seller standard in the absence of Philippine standards. The present size of the staff is hardly adequate to cope with the extensive and complex nature of the work involved. For a span of ten years the Bureau has promulgated 186 national standards covering agricultural and industrial products. The Bureau also operates a certification mark

scheme known as the PTS Mark and has since 1968 issued 143 licenses to manufacturers to use the mark as a guarantee that their products comply with relevant national standards.

At the time when the Bureau came into existence, there existed and there now still continues to exist a number of other government agencies and organizations which were and are still concerned with standardization matters within specified fields. These are:

1. The Bureau of Fiber Inspection Service, which deals with the grading and inspection of Philippine commercial fibers for export, especially abaca, coir, ramie and maguey.
2. The Bureau of Forestry, now reorganized as Bureau of Forestry Development, which deals with grading rules for timber logs.
3. The Bureau of Public Highways, which is concerned with standard specifications for highways and bridges.
4. The Bureau of Public Works, now the Department of Public Works, which is the authority on materials and products for building and construction.
5. The Bureau of Supply Coordination, which is concerned with specifications for and inspection of goods processed for government use.
6. The Food and Drug Administration, which is responsible for the standards on food products and drugs.
7. The Philippine Coconut Administration, which is concerned with the grading and inspection of copra and coconut by-products.
8. The Philippine Tobacco Administration, which is concerned with classification and grading of native leaf tobacco.
9. The Sugar Quota Administration, which is responsible for the grading of sugar and for packing of sugar.
10. The Bureau of Labor Standards, which is concerned with codes of practice for wiring and electrical safety.
11. The Bureau of Internal Revenue, which is the Philippine authority on control of weights and measures.
12. The National Institute of Science and Technology (NIST), which is equipped with testing and standards laboratories,

and charged with the task of maintaining national standards and conducting on a high scientific level specific tasks intended to serve the needs of a number of entities and private enterprises in matters of testing of goods and making chemical analyses of products.

13. The National Cottage Industry Development Authority, which deals with the standardization of cottage industry products.
14. The Bureau of Soils, which deals with the standards and testing of fertilizers.
15. The Bureau of Plant Industry, which is the agency for classifying plants in the Philippines.
16. The Bureau of Fisheries, which deals with the classification of fish and marine products.
17. The Bureau of Animal Industry, which deals with the grading of poultry feeds and animal products.
18. The Philippine Standards Association, which is a private agency composed of and managed by manufacturers and producers.

With such many and varied agencies in mind, it would not be difficult to imagine the considerable problem of coordinating, unifying and rationalizing their different standardization operations and responsibilities.

3. Metrication

Historically, the metric system was introduced in the Philippines in the year 1906 and the then Bureau of Science (now National Institute of Science and Technology) was authorized to maintain the "meter" and "gram" as standard units of measurement. A meter bar certified by the International Bureau of Weights and Measures with Serial No. 71 and calibrated at 999.9862 mm had been procured. The meter bar has not been calibrated since then.

In actual practice, the use of the English system and other local measures is still prevalent in the country. With the emergence of the New Society, Presidential Decree No. 187 was issued on May 10, 1973, recognizing only the metric system of weights and measures and enjoining complete adoption of the system in the Philippines effective January 1, 1975.

To realize this objective, the decree created the Metric System Board under the chairmanship of the Secretary of Trade, with the following duties:

1. Cause conversion of existing measures,
2. Draw up a program for nationwide use of the metric system,
3. Promulgate rules and regulations,
4. Acquire new devices conforming to standard weights and measures in the metric system,
5. Disseminate information on the new system, and
6. Provide official equivalents for the old measures.

The Metric System Board has already agreed on the terms relating to fundamental units, conversion factors (including those for old measures), specifications on commercial length, weight, and capacity measures. With respect to the definitions of fundamental units, the Board has decided that national prototypes be maintained by the National Institute of Science and Technology, but the maintenance of National Time remains the responsibility of the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), formerly called the Weather Bureau.

Physical standards at various levels (prototype, reference, secondary and working) have to be procured and maintained in the country and these have to be traced back to the international standards. The work involves metrology of many types. The maintenance of physical standards of various accuracies and the related metrology is very important in view of the expanding industrialization of the Philippines, not to mention its remarkable economic growth and social stability. At the request of the Metric System Board, a UNIDO Metrication Expert on loan to our Bureau with the assistance of officers of the Tests and Standards laboratories, NIST, the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), the Precision Measurement Association of the Philippines and representatives of trade activities, prepared an estimate of the cost involved in the procurement of various devices and the associated metrology. The estimated cost of various units and measuring instruments was about U.S.\$1.5 million but, considering the global inflationary trends, the amount may actually exceed U.S.\$2 million.

The Philippines Bureau of Standards has no laboratory of its own, a handicap since its inception. It avails itself of the testing

facilities of the National Institute of Science and Technology and other government agencies, including private laboratories, but these facilities have been found to be inadequate to serve for all products subject to standardization. The Bureau has now taken definite steps to set up its own laboratory.

As the science of measurement has become sophisticated, advanced and intricate, it is felt extremely important that we in the Philippines undertake studies in such highly developed countries as the United Kingdom, U.S.A., Switzerland, France, West Germany and Japan. The studies would effectively help us in the maintenance of highest accuracies and in the work with commercial weights and measures, as well as in bringing about complete metrication.

4. Conclusion

That, in brief, is a modest presentation of the condition of standardization in the Philippines, together with its attendant problems. It is hoped that all the participating countries in this Workshop can assist each other in improving their standardization activities, particularly in solving our common problems, under the enlightened leadership and guidance of the host country, the United States of America.

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