NATIONAL BUREAU OF STANDARDS REPORT

10 583

Report on Phase I of
Project Implementation Order Entitled

UTILIZATION OF THE INDUSTRIAL TECHNOLOGY CAPABILITY OF THE NATIONAL BUREAU OF STANDARDS

to
Agency for International Development
Bureau for Technical Assistance
Office of Science and Technology
Washington, D. C.

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

NATIONAL BUREAU OF STANDARDS

The National Bureau of Standards [1] was established by an act of Congress March 3, 1901. Today, in addition to serving as the Nation's central measurement laboratory, the Bureau is a principal focal point in the Federal Government for assuring maximum application of the physical and engineering sciences to the advancement of technology in industry and commerce. To this end the Bureau conducts research and provides central national services in four broad program areas. These are: (1) basic measurements and standards, (2) materials measurements and standards, (3) technological measurements and standards, and (4) transfer of technology.

The Bureau comprises the Institute for Basic Standards, the Institute for Materials Research, the Institute for Applied Technology, the Center for Radiation Research, the Center for Computer Sciences and Technology, and the Office for Information Programs.

THE INSTITUTE FOR BASIC STANDARDS provides the central basis within the United States of a complete and consistent system of physical measurement; coordinates that system with measurement systems of other nations; and furnishes essential services leading to accurate and uniform physical measurements throughout the Nation's scientific community, industry, and commerce. The Institute consists of an Office of Measurement Services and the following technical divisions:

Applied Mathematics—Electricity—Metrology—Mechanics—Heat—Atomic and Molecular Physics—Radio Physics [2]—Radio Engineering [2]—Time and Frequency [2]—Astrophysics [2]—Cryogenics.[2]

THE INSTITUTE FOR MATERIALS RESEARCH conducts materials research leading to improved methods of measurement standards, and data on the properties of well-characterized materials needed by industry, commerce, educational institutions, and Government; develops, produces, and distributes standard reference materials; relates the physical and chemical properties of materials to their behavior and their interaction with their environments; and provides advisory and research services to other Government agencies. The Institute consists of an Office of Standard Reference Materials and the following divisions:

Analytical Chemistry—Polymers—Metallurgy—Inorganic Materials—Physical Chemistry.

THE INSTITUTE FOR APPLIED TECHNOLOGY provides technical services to promote the use of available technology and to facilitate technological innovation in industry and Government; cooperates with public and private organizations in the development of technological standards, and test methodologies; and provides advisory and research services for Federal, state, and local government agencies. The Institute consists of the following technical divisions and offices:

Engineering Standards—Weights and Measures — Invention and Innovation — Vehicle Systems Research—Product Evaluation—Building Research—Instrument Shops—Measurement Engineering—Electronic Technology—Technical Analysis.

THE CENTER FOR RADIATION RESEARCH engages in research, measurement, and application of radiation to the solution of Bureau mission problems and the problems of other agencies and institutions. The Center consists of the following divisions:

Reactor Radiation—Linac Radiation—Nuclear Radiation—Applied Radiation.

THE CENTER FOR COMPUTER SCIENCES AND TECHNOLOGY conducts research and provides technical services designed to aid Government agencies in the selection, acquisition, and effective use of automatic data processing equipment; and serves as the principal focus for the development of Federal standards for automatic data processing equipment, techniques, and computer languages. The Center consists of the following offices and divisions:

Information Processing Standards—Computer Information — Computer Services — Systems Development—Information Processing Technology.

THE OFFICE FOR INFORMATION PROGRAMS promotes optimum dissemination and accessibility of scientific information generated within NBS and other agencies of the Federal government; promotes the development of the National Standard Reference Data System and a system of information analysis centers dealing with the broader aspects of the National Measurement System, and provides appropriate services to ensure that the NBS staff has optimum accessibility to the scientific information of the world. The Office consists of the following organizational units:

Office of Standard Reference Data—Clearinghouse for Federal Scientific and Technical Information [3]—Office of Technical Information and Publications—Library—Office of Public Information—Office of International Relations.

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[1] Headquarters and Laboratories at Gaithersburg, Maryland, unless otherwise noted; mailing address Washington, D.C. 20234.
[2] Located at Boulder, Colorado 80302.
[3] Located at 5285 Port Royal Road, Springfield, Virginia 22151.

NATIONAL BUREAU OF STANDARDS REPORT

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by
E. L. Brady and H. Steffen Peiser
National Bureau of Standards

to
Agency for International Development
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NBS No. 10583

NBS Report to AID on Phase I of
Project Implementation Order Entitled

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by

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Standards, calibration, and measurement and testing services have been important features of all developed countries and have accompanied the industrialization process of a number of recently developed countries. Such activities are critically needed by developing countries for, inter alia, control of manufacturing processes, quality control of products, encouragement of exports, and the transfer of technology from abroad. The general case and the relevant history is well presented in "Standardization" United Nations, Monograph 12 of UNIDO.

An NBS seminar organized with the collaboration of NAS, NAE, and partially supported by AID, under the general theme "The Role of a National Capability in Metrology and Standardization in Industrializing Economies" was held at Airlie House, Warrenton, Virginia on February 1-4, 1971. The seminar aimed at determining high priority needs for metrology and standardization in developing countries, informing officials from such countries about the capabilities and services available at NBS, eliciting their views about the problems that face them, and obtaining guidance about the nature of an NBS program designed to help solve those problems.

The seminar, which was attended by 13 representatives from developing countries, 9 representatives of international and regional organizations involved in technical assistance, and industry and government representatives from the United States for a total of 55 persons, was successful in highlighting the problem areas and in defining the types of technical assistance needed. As the table of contents of the Proceedings of the seminar (see appendix 1) shows, most of the representatives from developing countries and international organizations presented prepared papers in which they discussed quite elaborately and candidly various problems associated with their industrialization and standardization efforts. They also participated vigorously in the discussions that followed each of the eight sessions of the seminar. The representatives were unanimous in their agreement that there is a high priority need for a properly structured assistance program on metrology, standards, quality control, product certification and training in LDC's. They further confirmed

this opinion in their responses to a special questionnaire, details of which are summarized in appendix 2 of this report. To facilitate consideration of future involvement in international development, NBS had prepared a review of its past activities in this field. This review was called for under this AID contract and is therefore itself to be regarded as a part of the present report (see appendix 4).

Evaluation of the results of Phase I - that is, the Industrialization Seminar and the response to the NBS/AID questionnaire (see appendix 2), indicates that there is need for multi-purpose assistance to LDC's in the areas of metrology and industrialization. Our conclusion, therefore, is that we should proceed with planning for implementation of the remainder of the program, i.e. Phase II and Phase III.

PLANS FOR PHASE II (2-YEAR PROGRAM)

Phase II will cover the NBS program of assistance to LDC's during the first two years of operation and will consist of the following activities: selection of target countries; surveys of national standardization systems in up to four LDC's participating in the program; preparing and providing on a trial basis a variety of audio-visual aids on standardization; procurement and distribution of standards literature; development of individualized training programs; and support of close collaborative working relationship between ANSI and COPANT.

Selection of Target Countries

Phase II will be a modest effort designed to test on a worldwide basis the potential effectiveness of NBS collaboration in the industrialization programs of LDC's. For best results, test programs initiated during this phase should be confined to a few carefully selected areas of the world in which an assessment of effectiveness can be made on the basis of essentially experimental tasks. Therefore, three to four target countries will be selected in which internal conditions seem especially conducive to an effective program.

The selection of each of the target countries will be made according to a few basic criteria which are necessary in order to ensure success of the program:

(a) the target country must be one of the LDC's currently on the AID list.

(b) the target country must be willing to invest some of its own resources, financial and other, in the effort.

(c) there must be reasonable expectation of internal stability in the target country.

Surveys of National Standardization Systems

Although LDC's may differ significantly from each other in their individual aspirations with respect to industrial development, many of the problems they face in establishing an effective infrastructure of measurement technology and standardization for production and quality control are similar. As a result, standardization experts in most of these countries are keen to share their experiences and learn from each other. Accordingly, under sponsorship of AID, NBS proposes to use the following trial mechanism to conduct three or four surveys in a number of LDC's:

1. Three to four LDC's participating in the program will be invited to offer their own standardization system to be freely studied in situ for two weeks by a team consisting of an NBS designated team leader, one member from each of the other participating countries, (optionally) one representative of UNIDO, one from ANSI or NAE, and one additional NBS staff member.

2. Each participating country will make available one English-speaking expert to attend a two-week standardization workshop, probably held in the United States prior to the conduct of the surveys. The expert will next visit as a member of the team and at suitable intervals, up to three other LDC's in which he will make his experience and views constructively and openly available both in discussion and in the preparation of a report to AID and the host country. Publication of the report in whole or in part will be at the discretion of the host country.

3. Four distinct aspects should be stressed in the workshops and later identified in the survey.

   a. Maintenance of national standards of measurement compatible with SI.

   b. Field surveillance of weights and measures in the market place.

   c. Procedures for the development of standards, including standards of safety, consumer protection, building codes, etc.

   d. Inspection and quality control of production (sampling, tolerances, control charts).

4. Cost of international travel of NBS and LDC participants in team visits will be borne by the AID PASA with NBS, hereafter designated as NBS/AID; salaries will be paid by the employer country but the host country will pay local transportation, accommodation and subsistence of

the team plus reasonable interpreter expense, if needed, and some secretarial facilities. In addition, NBS/AID will pay a per diem allowance of $5 per team member, for incidental expenses.

Audio-Visual Aids for Dissemination of Instructional Materials

NBS currently has significant contacts with about 20 LDC's. The number is growing and NBS is unable to respond to all requests for assistance in measurement science, weights and measures activities, and standardization problems.

Even if all of the numerous, relevant financial and legal problems associated with such activities were solved, NBS would still be unable either to muster the manpower to train technicians in all fields from all these countries, or to send experts in the many specialized subjects to tour all countries concerned.

As an alternative, therefore, NBS will begin immediately to develop films, audio-visual aids, lecture notes, and demonstration kits which could accompany one or two staff members to selected regional centers where workshops might be held. The first such workshop may be organized before the end of calendar year 1971, possibly in Morocco. It is hoped that by then NBS will have one or two sample films, demonstration materials, etc. to try out. The assemblage of effective teaching material, however, is a major task which will require a great deal of effort throughout Phase III of the NBS/AID program (see below). At that time it is hoped to prepare some of the audio-visual aids and films under subcontract. During Phase II, NBS intends to draw heavily on currently available materials by:

(a) live filming some instruction courses prepared by the NBS Office of Weights and Measures for U.S. states.

(b) using and adapting existing NBS films, presenting for example established techniques for characterizing materials such as can be made the basis of test procedures.

(c) using tapes from NBS seminars, conferences, and workshops, especially on calibration of instruments.

(d) recording of short lectures, given by exhibitors of instruments, representatives of standards organizations, and experienced industrial inspectors, importers, etc., to explain their techniques in dealing with standardization problems.

(e) soliciting contributions from semi-developed countries and UN organizations of material describing successes in development.

Development and Distribution of Standards Literature

NBS will develop and distribute to LDC's basic information on scientific and industrial standards. This information is intended to meet a broad range of LDC needs in metrology and standardization. It will include: how industrializing economies can best organize appropriate standards, calibration and testing activities in support of manufacturing, trading, and governmental interests; product specifications; areas of measurement and analysis techniques; quality control; and laboratory organization. To increase accessibility to basic standards literature by LDC's, NBS plans to place such information in a number of regional depositories around the world from which industrializing countries might quickly obtain whatever materials they may need.

Development and Distribution of Standard Reference Materials

During the NBS/AID Seminar, the view was expressed and strongly supported in the summary session, that a modern system for calibration of instruments and quality control of products could best be monitored by the use of Standard Reference Materials. These materials could also help in LDC's for self-evaluation of measurement systems and manufacturing controls. The NBS was requested and has accepted a leadership role in the development and production of SRMs especially for the use by LDC's. Such materials would also be useful in laboratories in the United States with comparable functions; no special charge to this AID contract is to be made for this development work. However, the cost of the actual production of SRM's distributed through the AID missions in LDC's will be charged.

Development of Training Programs

Parallel to the development of standards information suitable for use by the LDC's, NBS will also develop appropriate programs for training a few carefully selected and promising scientists and technologists from abroad who are potential future leaders in standardization in their own countries. Comparable programs will be conducted at NBS, or in appropriate LDC's, for selected Government leaders, financial planners, managers and other top officials of industrializing countries that are concerned with standardization development, policy, procedures, or management. The length of training courses and seminars may very from two weeks to several months and will cover a broad range of topics especially tailored to meet the needs of LDC's as analyzed under Phase I of the program (Industrialization Seminar and questionnaire).

Support of Collaborative Working Relationship Between ANSI and COPANT

COPANT is the Latin American counterpart of ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission) in whose standardization activities the United States participates through ANSI (the American National Standards Institute). COPANT has not been very effective heretofore partly because of weak participation in its activities by the United States. ANSI membership in COPANT, therefore, apart from being in the interest of the U.S. Government, will promote the objectives of the NBS/AID program in standardization envisioned for the Latin American countries. ANSI participation will be an essential feature of this program and any action that is likely to enhance ANSI's collaborative involvement in COPANT activities will be strongly supported by NBS.

PLANS FOR PHASE III (5-YEAR PROGRAM)

The character of the program to be developed and implemented under Phase III will largely depend on the extent of success achieved and the experience gained under the two-year trial-scale program (Phase II). Essentially, Phase III, which will cover the next five years, will be an extension to a world-wide basis of those elements of the program initiated and carried out under Phase II that are judged successful or highly promising. More specifically, Phase III will probably involve:

(a) the organization of several additional team surveys of the kind described under Phase II, country study teams to make follow-up observations on specific country needs (i.e., legislative opportunities, organizational alternatives, procedures to enhance industry participation, etc.).

(b) a number of regional workshops that might help accelerate the establishment and operation of sound and effective metrology and standardization systems in LDC's. Almost certainly there will be a pressing need to develop audio-visual material, taped lectures, films, demonstrations and exhibits.

(c) national and possibly international extension services for small industrial units may be created in collaboration with applied technological agencies of LDC's, if determined to be needed.

(d) continued and expanded training programs.

(e) short visits of experts (U.S. and third country) to respond to special and justifiable requests.

(f) continued distribution of standards literature (previously unavailable) to well-organized centers in LDC's where good communication with industry exists.

Appendix 1

NBS/AID Industrialization Seminar 1971

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Glenn E. Schweitzer, AID
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Expectations from the Seminar - Lewis M. Branscomb, NBS
Keynote Address - Jesse D. Perkinson, Pan American Union
NBS Programs to Provide Infrastructure Services for Science and Technology in USA - Lawrence M. Kushner, NBS
Discussion

Session 2
The Sociological, Economic, and Managerial Environment in Industrializing Countries

Chairmen: A. N. Ghosh, New Delhi
Edward U. Condon, Boulder, Colorado
Overview - The Anatomy of an Industrializing Economy
George Kalmanoff, World Bank
An Industrial Case Study from Latin America - Jorge A. Sabato, Buenos Aires
Labour-Saving vs. Capital-Saving Industrial Technology for the Developing Countries - Joseph E. Stepanek, UNIDO
The Role of Technology in Politics and Economics - Geraldo N. S. Maia, Rio de Janeiro
Discussion

Session 3
Making Scientific and Technological Measurement Meaningful

Chairmen: Phi Minh Tam, Saigon
Lawrence M. Kushner, NBS
Overview - The Economic Role of Metrology Capabilities
Edward U. Condon, Boulder, Colorado

Needs for Measurement Controls in Developing Industrialization - Jerry L. Hayes, USN
Problems in Establishing Accurate Measurements in Industrializing Economies - Harry Z. Tabor and Leonard R. Farkas, Jerusalem
Instrument Problems in a Developing Economy - Procurement, Calibration, Maintenance - Luiz Cintra do Prado, Sao Paulo
Needs for Standard Reference Materials for Calibration and Control - J. Paul Cali, NBS
Discussion

Session 4
The Dissemination of Information

Chairmen: Geraldo N. S. Maia, Rio de Janeiro
Ismael Escobar, Interamerican Bank
Overview - The Role of Federal Information Activities - Melvin S. Day, NASA
Government Responsibility for Information for Industry - Alfredo Fontes, Pan American Union
Publications; Documentation Indexes - William T. Knox, NTIS
Industrial Extension and Productivity Services - Phi Minh Tam and Niels C. Beck, Saigon
Standardization in Africa: Problems and Programs - Zawdu Felleke, Addis Ababa
Discussion

Session 5
Promoting More Effective Use of Science and Technology

Chairmen: Rene Schmied, UNIDO
William T. Cavanaugh, ASTM
Overview - The Role of NBS Capabilities - F. Karl Willenbrock, NBS
Applying the Computer - James P. Nigro, NBS
Technology Transfer - Licensing, Subcontracting, Multinational Firms - E. Lartey, Accra
Operations Analysis and Systems Engineering - Simon E. Russek, Hughes Aircraft Company
Product Development and Market Research - Seymour Marshak, Ford Motor Company
Discussion

Session 6

Additional Case Histories

Chairmen: Mahmoud Salama, Cairo
Newman A. Hall, NAE

The Effect of Local Government Policies on Technology Transfer - Glenn E. Pratt, Monsanto Company

The Sale of Instrument Manufacturing Technology - Pradeep K. Rohatgi, Bethlehem Steel Company

The Iranian Institute of Standards - Harold K. Work, Fairfax, Virginia

The Application of Non-Destructive Testing - H. Steffen Peiser, NBS

Design and Development Through Metrology (Abstract) - Prem Prakash, New Delhi

Discussion

Session 7

Promoting Economic Strength and Commercial Equity

Chairmen: Inyong Ham, Korea and Pennsylvania State University
Henry A. Arnold, AID

Overview - The Spread of Standardization - Frank L. LaQue, ISO

Overview - Standardization in Industrializing Economies - A. N. Ghosh, New Delhi

Weights and Measures - Laws, Inspections, Enforcements - Mahmoud Salama, Cairo

Engineering Specifications - Raymond B. Smith, ASTM

The Colombian Government Faces the Problem of Quality Control - Hernando Fernandez F., Bogota

Quality Control and Product Certification in Peru - Susana Le Roux C., Lima

Discussion

Session 8

Guidance for NBS Technological Assistance Effort

Part A - Chairmen: Zawdu Felleke, Addis Ababa
Allen V. Astin, NBS

Planning Technological Systems - W. Edward Cushen, NBS

Using National Measurement Standards - Robert D. Huntoon, NBS

Discussion

Part B - Chairmen: Harry Z. Tabor, Jerusalem
Frank L. LaQue, ISO

Preparing Product Specifications - Newman A. Hall, NAE

Disseminating Information - Edward L. Brady, NBS

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Chairman: Lewis M. Branscomb, NBS

Address - Technology Transfer within Developing Areas - Edward S. Dennison, VITA

Discussion

Promotion of Education,Science and Technology by the Inter-American Development Bank - Ismael Escobar, Inter-American Bank

Institutes for Engineering Education - Pradeep K. Rohatgi, Bethlehem Steel Company

The Ethiopian Standards Institution - Zawdu Felleke, Addis Ababa

UNESCO Questionnaire on Metrology in South East Asia - Mervyn C. Probine, DSIR, New Zealand

Standards Laboratories Assistance to Developing Industry - Lehaney, DSIR, Australia

Participant List

Speakers' Biodata

Responses of Participants to AID Questionnaire

Appendix 2

Summary of Responses to NBS/AID

Industrialization Questionnaire

To help NBS and AID evaluate the results of the Industrialization Seminar and chart the course for Phases II and III of the program, the delegates were requested to answer a few questions regarding the nature of assistance in metrology and standardization they would like to be considered for incorporation in the program. Below follows a description of the questions asked together with a summary of the responses submitted by the delegates.

Question: Is there a major need for an NBS/AID program with the less developed countries?

Answer : The answer to this question was unanimously and overwhelmingly in the positive. The need, particularly in some countries, is so great that everything possible should be done to help them. A few delegates suggested that NBS work with UN technical agencies in extending its assistance, while others stressed that the program include selling the concept of metrology and standarization to high government officials and financial and industrial leaders. One delegate recommended that NBS/AID help establish a Standards Engineers Training Institute, if the one currently under consideration by UNIDO/UNDP for establishment in India fails to materialize.

Question: What type of program would you consider of high priority for the country (or countries) of principal interest to you such as:

(a) training technical specialists from the developing countries

(b) indoctrinating managers, planners, and financial people responsible for developing the standards infrastructure

(c) assisting in surveys of potential benefits from standards programs in developing countries

(d) responding to requests for follow-on technical assistance, including possible participation in adaptive or operational research to identify and prove out locally suitable methods.

Answer : Generally the delegates attached greater and about equal priority to items (a) and (d) above than to the other two items. A number

of delegates felt that item (b) was important, while only a few indicated that there is any real need for item (c). In response to item (a) one delegate said that the training of initial trainees should be done largely through the establishment of training institutes in developing countries rather than through bringing of trainees to the United States; another delegate felt that the same goal might be accomplished through strengthening the Instrument Repair and Calibration Centers set up in a number of countries by making available to those Centers suitable equipment and training the staff in procedures and the use of such equipment. Key staff might be brought to NBS for special training. One delegate emphasized the importance of providing "on the spot" help over an extended period of time, while another recommended that NBS/AID be ready to provide telephoned inquiries in specific technical problems, to supply consultants for missions of 2- to 3-weeks' duration in connection with project appraisal, design, and evaluation, and work with UN technical agencies, to assemble experts for missions of 1 month to 2 years,and for arranging for seminars and obtaining qualified speakers. A number of delegates stressed the need for NBS/AID assistance in providing plans for suitable housing (adequate temperature and humidity control, vibration-free mountings, dust-free atmosphere, good electrical supply, etc.) and other physical requirements (libraries, testing facilities, district control laboratories, etc.) related to metrology and standardization.

With regard to item (b) one delegate suggested that as far as possible people who are "next in line for the top job" be selected, provided they meet the requirements of ability and personality. Such training must be conducted at a fairly simple level and encompass the areas of management, communication, organization, planning, financial control, etc. It is better to train people to manage their own affairs than to do the job for them. One delegate felt that item (c) would be beneficial provided the work was done by people who really understand the country in which the survey is being conducted.

Finally, in connection with item (d) one delegate noted that the exchange of persons should not be limited to trainees but must also include experts.

Question: What kinds of persons should be involved in training, exchange, demonstration or working visits to NBS - scientists, technologists, technicians, entrepreneurs, business men, economists, government leaders, or financiers?

Answer : The delegates' response to this question is that, whereas the need for experts in all the areas mentioned above is great in the LDC's, that need is exceptionally urgent for scientists, technologists, and

engineers. One delegate suggested the use of managers, planners, and financial people exclusively, another the involvement of entrepreneurs, businessmen, and technology educators, while still another recommended that government leaders from developing countries be brought to the United States for a short-term indoctrination in metrology and standardization.

The original responses are available for study.

Appendix 3

List of Participants
NBS/AID Seminar on Industrialization

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Appendix 4

A REVIEW of NATIONAL BUREAU OF STANDARDS INTERNATIONAL TECHNICAL ASSISTANCE ACTIVITIES 1955-June 1970

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January 25, 1971

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ABSTRACT

The National Bureau of Standards has been involved from time to time in providing technical assistance to developing countries, mostly at the request of the Department of State or the Agency for International Development. These activities and events are here described in three groups: (I) technical assistance to Latin American countries, (II) technical assistance to other countries, and (III) technical assistance in training at NBS. The Latin American countries were grouped separately because a fairly well sustained program was executed, and because there were regional overtones in connection with the Comisión Panamericana de Normas Técnicas (COPANT).

Key Words: Africa; Agency for International Development; Asia; Department of State; Europe; foreign guest workers; Latin America; technical assistance

I. Technical Assistance to Industrializing Nations — Latin America

A. COPANT (Pan American Standards Commission; Comisión Pan Americana de Normas Técnicas)

1. Participation of L. L. Wyman, NBS, in COPANT meeting on Iron and Steel Standards, and survey of national standards bodies and iron and steel activities (9/20 - 11/24 1962). (1) Mr. Wyman visited ten of the Latin American countries in connection with a meeting of COPANT held at Lima, Peru, from November 7-10, 1962. He was a special delegate to this meeting, which concerned itself with further organization of COPANT, and with program emphasis on Latin American standards for iron and steel. In these countries he made visits to the various standards and standards-writing bodies, as well as to industrial groups, technical societies and universities with interests in such standards and in the production of iron and steel. He gave much information on ASTM and ASA (ANSI) standards for iron and steel materials and products.

The principal international bodies were: Instituto Centro Americano de Investigacion y Tecnologia Industrial (ICAITI), an independent organization sponsored by the Organization of American States, assisted by the United Nations, for the Central American free market group; Associacion Latino Americano de Libre Comercio (ALALC), a Latin American free market activity; Instituto Latin Americano de Fierro y Acero (ILAFA), the Latin American organization of iron and steel producers.

He visited the following national standards bodies: Dereccion General de Normas (DGN), Mexico; Comicion Guatemala Normas (COGUANOR); Comission Venezolana de Normas Industriales (COVENIN); Associcao Brasileiro de Normas Tecnicas (ABNT); Instituto Urguayo de Normas Tecnicas (UNIT); Instituto Argentina de Racionalizacion de Materiales (IRAM); Instituto Nacional de Investigaciones Tecnologicas y Normalizacion (INDETECNOR), Chile; Instituto Nacional de Normas Tecnicas Industriales y Certificacion (INANTIC), Peru.

2. Participation by L. L. Wyman, NBS, in COPANT activities on iron and steel standards, and surveys of national standards bodies and associated organizations (5/12 - 6/15/63). (2) Mr. Wyman particpated in the planning for the first of a series of three iron and steel standards-writing seminars to be held in Santiago, Chile, during 1963 under COPANT-OAS-ILAFA sponsorship, as well as visits to most of the other Latin American countries in the interests of promoting the formation of or enhancing the effectiveness of standards-writing bodies.

Standards activities were discussed in Argentina, Brazil, Peru, and Uruguay, and assistance given in planning for the formation of national standards bodies in Colombia, Ecuador, and Paraguay. Discussions were also held with the U.S. AID missions in those countries.

In Ecuador the Committee on Science and Technology of the Society of Engineers and Architects will be the focal point for the establishment of a standards body. In Colombia an independent body called Instituto Colombiano de Norman Tecnicas (ICONTEC) may become the dominant standards body. In Paraguay there is the Comite Paraguayo de Normas Tecnicas (CPNT) of the Centro Paraguayo de Ingenieros, which may serve as the focal point for a standards body.

3. Visits by L. L. Wyman, NBS, to the standards bodies and groups interested in standards promotion in ten Latin American countries and participation in the COPANT Tubular Steel Products Standards-Writing Seminar in Chile (9/14 - 21/27/63). (3) Mr. Wyman participated in this seminar as an official delegate of the American Standards Association (now ANSI) in the COPANT-sponsored seminar on Tubular Steel Products at Santiago, Chile, November 4-23, 1963. He discussed standards activities in Argentina, Brazil, Chile, Peru, Uruguay, and Venezuela. He visited Bolivia, Colombia, Ecuador, and Paraguay to assist in the formation of national standards bodies. Part of the accomplishments of the COPANT seminar was the development of nine standards relating to tubular steel products.

This report mentions the efforts of the U.S. Department of Commerce and the National Bureau of Standards in contracting for the translation of certain standards into Spanish, and eventually, into Portuguese. Most of the standards so far translated related to Department of Labor safety standards, but some materials standards have also been translated, among them iron and steel standards, and standards necessary for water works facilities.

4. Visits by L. L. Wyman, NBS, to the newly established Colombian Standards body and to the annual meeting of the Latin American Iron and Steel Institute (4/25 - 7/25/64) (4). By the time of this visit, the Instituto Colombiana de Normas Tecnicas (ICONTEC) had received its charter and was in an active status. Responding to the advice of Mr. Wyman and others, it had set up appropriate committees and subcommittees to deal with areas of immediate urgency. Further advice was given for a standards library and for staff training and staff visits to the United States. This new group expressed a strong desire to be part of the oncoming Weights and Measures Seminar then being planned by COPANT.

Mr. Wyman also took part in the annual meeting of the Latin American Iron and Steel Institute held in Mexico City July 17-25, 1964.

The main theme for this meeting was planning for the development of the iron and steel industry through 1970.

5. Participation of L. L. Wyman, NBS, in the second seminar on standards for steel pipes and tubes, sponsored by COPANT-OAS-ILAFA at Santiago, Chile (9/26 - 10/17/64) (5). This was a continuation of the 1963 seminar on the same category of materials standards. Mr. Wyman was again a U.S. delegate and responsible for presenting the viewpoints of the USA National Committee for International Standardization of Steel and for maintaining the interests of the U.S. in the formulation of COPANT standards.

Corrections were made to the steel classification proposal; standards for preferred diameters and wall thicknesses were expanded. Specifications in steel couplings and malleable couplings were written to cover both ASA and ISO threads. Some 30-odd proposals for additional standards were made, and plans were made for the next seminar on pipes and tubes.

6. Participation of L. L. Wyman, NBS, in the third standards-writing seminar on steel pipes and tubes held at Santiago, Chile, November 1965 (11/5 - 12/3/65) (6). Nine of the draft recommendations from the 1963 seminar and 21 of the draft recommendations from the 1964 seminar were reviewed, and 28 drafts were approved and made ready for COPANT circulation for final vote. It was recommended that seminars should be held every two years and that the seminar planned for 1967 be held in Montevideo. Fourteen new subjects were recommended for preparation for that meeting. It was further recommended that COPANT organize a seminar on malleable cast iron and appropriate tests and standards for fittings.

7. Participation of L. L. Wyman, NBS, at the COPANT Annual Meeting of the Council and the General Assembly, Lima, Peru (1/26 - 2/4/68) (7). Considerable time was devoted to review of statutes, financial considerations and establishment of a permanent headquarters for COPANT. Eighteen standards were approved. Activities in the agriculture, steel pipe and tube, iron ore, agricultural machinery, and copper "seminars" were noted. The future needs of COPANT were set forth, and a new standardization committee within the Inter-American Committee for the Alliance for Progress (CIAP) was proposed, in order to respond to some of the needs for COPANT and its programs.

8. Participation by J. R. Kanagy and J. Naghski, NBS, in an AID sponsored survey of leather standards in Latin America (5/27 - 6/29/63) (8). Messrs. Kanagy and Naghski visited Brazil, Uruguay, Argentina, Paraguay, Chile, and Peru to investigate the status of standards used in the leather industry. Conferences were held with those concerned with the development of Pan American Standards (COPANT) and with the official standards-writing bodies of each country. Fourteen leather factories were visited. At that

time none of these countries had official standards methods for leather, but were familiar with British, German, and French standards. It was recommended that the appropriate technical committees of COPANT meet within the next year for this purpose and that ASTM standards should be translated into Spanish and Portuguese and distributed. US AID support to Paraguay to develop a strong leather industry was urged and expert technical advice recommended for Argentina to help research in collagen.

9. Participation by C. T. Mahaffey, NBS, in the COPANT Commission for Materials for Construction and Modular Coordination held at Caracas, Venezuela June 1965 (6/7 - 6/26/65) (9). Mr. Mahaffey was a U.S. delegate to this meeting. Stemming from his involvement with ICONTEC, the Colombian standards body, and the attempt to develop Colombian standards for Modular Coordination, two needs were seen - a module common to all Latin American countries to be established and officially recognized; definition of and agreement on basic terminology used in Modular Coordination.

Ten centimeters was established as the basic COPANT module. The final document approved agrees in principle with portions of the current American Standard A62. Reasonable definitions were also agreed upon. It was proposed that a Pan American construction information center be established. NBS is specifically mentioned in this proposal.

10. Participation by H. F. Schiefer, NBS, in the development of Pan American Standards for Textiles (5/17 - 6/30/62) (10). Mr. Schiefer visited numerous countries to determine their interests and capabilities in textile standards and approximately 200 standards written in Spanish were obtained for study. He visited industrial groups, technical institutes and industrial concerns in Mexico, Argentina, Guatemala, Colombia, Peru, Chile, Uruguay, Brazil, Venezuela, and the standards bodies in those countries, as well as the United Nations Office for Latin American development. This work was in preparation for a planned program of textile standards writing seminars under COPANT, the Pan American Standards body.

11. Participation by H. F. Schiefer, NBS, in the COPANT Council Meeting of November 1962 and COPANT Technical Committee 6 for Textile Standards (11/2 - 11/18/62) (11). Mr. Schiefer attended the COPANT meeting as an official delegate from the U.S. The Council set up by-laws for the functioning of the technical committees of COPANT and endorsed a uniform law for Pan American standards. A textile seminar was planned for April 1963 in Lima since the Secretariat for Technical Committee 6 is held by INANTIC, the national standards body for Peru. Further meetings were planned for November 1963 in Peru, April - May 1964 in Rio de Janeiro and September - October 1965 in New York City. Numerous draft recommendations were assembled for future consideration by Technical Committee 6.

In discussion with the United Nations Textile Council for Central America, special efforts were made to have the Central American countries participate in COPANT textile standards activities.

12. Participation by Miss J. M. Blandford, NBS, in the International Seminar on Textile Products, a working meeting of COPANT Technical Committee 6 on Textiles in Lima, Peru (9/2 - 10/4/63) (12). Miss Blandford was a member of the U.S. delegation to this meeting. She visited Guatemala in August 1963 to determine the textile activities of ICAITI (Instituto Centro Americano de Investigacion y Tecnologia Industrial) which was taking the leadership in the establishment of the Central American Textile Association.

The International Seminar on Textile Products under the auspices of the OAS was a working meeting of COPANT Technical Committee 6 on Textile Standards. It was held in Lima, Peru, September 2 - October 5, 1963. Its objective, the development of textile standards for Latin America, was initiated in 1961 and advanced in 1962. The agenda comprised 21 Draft Recommendations decided upon at the November 1962 meeting of Committee C6. Seventeen of the 21 recommendations were approved, one new recommendation developed and approved. A program for the 1964 meeting of the Seminar on Textile Products was planned and proposed, including 55 subjects for recommendations.

13. Participation by Miss J. M. Blandford, NBS, in the Second International Seminar on Textile Products, Lima, Peru (10/26 - 11/14/64) (13). Miss Blandford was again a member of the U.S. delegation to the Seminar. The seminar was sponsored by the OAS and was a working meeting of the COPANT Technical Committee 6 on Textile Standards. The host was the Instituto Nacional de Normas Tecnicas Industriales y Certificacion (INANTIC), the official standards organization of Peru, which provides the secretariat for this committee. ICAITI (the Instituto Centroamericano de Investigacion y Tecnologia Industrial),had now been designated to represent the Central American Textile Association. Twenty-four draft recommendations were considered, of which 17 were approved, plus two which required some redrafting. Plans for a meeting in 1965 were made and 38 subjects proposed, but the meeting was never held because OAS and COPANT funds were not available.

14. Participation by Miss J. M. Blandford, NBS, in the Third OAS-COPANT Seminar on the Standardization of Textile Products, held in Montevideo, Uruguay (5/8 - 5/21/66 (14,33). Miss Blandford was one of the 11 official U.S. delegates, all of whom were accredited by the ASA (the American National Standards Institute). The host was the Instituto Uruguayo de Normas Tecnicas (UNIT). This meeting was the third textile standardization seminar of OAS Project 207 within the Regional Standardization Program To Aid Economic Integration. The program was initiated in 1961 and 1962, and seminars were held in 1963 and 1964. The earlier seminars approved 32 COPANT Draft Recommendations of which 17 were eventually approved by member countries, thus becoming COPANT Standards. They cover Testing Procedures for Colorfastness, Fibers and Yarns, Wool Fibers, Fabric Appearance, Dimensional Change, Wool Solubility, Alpaca Types, Classification of Fibers, Yarn Irregularity,

Fabric Defects, Conditioning, The Tex System, and Moisture Gain. In 1966, twenty other drafts were approved as COPANT Draft Recommendations, and 39 subjects were selected for consideration at the next meeting of C6. However, neither country approvals nor detailed drafts were ever completed, because of lack of funds.

15. Cement

D. O. Woolf, Bureau of Public Roads and Bruce Foster of NBS participated (34) in the initial meeting of the COPANT Cement Committee (7/17-8/7 1962). Representatives from Mexico, Uruguay, and Argentina discussed standard test methods for portland cement and for concrete aggregates. Except for strength determination, ASTM methods were generally favored. The U. S. representatives were able to answer technical questions on these requirements, and they later visited the Portland Cement Association and the Argentina Standards Institute in Buenos Aires, the Standards Institute in Santiago, Chile, and the Peruvian Technical Institute in Lima.

At the second meeting (7/28-8/12 1963) Brazil, Chile, Paraguay, Peru and Venezuela were also represented. Three procedures for strength determination - those of ASTM, ISO, and Brazil - were discussed, and all three were incorporated as alternatives in the specification finally adopted in 1970. In 1963, Mr. Foster also visited with cement industry and university personnel in Sao Paulo, Montevideo, and Buenos Aires.

At a third meeting in 1964, NBS arranged for U. S. technical representation from the Lone Star Cement Company, with expenses paid by OAS.

B. ICAITI (Instituto Centro Americano de Investigacion y Tecnologia Industrial)

The Establishment and Development of the Measurement Center and Metrology Laboratory at ICAITI was a project sponsored by US AID. D. R. Mackay, NBS, in 1967, discussed the US AID desire to assist ICAITI in developing a standards program for the Central American Common Market (CACM) countries (Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua), by providing funds for technical specialists from NBS and for necessary specialized equipment. The four main interests in consumer and/or commodity standards were: food products, building materials, textiles, and electrical components. ISO and COPANT standards would be used. As a consequence, a detailed plan under the above title was prepared, giving objectives, long-term aims (e.g., establishment of standards laboratories in the five Central American countries), short-term aims, a full listing of standards and instruments, location recommendations, space needs, environmental controls, layout, equipment, installation, a training program, personnel requirements, and an operating program. Costs for five years were estimated. (15)

C. COLOMBIA

1. Recommendations for National Building Code System for Colombia (16) - C. T. Mahaffey, NBS, made these recommendations for the benefit of US AID, the Instituto Colombiano de Normas Tecnicas (ICONTEC), the Centro Colombiana de las Construccion (CCC), and the code group appointed by the city of Medellin. Discussion with all these groups and interested persons were held June 9 - 24, 1967. Among the recommendations are the creation of a national building code (including development of plumbing, electrical, and elevator national codes), with the national code being developed around the performance concept. It was pointed out that the operation of a performance code relies heavily on the availability of performance test methods and facilities. It is remarked that such a code would need to be in two parts, one the health and safety requirements (to be enacted into law), the other the solutions to the requirements, to become acceptable national standards. There must also be a systematic way to keep the two-part document up to date. A comprehensive organization chart embodying all elements needed to maintain and operate (excluding enforcement functions) the national code system should be prepared. Detailed organization recommendations were made.

2. Participation by H. F. Wollin, NBS, and T. M. Stabler, NBS in the Establishment of a Metrology Laboratory in Bogota, Colombia, and Operation of a Training Program (17, 32).

In July 1965 a metrology laboratory was established at the National University, Bogota, Colombia, to serve national needs and also to serve as a calibration and training center for Latin America. Early in 1962, A. T. McPherson, NBS, and M. W. Jensen, NBS, acting for the U.S. Department of Commerce, developed a plan for the establishment of a model weights and measures laboratory for Latin America, equipped with newly designed physical standards. M. W. Jensen, NBS, and D. R. Mackay, NBS, travelled to several Latin American countries in May 1962 to determine their interests and capabilities. In 1963, U.S. AID Washington provided funds for the fabrication and calibration of the primary standards and for precision laboratory instruments of measurement and other equipment. Delivery was completed during 1964. In April 1965, funds were provided for Spanish and Portuguese translations of technical material and methods of calibration of standards. AID also provided funds for NBS staff travel.

T. M. Stabler, NBS, made a preliminary trip to Bogota in June 1965 to supervise the unloading and transfer of the equipment to the laboratory site (5 crates, 6000 pounds). H. F. Wollin, NBS, and T. M. Stabler, NBS, travelled to Bogota in July 1965 to help prepare the laboratory, install the standards and precision instruments, and plan the training course with local officials. The three weeks course trained 2 Venezuelan, 2 Ecuadorian, and 5 Colombian officials. The first week dealt with weights and measures

administration, laws and regulations, and field training. The remaining two weeks covered instruction in laboratory procedures and calibration techniques using the new standards. A second metrology course for 1966 was planned.

D. COSTA RICA

In May 1952 W. Souder, NBS, visited Costa Rica to advise on the establishment of a National Standards Laboratory (no report available).

E. PANAMA

Participation by H. F. Wollin, NBS, in planning for the establishment of a National Weights and Measures Program in Panama (July 26-28 1965) (18, 32).

Some background for this meeting was the visit of M. W. Jensen, NBS, and D. R. Mackay, NBS, to several Latin American Countries to determine the interests, needs, and capabilities of these countries in weights and measures and physical standards matters. Panama desired such a program. The Model Weights and Measures Law of the U.S. National Conference on Weights and Measures was recommended to Panama, along with several other publications covering regulation, administration, etc. Recommendations were made covering laboratory facilities, physical standards, and technical training. It was suggested that all basic training could be obtained in Colombia.

F. Latin American Standards Seminars

1. Participation in and coordination by L. L. Wyman, NBS, of U.S. team activities (4, 8, 9, 10, 11, 17, 19, 20, 21, 22, 23, 24, 32, 34) in the Latin American Standards Seminars (4/22-6/12 1965). USDA and USNOL assisted ICONTEC and ICOLDA on Quality Control Seminars.

During the past three years, with assistance from US AID/Colombia and NBS personnel, the Colombian Standards Institute, ICONTEC, had been established. The AID support program to this private independent body had three phases - a seminar program, establishment of a standards library, and training of ICONTEC personnel. The total program included nine seminars. NBS personnel were the leaders of six of these (B. E. Foster, cement and concrete; J. R. Kanagy, hides and leather; G. M. Kline, plastics; H. F. Schiefer, textiles; L. L. Wyman, Ferrous and non-ferrous metals). Each seminar ran for two weeks, with mornings devoted to broad aspects of standards from the business, economic and technical points of view, and the afternoons to work with ICONTEC personnel in actual standards writing. NBS made significant inputs also to plans for the standards library and the ICONTEC staff training. NBS had made available a full set of weights and measures

standards for use in Latin America, supported by the Department of Commerce and AID Washington. It was decided to locate them in Bogota, Colombia, and NBS staff initiated the program and assisted in setting up the laboratory and testing the instrumentation. Venezuela was visited because of its interest in participating in the Bogota Weights and Measures center (32).

2. Participation by C. T. Mahaffey, NBS, in the Latin American Standards Seminar at Bogota, Colombia, sponsored by US AID (April 26 - May 7 1965) (20).

Mr. Mahaffey was the leader of the seminar on modular coordination and building codes, one of nine seminars conducted in this program. There were approximately 30 attendees at this seminar. Mornings were spent in lectures and discussions of standards and codes, modular principles, outline of a suggested building code system, and review of modular practices. Afternoons were spent with appropriate committees of ICONTEC, the Colombian standards body.

3. Participation by J. R. Kanagy, NBS, in the Latin American Standards Seminar at Bogota, Colombia, sponsored by US AID (May 29 - June 11 1965) (21).

Mr. Kanagy was the leader of the seminar on leather and hides, one of nine seminars conducted in this program. There were approximately 25 attendees at this seminar. Topics covered included the importance and philosophy of standards, standards activities in the USA and relations with ISO and COPANT, federal specifications, quality control in U.S. tanneries, and standards for hides. Much U.S. standards and specifications material was made available.

4. Participation by H. F. Schiefer, NBS, in the Latin American Standards Seminar at Bogota, Colombia, sponsored by US AID (May 8-21 1965) (22).

Mr. Schiefer was the leader of the seminar on textiles, one of nine seminars conducted in this program. There were approximately 15 attendees at this seminar. A Technical Committee for Textiles (C15) as part of ICONTEC, the Colombia standards body, was formed at this time, and ten additional persons from five additional organizations were added to the Committee. Subcommittees on Fibers, Yarns, Fabrics, and Colorfastness were formed.

5. Visit by L. L. Wyman, NBS, to Bogota, Colombia, at the request of US AID, in relation to the Latin American Standards Seminar (November-December 1965) (6).

Mr. Wyman summarized the results of the 1965 Latin American Standards Seminar Program, which consisted of a series of nine two-weeks seminars. Planning for the second series of seminars in 1966 was done.

Further advice and assistance was given concerning the Colombian Standards Library, Weights and Measures training, ICONTEC personnel training, and testing facilities.

6. Participation by T. M. Stabler, NBS, in the Weights and Measures seminar at Bogota, Colombia (July 25-August 12 1966) (23).

The second weights and measures training seminar for Latin American officials was conducted at the National University, Bogota, Colombia, July 25 to August 12, 1966.

The program included instruction in weights and measures administration, in the field testing of commercial devices, and in laboratory calibration of length, mass, and volume standards. Mr. Stabler participated in the laboratory instruction and the planning meeting that followed. Three Venezuelan, two Guatemalan, and five Colombian officials participated.

In review of the past year, three major accomplishments were noted: (1) the establishment of the laboratory, and the first Metrology Seminar in 1965; (2) training at NBS for Dr. Silva of the Physics Department of the National University, and (3) planning for the Second Metrology Seminar for 1966.

Among objectives for 1967 were: a Third Metrology Seminar for 1967; expansion of capabilities to include electrical, density, pressure and illumination measurements; application for Colombian membership in the ISO; support of the adoption of a uniform weights and measures law for Colombia; move toward a Latin American Conference on Weights and Measures (Legal and Scientific Metrology); publication of a report covering the course of instruction just completed.

7. Participation by L. L. Wyman, NBS, in the technical assistance program sponsored by US AID/Colombia to promote the development of Colombia through standardization (March 31-April 15, 1967) (24).

This program began in 1963 when Mr. Wyman and local AID personnel helped to establish the private independent standards institute Instituto Colombiano de Normas Tecnicas (ICONTEC). AID provided headquarters equipment, a reference library of standards, and provided staff training. Mr. Wyman was a key figure in organizing, with eight other experts from the U.S. (five from NBS), the 1965 Standards Seminar in Bogota. For the 1967 program, arranged through ICONTEC, there were four travelling seminars in the following cities (Medellin, Manizales, Barranquilla, Cali, Cucuta, and Bucaramanga) in the following fields by the indicated seminar leaders (Standards Education and Promotion, L. L. Wyman; Quality Control, W. R. Pabst, Jr.; Building Codes and Modular Construction, C. T. Mahaffey; Colombian Electrical Code and Colombian Elevator Code, W. J. Meese). Abstracts of these activities are contained in this report.

G. U.S. - Brazil Science Cooperation Program (35)

Brazilian and U.S. scholars met in Rio de Janeiro (4/11-4/16 1966) under the auspices of the National Research Council of Brazil (CNPq) and the U.S. National Academy of Sciences, with the cooperation of AID, to discuss the contribution of science and technology to economic development. One recommendation on aid to industry proposed formation of a Joint Study Group to support the long-term development of a Center for the Control of Quality and Standards. Its terms of reference (11/7/66) called for recommendations on

a) present organization, programs, personnel and equipment related to standards and measurements in Brazil;

b) role of government, industry, educational institutions, and technical societies in industrial and commercial measurements;

c) inter-relationships between technological institutes, universities, industry, state and federal governments, science-related institutions and measurement standards facilities with regard to financing, direction, and control;

d) adequacy of relationship between organizations and activities relating to measurements and those relating to codes and specifications covering products and commodities;

e) present and anticipated requirements of measurement standards and techniques in relation to the needs of Brazil's economy and its development plans.

Its members included Brazilians G. N. S. Maia, G. A. Gomes, A. A. Arantes, A. S. Neves, and L. C. Prado; NBS staff members A. A. Bates, R. B. Hobbs, M. W. Jensen and A. G. McNish; with F. C. Frost of ANSI, J. Engel of NAS, and R. A. Sawyer of NRC.

The Joint Group met at NBS (5/8-5/19 1967), at the Brazilian Academy of Sciences (8/28-9/7 1967), and at Airlie House (3/4-3/15 1968). Its members visited 32 laboratories and offices in U.S. and 12 in Brazil. Its report (35) recommended that "agencies responsible for standardization should constitute an overall system national in scope with the support of both government and private organizations in general. Preparation and application of the standards (both normas and padroes) should be coordinated by a high-level technical administrator responsible for the system's operation, and (should be) assisted by an advisory and deliberative board entrusted with the formulation of the work programs." Specific organizations, their functions, and their relationships were proposed, together with appropriate steps in procedure and recommended sources of financial support.

II. Technical Assistance to Industrializing Nations in Africa, Asia, and Europe

A. Ethiopa

In October 1956, F. B. Silsbee, NBS, visited Ethiopa to advise on the establishment of a national standards laboratory. (No report available.)

B. Greece

In 1958, W. G. Brombacher, NBS, visited Greece to advise on their standards laboratory activities. (No report available.)

C. India

Survey of Textile Research, Education, Standards and Activities in India by H. F. Schiefer, NBS, for ICA (Sept. 10-Oct. 7, 1955) (25).

Mr. Schiefer visited member government and private institutions and laboratories, among them the Indian Central Jute Laboratory, the Council for Scientific and Industrial Research, the Textile Department of the Delhi Polytechnic Institute, the National Physical Laboratory, the India Standards Institution, the Shri Ram Institute for Industrial Research, the Delhi Cloth Mills, the Swatantra Bharat Mills, the Department of Chemical Technology of the University of Bombay, the National Rayon Corporation, the Silk and Art Silk Mills' Research Association, Bombay Mill Owners Association, the Tata Mills, the Calico Print and Dyeing Company, the Indian Central Cotton Committee Laboratory, the Bombay Textile Industry Research Association, and the Ahmedabad Textile Industry Research Association, the Physical Research Laboratory of Gujarat University, and visits to nearby mills.

Besides giving numerous lectures to many of these groups and providing direct advice to them, he rendered a full survey report, with recommendations, to the ICA.

D. Iran

Dr. A. V. Astin, Director, NBS, visited Iran October 17-22, 1967, at the request of the Department of State. The central point was concern for future technical assistance now that the US AID program had been terminated. He visited numerous industries and quality control centers and the standards library. He recommended that Iranians spend time on training assignments in the United States, and that recently retired American executives with technological backgrounds work for limited periods in Iran. (No report available.)

E. Israel

1. In 1958 W. G. Brombacher, NBS, visited Jerusalem to assist personnel of the Standards Institute of Israel in preparing a list of lab equipment to be financed by AID. Desirable extension of SII activities was recommended (36).

2. During March - June 1959, R. C. Cook, NBS, was in Israel, assisting in the establishment of an acoustics laboratory at the Standards Institute of Israel. (No report available.)

F. Jordan

In 1965 Henry T. Wensel, NBS, visited Jordan to assist in the establishment of a standards institute and a customs laboratory. Complete plans were presented for the establishment of a Jordan Standards Institute, authority for which at that time still required enactment into law. When authorized, the JSI laboratory would be located in Amman. It would be charged with maintaining the standards of measurement and checking of the measuring devices used in industry and commerce; preparation of standards of quality and specifications to promote honesty in trade; and determination of compliance of commodities or devices with established standards. Detailed recommendations were made for organization, facilities, equipment and training. Recommendations were also made for a separate Customs Service Laboratory to be located at Aqaba. (26).

G. Korea

NBS survey of Korean Technology and Standards, Sept.-Oct. 1967 for US AID (27).

At the request of AID and with its support, a three-man team (F. K. Harris, R. K. Eby, H. S. Peiser) spent several weeks in Korea preceded by several days in Japan. In Korea the team visited approximately 50 Korean research, testing, and standards laboratories and government offices. Among the comments and recommendations made were:

(1) A new organization should be established in the Ministry of Commerce and Industry, tentatively designated as the Institute of Metrology, Standards, and Related Research (IMSRR). It should include the National Industrial Research Institute (NIRI), the Bureau of Weights and Measures, and the Korean Bureau of Standards. Also included should be the responsibility for electrical standards (from the Ministry of Communications), radiation and radioactivity standards, temperature standards, standard reference materials, and industrial safety standards. An advisory panel should be formed for this organization.

(2) The need for competitive salaries for these government personnel was pointed out as well as the need for additional facilities and a new library.

Future possible NBS assistance (if resources were made available) could include training at US/NBS, future visits of NBS experts to Korea, assistance in planning and acquiring physical standards, laboratory instrumentation and standard reference materials, and in planning laboratory and library facilities and training.

A "Sister-Institute" agreement was signed but as yet very little follow-up has occurred. However, a set of new Weights and Measures standards and precision instruments was provided to Korea by the US AID program and installed in the Korea Institute of Science and Technology at Seoul. A visit for this purpose was made by T. M. Stabler, NBS, in February 1969.

H. Saudi Arabia

A Weights and Measures Program survey was made by M. W. Jensen, NBS, and H. F. Wollin, NBS, in November 1967 (28).

This survey, sought by and supported by the Kingdom of Saudi Arabia, provided an extensive and coherent design for a new Weights and Measures program for the country. It provided an organizational structure; a plan for staffing, personnel development and technical training; specifications for both office and laboratory facilities; lists of requirements for physical standards, laboratory instruments, and field testing equipment; a scheme for essential and orderly reports and records; a complete set of draft ordinances and regulations; and recommendations for a financial plan to establish and maintain the system.

The study recommended that this system be called the Department of Weights and Measures and Consumer Services, to be located within the Ministry of Commerce and Industry, and reporting directly to a Deputy Director for Regulatory Services. Control of the structure was to be highly centralized. A National Laboratory was to be established at Riyadh, and regional laboratories (to be called Measurement Centers) at Riyadh, Jeddah, and Damman, plus a number of field offices. It further recommended that two senior consultants be employed for periods of two years to organize the structure, establish laboratory operations, and oversee training until returning native trainees were available to operate the system.

I. Taiwan

Visit to Taiwan by NBS Team (F. K. Harris, H. S. Peiser) November 1967 (29).

This visit was made at the request of the Department of State and the President's Science Adviser. The AID program for Taiwan had been terminated because the country had reached a definite level of economic viability. Visits were made to numerous government offices and laboratories relating to standards, quality control, and industrialization, and to industrial companies.

Recommendations included: Expansion of Republic of China National Bureau of Standards measurement capabilities to include electrical measurements, temperature over an extended range, radiation and photometry; for the provision of key calibration services; and for the correlation of national reference standards with the International System. Further equipment and training would be needed to accomplish these things. Measurement science courses should be established or expanded at a nearby university. A National Measurement Center should be developed. Geological Survey activities should be placed at a National level rather than a provincial level.

J. Thailand

Survey by M. R. Meyerson, NBS, of standardization practices in countries of concern to UN/ESCAFE (Economic Council for the Asia and the Far East). (Aug. 25-Sept. 18, 1965) (30).

At the request of the Department of State and AID, a survey was made of the status of standardization in the iron and steel industries of these countries. The central accomplishment was to assist ECAFE Headquarters in Bangkok, Thailand, in preparing a specific program for the introduction of regional standards for iron and steel materials into the ECAFE area. A four-year program and schedule for the establishment of a regional standards organization was prepared and submitted. Included were: Recommendations for the training of standards engineers; a listing of the status of national standards organizations; a plan for the formulation of three regional standards of a specific nature (ferrous metallurgy, non-ferrous metallurgy, and simple engineering products); details of minimal arrangements which must be made prior to formulation of a regional standards organization; and a description of the supporting and consulting personnel needed. A report was made to the Department of State.

K. Turkey

In November 1957 under AID sponsorship, W. G. Brombacher, NBS, provided assistance in planning standards laboratory facilities and activities for the semi-autonomous Turkish Standards Institution (31, 36). About 50 establishments were visited, including government offices and laboratories in Ankara, Izmir, and Istanbul, to universities and research institutes in Ankara, Bursa, and Istanbul, and to factories and factory laboratories in all

four locations. Two reports were prepared, one covering the laboratories needed to support existing industry and agriculture, the other being a list of laboratory equipment to be purchased by the Turkish government. Detailed recommendations were made for both primary standards and commercial and industrial standards, with a list of specific standardization projects.

L. Mission to the Philippines (37)

The Republic of the Philippines requested UNESCO to provide a consultant for a six-week mission to "advise the Philippine Government with reference to the present organization and possible strengthening of the National Institute of Science and Technology." UNESCO asked NBS to recommend one of its staff members. Mr. Arnold Wexler of the NBS staff was appointed consultant for this mission. He arrived in Paris on the 7th of November 1964 for briefing at UNESCO Headquarters and arrived in Manila on the 15th of November 1964. His mission terminated on the 31st of December 1964.

During his stay in the Philippines, he conferred with Government, industrial and university officials. He visited Government agencies, manufacturing plants, industrial organizations, scientific institutes, and universities to survey and assess the technological and industrial development of the country and to obtain information on the needs for testing and analysis of materials and products, for standards and specifications, and for scientific and technological measurements. He studied the structure and operation of NIST and of the Scientific Instruments Center within NIST.

He prepared for the Philippine Government a document requesting monetary assistance from the U.N. Special Fund for establishing a Testing and Standards Center with recommendations for location, buildings, equipment, personnel, and financing. He also prepared a supplementary report to UNESCO on NIST, the Scientific Instruments Repair Center, and the proposed Testing and Standard Center.

Among those consulted were:

Commissioner Cannto G. Manuel, Dep. Comm. Flaviano M. Yenko, and Leopoldo Salazor, Chief of the Division of Tests and Standards, all of NIST; and Juan Salcedo, Jr., Chairman, National Science and Development Board.

III. Technical Assistance for Training in USA

In the decade 1957-1967 NBS trained 1,190 persons from 48 countries. Training requests came from a number of organizations--Fulbright Program, American Council on Education, United Nations, National Aeronautics and Space Administration, National Research Council, Ford Foundation, Office of Cultural Exchange, Council of International Programs, International Labor Organization, World Health Organization, and the Agency for International Development. Most training was of short duration. After 1963 training activities diminished sharply. Since 1960 there have been 22 persons trained for longer periods, ranging from one month to three years. These were from the following countries-- Colombia 3, India 2, Indonesia 2, Iraq 1, Japan 1, Korea 5, Nepal 1, Taiwan 1, Thailand 1, Turkey 2, and Yugoslavia 3.

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Appendix 5

UNIDO/ECA Workshop, November 1970

A training workshop for personnel engaged in standardization was held in Addis Ababa, Ethiopia, 17-24 November 1970, as programmed by Mr. Ademola Banjo of the UNIDO Economic Commission for Africa. The U.S. Agency for International Development sent Dr. Sanford B. Newman of NBS as an observer; other observers were from the Malawi Embassy, Addis Ababa, from IEC, Geneva, and from UNIDO, Vienna.

Participants from Ethiopia, Ghana, Kenya, Nigeria, Sudan, Tanzania, Zambia, Uganda, and the East African Community described standardization work in their own countries. Formal papers were also presented as follows:

J. M. L. Gavin (UK), "Organization and Operation of a National Standardization Body (NSB)"

V. Korenic (UNDP), "Regional Standardization"

W. Artels (ISO), "International Standardization"

L. Wallden (Sweden), "Standardization and Exports Promotion"

J. M. L. Gavin (UK), Standards, Quality Control and the International Market"

L. Wallden (Sweden), "Priorities for Standardization in Specific Sectors"

S. Janicki (Poland), "Training for Standardization"

B. S. Krishnamachar (India), "Basic Standards and Adoption of the Metric System (SI)"

J. Blanc (IEC), "The Work of the International Electrotechnical Commission in International Standardization"

After extended discussion by all participants, the Workshop adopted the following recommendations:

1. Cooperation between UNIDO, ECA, and ISO is welcome, and similar projects should be organized on a recurrent basis.

2. Developing countries should be encouraged to set up viable National Standards Bodies.

3. An Advisory Committee within the ECA Secretariat should be formed to coordinate regional standardization activities.

4. National standards should be alined to ISO and IEC specifications to the maximum extent possible, with intensified activity by ISO/DEVCO.

5. Quality Control and certification schemes should be operated by National Standards Bodies.

6. National Standards Bodies should provide certification for all exports.

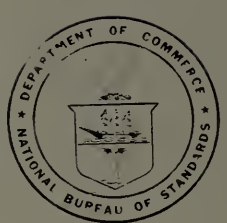
7. Priorities in selecting subjects for standardization should be based on immediate social and economic benefits to the country concerned, once basic standards for quantities and units are established.

8. Technical assistance arrangement for attaching trainees to establish National Standards Bodies, and training of company standards engineers should be made available to developing countries.

9. African countries should adopt the SI, with further UNIDO/UNESCO assistance in metrology.

Some of the participants were aware of training available in Japan, USSR, and Germany. Mr. Krishnamachar mentioned training planned by the Indian Standards Institute, and Mr. Korenic described a workshop to be completely subsidized by the Polish Government. Mr. Newman told of the NBS/AID plans for an industrialization seminar and subsequent training program; the Zambian and the Ethiopian participants expressed interest, and Mr. Krishnamachar offered his assistance.

The Workshop papers and Mr. Newman's trip report are available for inspection.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