NBSIR 77-1385

Report to AID on an NBS/AID Workshop on Standardization and Measurement Services

Edited by:

H. Steffen Peiser
Charles C. Raley
Cathy A. Schroyer

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

Held October 16-30, 1976

Issued December 1977

The Workshop was conducted as a part of the program under the
US/NBS Agency for International Development PASA TA (CE) 6-71

Prepared for
Agency for International Development
Department of State
Washington, D.C. 20523

NBSIR 77-1385

REPORT TO AID ON AN NBS/AID WORKSHOP ON STANDARDIZATION AND MEASUREMENT SERVICES

Edited by:

H. Steffen Peiser
Charles C. Raley
Cathy A. Schroyer

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

Held October 16-30, 1976
Issued December 1977

The Workshop was conducted as a part of the program under the
US/NBS Agency for International Development PASA TA (CE) 6-71

Prepared for
Agency for International Development
Department of State
Washington, D.C. 20523

U.S. DEPARTMENT OF COMMERCE, Juanita M. Kreps, *Secretary*

Dr. Sidney Harman, *Under Secretary*

Jordan J. Baruch, *Assistant Secretary for Science and Technology*

NATIONAL BUREAU OF STANDARDS, Ernest Ambler, *Acting Director*

TABLE OF CONTENTS

INTRODUCTION

On behalf of the National Bureau of Standards and the Agency for International Development, I present once again the Report of one of the annual Workshops on "Standardization and Measurement Services." Distinguished technical leaders from less industrialized regions of the world visit us for two weeks to examine such services provided by the private and public sectors in the United States. It is neither desired nor appropriate to imitate elsewhere the U.S. systems of standards and of metrology, but an awareness has been found useful of how various groups in the United States have responded, or are attempting to respond, to ever changing needs and growing demands for standards and control by measurement. From the NBS viewpoint, it is a challenge to choose typical, well-balanced examples from the U.S. scene when one views the enormous choice available and the very short time our visitors can be with us.

For the most part, I have varied the organizations visited from year to year. Few, other than NBS, the American National Standards Institute, and the American Society for Testing and Materials have been visited by more than one of the six annual workshops that have taken place. It is remarkable that during these itineraries we have been so openly and generously received by virtually all U.S. organizations from which we requested visits and that noted specialists have joined us on many an evening to tell of their professional lives.

I can never properly thank the organizations and individuals who spend so many hours preparing for meetings with the NBS/AID Workshop groups. This year, however, I want to acknowledge especially the unforgettable leadership for development given by the late Edward M. Glass, who chaired and later reported on the Evaluation Session of this Workshop. This event preceded by all too few months his most sudden and unexpected early passing from his exemplary life, the last years of which he spent in unselfish devotion to the development of economically disadvantaged regions of our earth. His time was sought by UN and national agencies and I feel profoundly grateful to him for having supported our Workshop with a closing session which he made into a truly brilliant event. His own report (see page 99) is probably the last written document he left to us who must continue this work if the world is to see a brighter and happier future in peace through industrial development. The reader of this report may also wish to turn to page 103 for the comments and suggestions made by the participants in writing.

As for the rest of the report, it only gives an outline of the programs. Certain papers, however, are presented in full as they

were given to the Workshop. As in previous years, they include some evening discourses by eminent U.S. authorities and contributions by our visitors from less developed countries. The latter are encouraged to pick as topics one of their countries' programs or specific problems in standardization and measurement services; these articles are arranged alphabetically by the countries of the authors.

A special word of thanks is due to our colleagues at NBS who enthusiastically support the annual workshops and give generous personal guidance to these events. We also thank AID for sponsorship and program direction provided this year by Mr. William D. Roseborough in the Office of Science and Technology of the Technical Assistance Bureau of AID in Washington.

H. Steffen Peiser
Chief
Office of International Relations

WORKSHOP PARTICIPANTS AND BIOGRAPHICAL DATA

Mr. Mohammad Kabir Naziri
Director, Industrial and Agricultural Materials
Norms and Standards Department
Ministry of Mines and Industries
Kabul, Afghanistan

Mr. M. K. Naziri, born September 10, 1946, in Kabul, Republic of Afghanistan, is the Director, Industrial and Agricultural Materials, Norms and Standards Department, Afghanistan Ministry of Mines and Industries.

Mr. Mohd. Abul Bashar Khan
Deputy Director, Certification Marks
Bangladesh Standards Institution
3 DIT Extension Avenue
Dacca 2, Bangladesh

Mr. M. A. B. Khan, born January 11, 1927, in Chittagong, Bangladesh, received his M.S. degree in Chemistry from Dacca University in 1951. From December 7, 1972, he has been Deputy Director (Certification Marks) of the Bangladesh Standards Institution.

Mr. Jose Paredes
Chief, Quality Control Department
Direccion General de Normas y Tecnologia
Ministerio de Industria, Comercio y Turismo
Casilla 4430
La Paz, Bolivia

Mr. J. Paredes, born March 18, 1945, received a degree in 1971 from San Andres University in Bolivia. Since January 1975 he has been Chief, Quality Control, Bolivian General Direction of Standards and Technology.

Mr. Hernan Sotomayor
Chief, Weights and Measures Department
Instituto Ecuatoriano de Normalizacion
Casilla 3999
Quito, Ecuador

Mr. H. Sotomayor, born in 1948, received a degree in Electronics and Telecommunications Engineering from the National Polytechnic School of Ecuador. Presently he is National Director of Weights and Measures in the Ecuadorean Institute of Standardization.

Dr. Lawrence Twum-Danso
Principal Scientific Officer and Head, Materials
and Engineering Department
Ghana Standards Board
P.O. Box M. 245
Accra, Ghana

Dr. L. Twum-Danso, born April 28, 1933, received his Ph.D. from Astin University, England. Since 1972, he has been Principal Scientific Officer and Head of the Materials and Engineering Department of the Ghana Standards Board.

Dr. Rex B. Woo-Ming
Government Analyst
Department of the Government Analyst
19-21 Evans and Lyng Streets
Georgetown, Guyana

Dr. R. Woo-Ming, born May 11, 1934, in Buxton, Guyana, received his Ph.D. from the University of the West Indies. He is the Director-designate of the Guyana Bureau of Standards.

Dr. A. R. Verma
Director
National Physical Laboratory
Hillside Road
New Delhi 110012, India

Dr. A. R. Verma, born September 20, 1921, received his Ph.D. from Allahabad University in 1942. Since 1965 he has been the Director of the National Physical Laboratory, New Delhi.

Mr. Herudi Kartowisastro
Director, National Institute for Instrumentation
Indonesian Institute of Sciences
LIPI Complex, Jl. Sangkuriang
Bandung, Indonesia

Mr. H. Kartowisastro, born January 17, 1939, received an engineering degree from the Institute of Technology, Bandung, Indonesia. From 1965 he has been the Director of the Indonesian National Institute of Instrumentation.

Dr. D. Davoudzadeh
Director, Division of Coordination in Formulation
and Implementation of National Standards
Institute of Standards and Industrial Research of Iran
P. O. Box 2937
Tehran, Iran

Dr. D. Davoudzadeh, born February 1942, received his Ph.D. from Strathchyde University, U.K., in 1973. Presently he is Director for Divisional Coordination, Formulation, and Implementation of National Standards in Iran.

Mr. Mahmoud Issa Khasawneh
Acting Director and Head, Standards Section
Directorate of Standards
Ministry of Industry and Trade
P.O. Box 2019
Amman, Jordan

Mr. M. I. Khasawneh, born January 9, 1942, received his B.S. degree in Chemical Engineering from Auburn University, U.S.A. Since 1971 he has been Head of the Standards Section and Acting Director of the Directorate of Standards of Jordan.

Mr. Raila Odinga
Group Standards Manager, Engineering Section
Kenya Bureau of Standards
P.O. Box 10610
Nairobi, Kenya

Mr. R. Odinga, born January 7, 1945, received a post graduate degree from Magdeburg College of Advanced Technology in Mechanical Engineering in 1969. Since 1975 he has been Group Standards Manager for the Kenya Bureau of Standards.

Dr. Wun Jung
Vice-President of Metrology
Korea Standards Research Institute
C.P.O. Box 156
Seoul, Korea

Dr. W. Jung, born June 13, 1932, received a Ph.D. degree in Physics from Purdue University in 1963. Since the beginning of 1976, he has been the Vice-President of Metrology for the Korea Standards Research Institute.

Mr. F. P. A. Obi
Assistant Director
Nigerian Standards Organization
Federal Ministry of Industries
11 Kofo Abayomi Road, Victoria Island
Lagos, Nigeria

Mr. F. P. A. Obi, born August 12, 1933, received a B.S. degree in Chemical Engineering from Purdue University in 1963. From 1971 he has been the Assistant Director of the Nigerian Standards Organization.

Mr. Jawdat M. Nazer
Economic Expert
Ministry of Supply
Sana, Yemen

Mr. J. Nazer, born in 1926, has served since 1974 as an Economic Expert to the Government of Yemen, Ministry of Supply, in the areas of quality control, metrology, and standardization.

Mr. D. Worku, who at the last minute was unable to attend but has contributed a paper, was born in 1936, and received his Masters Degree at the University of Iowa. Since 1974 he has been Head of the Standards Translation, Publication, and Documentation Division, Ethiopian Standards Institution, P.O. Box 2310, Addis Ababa, Ethiopia.

PHOTOGRAPH IDENTIFICATION

Standing (left to right):

Mr. J. Birch, Mr. J. Paredes, Dr. L. Twum-Danso,
Mr. H. Kartowisastro, Mr. S. Peiser, Mr. J. Nazer,
Mr. C. Raley, Dr. R. Woo-Ming, Mrs. D. Bluebond,
Dr. A. Verma, Mrs. F. Bullman, Dr. W. Jung,
Mrs. J. Cornish, Mr. M. Naziri, Dr. E. Brady,
Mr. M. Khan, Mr. H. Sotomayor, Mr. R. Odinga.

Kneeling (left to right):

Mr. F. Obi, Dr. D. Davoudzadeh, Mr. M. Khasawneh.

National Bureau of Standards
Agency for International Development
Workshop on Standardization and Measurement Services

"NBS--A RESOURCE FOR DEVELOPMENT"

October 16 - 30, 1976

October 16, Saturday

AM - PM	Arrival

October 17, Sunday

AM	Free
4:00 PM	Dinner and Talk, Mr. W. L. Eilers Deputy Director, Office of Science and Technology Agency for International Development U.S. Department of State

October 18, Monday

9:00 AM - 9:15 AM	Welcome, Dr. E. Ambler Acting Director, NBS
9:15 AM - 9:45 AM	NBS Overview, Dr. E. L. Brady Associate Director for Information Programs
9:45 AM 10:15 AM -	Workshop Introduction, Mr. H. S. Peiser Chief, Office of International Relations
10:15 AM - 10:30 AM	Break
10:30 AM - 11:45 AM	Executive Session I
11:45 AM -	Lunch
12:45 PM - 2:15 PM	Administrative Procedures
2:15 PM - 3:30 PM	Institute for Basic Standards Dr. H. A. Fowler, Scientific Assistant

3:30 PM - 3:45 PM	Break
3:45 PM - 5:00 PM	Institute for Materials Research Dr. E. Horowitz, Deputy Director
7:00 PM	Dinner and Talk, Dr. C. Weiss Science and Technology Adviser, World Bank Group-International Bank for Reconstruction and Development

October 19, Tuesday

9:00 AM - 10:15 AM	Institute for Applied Technology Dr. C. Muehlhause, Senior Scientist
10:15 AM - 10:30 AM	Break
10:30 AM - 11:45 AM	Institute for Computer Sciences and Technology Mr. P. F. Roth, Chief, Information Technology Analysis
11:45 AM - 12:00 Noon	Group Photograph
12:00 Noon - 2:00 PM	Lunch and Talk, Dr. J. Williams Assistant Director for International Product Standards, Office of the Secretary U.S. Department of Commerce
2:00 PM - 4:00 PM	NBS Tour
4:00 PM - 5:00 PM	Executive Session II

October 20, Wednesday

9:00 AM - 10:15 AM	Office of International Standards Mr. W. E. Andrus, Chief
10:15 AM - 10:30 AM	Break
10:30 AM - 11:15 AM	Office of Measurement Services Mr. J. M. Cameron, Chief

11:15 AM - 12:00 Noon	Office of Standard Reference Materials Mr. G. A. Uriano, Deputy Chief
12:00 Noon - 2:00 PM	Lunch and Talk, Mr. A. W. Alexander Program and Product Manager National Technical Information Service U.S. Department of Commerce
2:00 PM - 4:00 PM	Standards Application and Analysis Division Dr. L. E. Eicher Mr. K. G. Newell Dr. N. F. Somes (Break at 3:30 PM)
4:00 PM - 5:00 PM	Executive Session III
7:00 PM	Dinner and Talk, Dr. J. E. Arem President, Multifacet, Inc.

October 21, Thursday

9:00 AM - 10:15 AM	Center for Building Technology Dr. R. N. Wright, Director
10:15 AM - 10:30 AM	Break
10:30 AM - 11:00 AM	Office of Experimental Technology Incentives Program, Mr. R. T. Penn, Deputy for Operations
11:00 AM - 12:00 Noon	Office of Weights and Measures Mr. J. V. Odom, Metric Coordinator
12:00 Noon	Lunch
2:00 PM - 3:30 PM	Division of Weights and Measures Department of Economic Development District of Columbia Government 1110 U Street, SE Washington, D.C. 20020 Host: Mr. E. Maxwell
5:00 PM	Dinner and Talk, Dr. A. A. Bates Consultant

October 22, Friday

9:00 AM - 9:30 AM	Library Division Mrs. P. W. Berger, Chief
9:30 AM - 10:15 AM	Instrument Shops Division Mr. J. L. Pararas, Chief
10:15 AM - 10:30 AM	Break
10:30 AM - 11:15 AM	Dental and Medical Materials Section Dr. J. M. Cassel, Chief
11:15 AM - 12:00 Noon	Office of Air and Water Measurement Dr. W. H. Kirchhoff, Acting Chief
12:00 Noon - 2:00 PM	Lunch and Talk, Dr. P. G. Harrill Deputy Director, Division of Food Technology Food and Drug Administration U.S. Department of Health, Education and Welfare
2:00 PM - 2:30 PM	Office of Developmental Automation and Control Technology, Dr. R. N. Davis, Director, ICST
2:30 PM - 3:30 PM	Talk, Mr. M. A. Pisciotta Deputy Managing Director of Standards Programs American National Standards Institute, Inc.
3:30 PM - 3:45 PM	Break
3:45 PM 5:00 PM	Executive Session IV
5:00 PM -	Farewell Reception and Dinner

October 23, Saturday

AM - PM	Free

October 24, Sunday

AM - PM	Free

October 25, Monday

10:00 AM — American Society for Testing and Materials
1916 Race Street
Philadelphia, Pennsylvania 19103

Host: Mr. Albert J. Sadler, Assistant to the Deputy Director for National and International Standards Coordination

October 26, Tuesday

9:30 AM — Transportation Test Center
U.S. Department of Transportation
Pueblo, Colorado 81001

Host: Mr. Pres Lockridge, Public Affairs Officer

October 27, Wednesday

9:00 AM — Institute for Basic Standards
National Bureau of Standards
Boulder, Colorado 80302

Host: Mr. R. D. Harrington, Chief
Program Coordination Office

October 28, Thursday

9:30 AM — Stanford Research Institute
333 Ravenswood Avenue
Menlo Park, California 94025

Host: Dr. Charles A. Anderson
President and Chief Executive Officer

12:00 Noon — Stanford University
Stanford, California 94305

Host: Mr. Donald T. Carlson
Director, University Relations

October 29, Friday

10:00 AM — Hughes Aircraft Company
P.O. Box 90515
Los Angeles, California 90009

Host: Mr. Roy H. Leach, Manager, Advanced Program Development, Support Systems Division

October 30, Saturday

7:30 AM - 12:00 Noon — Breakfast and Concluding Session
Chairman: Mr. E. M. Glass
Technical Assistance Expert

WELCOME TO NBS/AID WORKSHOP

by

Dr. E. Ambler
Acting Director, NBS

Good Morning. And welcome to the sixth NBS/AID Workshop on Standardization and Measurement Services. One of the most vital elements in technological progress is the availability of adequate and appropriate measurement capabilities.

Our Secretary of Commerce, Mr. Elliot Richardson, delights in telling the story of the merchant in ancient times. It seems the merchant called to his assistant, "Hand me the measuring stick." To which the assistant replied, "The one by which we sell, or the one by which we buy?" Mr. Richardson concluded by noting "that was a country in need of a national standards organization."

It is an acknowledged fact that standards based on technical measurements are the basic building blocks for a growing economy. Mr. Richardson's little story points out the fact that they assure equity in the marketplace, providing confidence to both buyer and seller. And without confidence on both sides, the exchange of goods would grind to a halt.

Standards and measurements are also a known factor in the enhancement of productivity. It was the development of standardized parts that made mass production a reality. Even today, as we develop more sophisticated means of producing goods, standards and measurements are still a key factor in both implementation and production.

The development of a highly complex and technical society requires basic norms and agreements to which all men can adhere. This forms the nucleus of our system of laws and justice and it underlies our flow of goods and services to the marketplace. Thus, standards and measurement services are responsible for the manner in which we mark time, size clothing, determine load bearing strength of building walls, prescribe medication levels, evaluate materials, and a host of others.

In short, these services determine the standard of living for the citizens of our respective societies. The governments of many nations have recognized the importance of a central organization responsible for maintaining basic standards, developing measurement techniques and establishing dissemination procedures. In the United States, that responsibility was given to this organization.

For the past seventy-five years, NBS has carried out a mission developed to support and encourage the growth of commerce, industry, science and technology. Our programs range from research aimed at exploiting scientific discovery to produce better tools of measurement to applied technology aimed at resolving problems of immediate practical importance.

In recent years, one fact has become increasingly clear. More and more, the marketplace wherein our respective societies conduct business is an international marketplace. And the language of communication in that marketplace is standards and measurement services. For that is the most elementary and necessary bond to develop communication between buyer and seller of different nationalities.

But, I'm sure that I'm not telling you anything new with that fact. However, the fact that our respective countries have recognized the need for common communication through standards and measurement services is relatively new. The American humorist Will Rogers once said, "even if you're on the right track you'll get run over if you just sit there."

Recognition of our need has us on the right track. Our participation in this Workshop provides the means for forward motion on that track. And hopefully, twelve days from now, when you sit down to breakfast and the concluding session in Los Angeles, California, you will have moved down that track to lay the groundwork for increasing the standardization and measurement services in your countries.

MINERAL RESOURCES IN A NEW LIGHT

by

Dr. Joel E. Arem, F.G.A.
Multifacet, Inc.

Astronauts on their way to the moon have described the earth as a "fragile piece of blue," floating in space. We are increasingly aware that our planet is indeed a fragile environment, subject to the accumulated abuses of a technological civilization. Our globe is a closed system, and we must surely pay the penalties for its mismanagement. Since most of us cannot leave the earth, we are obliged to take good care of the only home we have.

Rising standards of living throughout the world have resulted in tremendous expansion of the quest for natural resources of all kinds. The backbone of an industrialized economy is an ample supply of minerals and fuels. Developing nations have been increasingly pressured to exploit their own natural resources and export them to other countries, while at the same time internal pressures have forced governments to seek improvement for living conditions at home. But the basic key to development always remains wealth from the ground.

In the United States and many European countries, affluence has become a way of life for millions of people. With basic living conditions easily paid for by relatively few working hours, leisure time and excess capital to spend on hobbies is a normal part of the lives of many. In the past few decades, there has been a fantastic growth in the collection of minerals, not for their intrinsic value as sources of metal or fuel, but for their esthetic qualities. Even such mundane materials as cinnabar (mercury sulfide), metallic copper, manganite (manganese oxide), galena (lead sulfide), wolframite (iron tungstate), millerite (nickel sulfide), stibnite (antimony sulfide), and calcite (calcium carbonate) occur in spectacular crystals that are highly prized by collectors.

Certain mines and localities are well known to collectors around the world for the fine mineral specimens they produce. In almost all cases, these specimens are, on a pound-for-pound basis, worth far more than the massive ores in which they are found. The value of specimens can be so high, in fact, that marginally profitable mines could sometimes be profitably worked just for specimens.

Usually it is the gangue minerals, unwanted oxides, carbonates, and sulfates associated with commercial orebodies, that provide the

collectors with desirable specimens. These minerals include siderite (iron carbonate), wulfenite (lead molybdate), vanadinite (lead vanadate), proustite (silver sulfide), and calcite. Unlike the more somber-colored ore minerals, these minerals are usually brightly colored and make spectacular showpieces or display items in museums and private collections.

The lure of finding beautiful or valuable mineral specimens has created a major collecting movement in the U.S. and other countries, especially Germany, France, England, Switzerland, and Italy. Field trips have several major attractions: they offer an opportunity to get outdoors and get some exercise, especially for the average middle-class worker who spends most of his time at a desk. Collectors can be found in the field in any weather, on back roads or in places where there are no roads at all, exploring old mines and dumps, even digging great pits into the ground. The hobby is quite liberated in that women are equal participants. The "collecting fever" can be quite virulent, leading to unparalleled exertions in such areas as weight lifting and endurance. The work of collecting may be strenuous, but for many the rewards, in terms of material found, are great.

Although many hobbyists are mineral collectors, the so-called mineral and gem hobby is actually dominated by gem cutters and collectors. Lapidary, or gem cutting, accounts for approximately 90 percent of all money spent in the hobby, most of this going for cutting materials (rough), supplies, and equipment, as well as books and tools. Any colorful rock or mineral may be considered suitable for cutting by hobbyists; agate and jasper are the most popular and abundant of such materials. But even minerals that are considered ore, such as malachite, may be cut for jewelry, ashtrays, or other decorative objects. Of course, the well-known gemstones, such as beryl, topaz, and peridot, are mineral resources of great intrinsic value that are mined for their own right throughout the world and may play a great role in the economies of some countries, such as India, Sri Lanka, Burma, and Australia.

The hobby movement has, in addition to these gems, created a range of desirable gem materials not generally regarded as such by the gem trade. There is a small but growing number of connoisseurs, collectors of rare stones, who regard any transparent mineral as a potential gemstone. Such materials as calcite, barite, rhodochrosite (manganese carbonate), scheelite (calcium tungstate), cassiterite (tin oxide), and stibiotantalite (antimony iron tantalum oxide) have all been faceted for collectors. Some of these cut stones are among the rarest of all natural objects, and their potential for price appreciation is unrivaled.

Gemstones, in general, offer a haven from the ravages of inflation, because they are non-perishable, durable, beautiful, have accepted value worldwide, and their scarcity value seldom decreases. In the 1970's the gem market has seen a major increase in public awareness of the desirability of colored gems, as well as diamonds. This increased demand, coupled with increasing scarcity of some gems due to political problems in countries of origin, has driven up gem prices in a dramatic way, increasing their visability as investment vehicles. Developing nations that have gem material resources have become increasingly aware of this potential, and the desirability of creating a local gem cutting industry is becoming more and more apparent in many countries.

A major factor in the development of the gem and mineral hobby is the fact that it strongly attracts young people. The youth of a nation can, through motivation and education, be turned into a massive field explorationary force that can rapidly expand knowledge of local resources. An army of young people in the field picking up samples can map out far more ground than a small group of geologists ever could.

In conclusion, the development of awareness of the value of mineral specimens and potential gem materials in many countries is most desirable. Every effort should be made to educate local mining industries as to the value of such materials and stimulate them to preserve specimen minerals as natural resources.

A BRIEF TALK ON NORMS AND STANDARDS PROGRAMS IN AFGHANISTAN

by

Mr. Mohammad Kabir Naziri
Director of Standardization for
Industrial and Agricultural Materials
Norms and Standards Department
Ministry of Mines and Industries
Kabul, Afghanistan

In a technical and scientific workshop of so many distinguished experts in standardization, I am not going to say anything about the importance of standardization, its aims, and advantages. However, as the Director of Industrial and Agricultural Materials of the Afghan Norms and Standards Department (ANSD) of Afghanistan, I may be allowed to give a brief account of the activities of Afghanistan in the field of standardization.

Afghanistan, with a population of some 17 million people, is primarily an agricultural country. Nothing comes easily in Afghanistan, for it is a hard mountainous land, divided through its center by a rugged mountain range. During the long, dry, hot summers a great deal of effort must be applied to irrigation if the ground is to be made to yield its crops of rice, fruits, cotton, sugar beets, and sugar cane, and to support the sheep and cattle of the country.

Natural resources exist, such as coal, natural gas, marble, mercury, beryllium, and lapis lazuli. Besides these, the country is also known to have deposits of petroleum, minerals like sulfur, fluorite, barite, asbestos, mica, rock-salt, etc.

The economy of Afghanistan is based on agriculture and small-scale industry. Major products are: fresh and dried fruits, karakul pelts, hand-woven carpets and rugs, cotton, furs, and a large variety of handicrafts.

The population is spread throughout the country in small villages in addition to some concentrations in the towns and cities. More than 80 percent of the people work in agriculture and with livestock. Industry in Afghanistan is now developing alongside agriculture.

In 1919, Afghanistan received its independence after the third Anglo-Afghan War. In July 1973, the country reached its zenith of progress in the establishment of the Republic of Afghanistan by a national hero, Mohammad Daoud.

Under the direction of the leader of the revolution, Head of State and Prime Minister Mohammad Daoud, the Government and the people of the

Republic of Afghanistan have worked hard to make up for time lost in the past and to create the foundations for a prosperous Afghanistan. The new Republican Government has accelerated efforts in every direction. For example, until 1973 Afghanistan had not had a National Department of Standards which could concern itself with the study and preparation of national standards. In September 1973, under the direction of the Government, a new department of "Norms and Standards" was established. ANSD is working within the framework of the Ministry of Mines and Industries and has the following aims and functions:

AIM:

1. to improve the effectiveness and the capability of domestic production in various sectors and to promote the quality of products to meet national and international requirements;

2. to secure the required qualities of goods in order to minimize the diversity and quantity of imports; and

3. to obtain a maximum and reasonable advantage from the products and resources and to minimize the use of human and national resources.

FUNCTION:

1. to plan and set up the national standards for all the products including local and imported;

2. to set up national standards for measuring methods estimation and control;

3. to study and apply international standards to utilize those standards according to the economical, social, cultural, and regional conditions of Afghanistan;

4. to publish and distribute approved standards, and to apply them in concerned fields;

5. to cooperate with industrial and scientific organizations, with public and private sectors, and to consider their proposals for developing national standards and preparing the standards for all traditional handicrafts;

6. to carry out different scientific, technical, and economic investigations and researches in order to set national standards;

7. to create cooperative relations with international and regional standards organizations and to apply the recommendations and experiences of international organizations;

8. to strengthen cooperative relationships with the universities and all scientific and educational institutions of the country, to investigate and approve the national standards and quality control of products;

9. to prepare the bylaws, regulations, and functional directives of ANSD;

10. to publish and issue publications on standardization affairs;

11. to establish archives for the national and international standards for achieving more benefits from these standards;

12. to establish and maintain laboratories for the purpose of scientific and technical investigations in the field of standardization, and also to control the quality of products;

13. to train vocational and administrative personnel by establishing long- and short-term service courses administered by ANSD and also to send such personnel to friendly countries for increasing their vocational and administrative knowledge of standardization;

14. to give technical and scientific guidance to producers and commercial firms, to create facilities for improving national products and to limit the number of imports of inferior quality goods;

15. to test and examine samples of products and to issue permits for the privilege of use of the standards symbol, according to the regulations; and

16. to supervise the sampling and comparing with given standards.

At present 28 graduate personnel are working in the ANSD and there are plans for increasing the number of this personnel in the future.

The major objective behind ANSD is to develop national standards for a minimum quality of products and then further to increase the quality to meet national and international expectations.

In order to achieve this end, we need to draw up a comprehensive and practical program. Under this plan, first of all, norms and standards will be introduced and popularized on a national level. Parallel to that effort it is planned to establish laboratories for testing and researching products for developing national standards.

The first part of the program which has been implemented since the establishment of the ANSD is concerned with publicizing norms and

standards in the country and with overcoming the shortage of needed technical personnel through holding of seminars and conferences and teaching of norms and standards at university level. So far in five seminars and one conference a total of 345 people and by teaching the scientific fundamentals of norms and standards at the Polytechnic College a total of 311 people have been acquainted with the principles of norms and standards.

The second part of the program will include the establishment of laboratories. The construction of a separate building will require more time and money. Nevertheless, it is hoped that the second part of the program will also be undertaken.

Surveys and studies carried out on norms and standards by the Ministry of Mines and Industries during the past two years show that implementation of norms and standards, national and international, in different economic and social fields is now more imperative and necessary in Afghanistan than at any other time. Utilizing scientific principles of norms and standards in production activities for importing consumer goods and exporting handicrafts, natural resources, and agricultural products will not only accelerate the pace of economic growth in the country, but will also prevent irregularities in diverse activities.

Statistics and observations show that, with the exception of a few items, most products are being imported into the country without due attention to norms, standards, and technical specifications. Even among those goods that are imported on the basis of standards there are many instances where such standards and norms do not meet conditions and requirements in Afghanistan. They can also adversely affect the people and national economy. To solve this problem, strict control of imported goods, from a standards and norms point of view, will help local industries to turn out good quality products and save consumers from using goods of inferior quality.

In accordance with programs of the ANSD, so far 23 draft standards for different kinds of textiles and 2 for raisins have been prepared by technical commissions. They are ready for approval. For the industrial sector, standardization of chemicals, wood, and cotton, and for the mining sector, standardization of salt, industrial salt, talc, barite, coal, and cement have been studied by concerned technical commissions. Similarly, to standardize raw hides and skins, leather and leather goods, edible oil, soaps, and a few other items, studies are going ahead by concerned sections of ANSD.

Recently, the Government of Afghanistan, after observing and reading reports of the activities of the ANSD, has issued orders to all ministries, concerned firms, and organizations in the country to

develop their norms and standards with technical help and assistance from ANSD.

ANSD, through proper channels, has applied for membership in the International Organization for Standardization. Afghanistan has also applied for membership in the Asian Standardizing Advisory Committee and the International Electrotechnical Commission. ANSD hopes to establish fruitful contacts with ISO, IEC, ASAC, and with individual norms and standards bodies in different countries.

I hope that my visit to the National Bureau of Standards in the United States of America will be useful and bring benefits to us for developing our future activities in the field of standardization and that we will have good and regular contacts in this important field.

STANDARDIZATION AND MEASUREMENT SERVICES IN BANGLADESH

By

Mr. Mohd. Abul Bashar Khan
Deputy Director
Bangladesh Standards Institution
Dacca, Bangladesh

Bangladesh, which is hardly five years old as a sovereign, independent country, has had to tackle its standardization problems since its inception. Before liberation, a regional office of the erstwhile Pakistan Standards Institution was functioning at Dacca and so was a Certification Marks Inspectorate at Chittagong. On liberation of Bangladesh, the regional office which was merely functioning as a liaison office was up-graded and set up as the national standards institution called Bangladesh Standards Institution with headquarters in Dacca. It has presently a regional office at Chittagong mainly for inspection and certification work.

The main functions of BDSI are:

i) To prepare and promote general adoption of standards on a national and international basis relating to materials, structures, commodities, practices, operations, etc., and, from time to time, to revise, alter, and amend these standards.

ii) To consider and recommend to the Government national standards for measurement of length, mass, volume, and energy.

iii) To promote standardization, quality control, and simplification in industry and commerce.

iv) To provide for the registration of the standardization marks applicable to products, commodities, etc., for which the Institution issues standards to be branded on or applied to these products and commodities, which conform to the standards.

v) To provide or arrange facilities for examination and testing of commodities, etc., for any investigation or research that may be necessary.

vi) To establish, form, furnish, and maintain libraries, museums, and laboratories for the purpose of furthering the practice of standardization.

vii) To communicate information to members on matters connected with standardization and to print, publish, issue, and circulate periodicals, books, circulars, leaflets, and other publications as may seem conducive to any of the objectives of the Institution.

BDSI, although autonomous in character, is presently under the administrative control of the Ministry of Industries. The General Council, i.e., the governing body of the Institution, may be appointed soon. BDSI is mainly financed by Government grants-in-aid; the income from other sources such as sale of standards, certification marking fees, and sustaining membership is as yet small.

DIVISIONS AND DIVISIONAL COUNCILS

The work of BDSI, for the time being, is distributed among the following Divisional Councils and Divisions:

1) Agricultural and Food Products Divisional Council - This Council deals with the national standards relating to agricultural products such as tea, coffee, frozen prawns and shrimps, milk and milk products, cereals and pulses (seeds), etc. Draft standards are processed through the Sectional Committees appointed by the Divisional Council. The Divisional Council and the Sectional Committees are constituted from representatives of the respective interests of users (Government and private), manufacturers, and other persons or bodies, concerned or associated with the industries included in the Divisional or Sectional Committees. Bangladesh standards for tea, coffee, sugar, frozen prawns, and shrimps, milk products, oilcakes, fruits, and vegetable products have already been prepared.

2) Jute and Textile Divisional Council - Jute is the principal foreign exchange earner for Bangladesh. This Divisional Council, through its two Sectional Committees for Jute Fibers and Jute Products, has given priorities to the preparation of export standards for jute and jute products. Two Bangladesh standards for jute (pacca and katcha grade) have already been implemented by the Ministry of Jute. Jute product standards such as for Bangladesh Hessians, jute carpet backing fabrics, jute bags for cement packing, etc., have almost been finalized.

3) Electro-technical Divisional Council - This Divisional Council has already finalized standards for ceiling fans, chokes (ballasts for fluorescent lamps), glossary of terms relating to electrical cables and wires, etc.

4) Other Divisional Councils - Mechanical, Civil Engineering and Chemical Divisional Councils are working in a limited way.

Bangladesh standards for fire extinguishers, hurricane lanterns, M.S. nails for general engineering purposes, kerosines, water for use in secondary storage batteries, etc., have been finalized.

Besides the above standards prepared since liberation, 400 Pakistan standards have also been adopted as Bangladesh standards.

PROBLEMS AND DIFFICULTIES IN STANDARDIZATION

i) Laboratory facilities - BDSI has no laboratory of its own. So, problems associated with the preparation of standards have to be referred to other laboratories, which have their own priorities and commitments. They are also faced with difficulties such as additional funds to undertake investigations of such problems and also for reagents, chemicals, etc.

ii) The manufacturers do not come forward with standards drafts of their own. So the BDSI technical officers consult the ISO and other foreign national standards and prepare a draft for consideration by the Sectional Committee.

The Sectional Committee is sometimes bogged down in the absence of statistics and confirmed data, particularly when a new project for standardization is taken up and there is no corresponding ISO standard or well-recognized foreign standard. When a laboratory can be pursuaded to undertake a particular investigation, its data cannot be checked in another reference laboratory within the country. The Bangladesh laboratories deserve to be mentioned: the Laboratories of the Bangladesh Council of Scientific and Industrial Research, and the Central Testing Laboratories. While the former is engaged in fundamental and applied research, the latter is only testing samples sent by the Government departments, private industries, or commercial organizations. So there is no laboratory in Bangladesh exclusively devoted to the purpose of standardization, certification marking, and metrication services.

CERTIFICATION MARKING AND QUALITY CONTROL

The Certification Marks Ordinance, 1961, has empowered the BDSI to establish and publish Bangladesh standards, to specify a standards mark (Certification Mark), to grant and renew licenses, to levy fees for granting of such licenses, and also to make inspections and to take samples of any material, etc. Under the Ordinance, the Government has powers to prohibit export of any product, which does not conform to a Bangladesh standard and bear the BDSI Certification Mark. The Government has already prohibited export of (i) cane molasses, (ii) oilcakes, (iii) electrical accessories including ceiling fans, secondary storage batteries and dry cell batteries, (iv) biscuits (cookies), and (v) PVC electric cables, unless they bear the Certification Mark.

The Inspectors of BDSI either draw samples from the mills and factories or from the export point, or from both. The samples are tested in some Government laboratories and, if they conform to the relevant Bangladesh standards, a Certification Marks License is issued to the manufacturer/exporter for export of the commodities concerned.

In the absence of laboratories within BDSI, the samples cannot be tested as expeditiously as they should be. Sometimes the result of an analysis is required by the exporter within 48 hours. The Central Testing Laboratories are cooperating with BDSI in this task. Yet a separate BDSI laboratory could instill more confidence in the minds of the exporters, besides accelerating the certification marking activities.

METRICATION OF WEIGHTS AND MEASURES

Bangladesh has traditional weights (maunds, seers, chhataks) and imperial measures (i.e., on the foot-pound-second system). In the interests of export and for educating our children in the international system, the Government has agreed in principle to switch to the metric (SI) system of weights and measures at an early date. BDSI has been asked to prepare a plan for this changeover, stating the estimated cost, the institutional and other facilities to be created, the transition period, etc. The metric Standard Weights and Measures Act, 1967, legislated during Pakistan time, needs to be suitably modified in the changed circumstances of Bangladesh.

QUALITY CONTROL IN BOLIVIAN INDUSTRY

By

Mr. Jose Paredes
Chief, Quality Control Department
Directorate General of Standards and Technology
Ministry of Industry, Commerce, and Tourism
La Paz, Bolivia

The modern concept of integrated quality control that has evolved through operating experience covering a period of half a century is described as:

"An effective system for integrating quality development, quality maintenance, and quality improvement efforts of various groups in an organization so that production and service are carried out at the most economic levels that will bring full customer satisfaction."

In the development of that concept, the function of a company which designs, processes, and sells products in a competitive market is taken into consideration. To be successful, the company has to take into account the impact of the many stages of the industrial process where quality of any product is affected. Moreover, this concept has evolved as a result of the pressure which manufacturers operating in highly industrial societies are required to face due to conflicting demands:

a) increasingly high quality requirements by customers,

b) the necessity to upgrade in-plant quality control practices and techniques to meet these demands, and

c) rising quality costs which could tend to place even the best manufacturers in an unfavorable competitive position.

In contrast to the above, industry in Bolivia is operating in a different situation. Since her industries are at early stages of development, the Government is providing a number of facilities among which the following are relevant.

a) The Supreme Decree (DS) No. 9984 of November 5, 1971, guarantees national industry an assured market in the public sector. All public institutions, statutory bodies, and industrial units in the public sectors are required to make purchases of goods for use or consumption from domestic industry where that industry is in a position to meet the requirements both in respect to quality and quantity, and provided price does not exceed 20 percent of the cost of importing these items.

b) DS 12914 of October 3, 1975, prohibits for a period of two years importation of a number of products manufactured in-country, so that domestic industry, with the assurance of an even larger internal market, is given the chance of establishing itself competitively in international markets.

Both Supreme Decrees emphasize the need for domestic industry to maintain and improve the quality of the products. However, since there are few manufacturers in Bolivia, no effective competition exists to provide the required incentives to the manufacturers for concerted efforts to maintain or improve quality or to reduce price. This situation was countered by operating a lot certification scheme and by introducing a certification mark which put some pressure on industry to provide adequate attention to product quality.

Domestic industry in Bolivia is at a very early stage of development. It seldom engages in research and development activities which could provide guidelines for manufacturing. The design of products, manufacturing processes, etc., of international business houses are adopted by Bolivian industry. Its problems are therefore related to difficulties in adhering to those requirements under local conditions.

Operating under this handicap, the national industry needs to be given emphasis on quality control activities. Studies have recently been conducted on the present situation in some industrial sectors of Bolivia. One can summarize the conclusions of all such studies. Lack in quality control leads to problems in the processing industry. The consequence is deficient quality of products.

This situation seems to be a result of the traditional economy of Bolivia, which is governed by unsatisfied demand. Quality considerations play little or no part. However, the situation will change when quality will become a prime interest to the producer, consumer, and the whole society.

In order to accelerate this change, the Bolivian Directorate General of Standards and Technology (DGNT) was established in 1971 under the direction of the Ministry of Industry, Commerce, and Tourism. DGNT emphasizes that the efforts for promoting quality control in Bolivian industry in the initial stages must be guided by the following considerations:

a) Standards of quality of finished products must be established to guide manufacturing operations.

b) Quality standards need also to be established for raw materials and semi-finished products procured from the market for further processing to products of desired quality.

c) Standards of quality of finished products, raw materials, etc., become meaningful only when a system is in operation to ensure conformance to the standards.

d) Without an efficient system of control of quality during production, it is impossible to reduce rejection rates and to ensure a uniform quality of finished products.

e) Evaluation of quality, testing equipment, and trained manpower are basic needs.

f) Without a suitable in-plant organization with adequate authority for the establishment of standards, a system of control, etc., and continuous supervision of the plant operation on the basis of the above quality control, activities are not likely to yield beneficial results.

DGNT has a Department of Quality Control (DQC). Its basic aim is to promote quality control in the domestic industry. All functions of DQC are oriented towards providing required incentives to manufacturers to establish quality control procedures. With this objective in view, the activities of the DQC are as follows:

1. Lot Certification Scheme

The Lot Certification Scheme is basically a service to Government departments, statutory bodies, etc., for inspection of goods manufactured in the country before they are procured. However, experience has indicated that quite often specifications underlying purchase contracts are so vague that quality certification becomes meaningless. Consequently, DQC offers advice to purchasers on specifications of goods which will form the basis of their procurements.

Such Lot Certification on a compulsory basis to regulate procurement of goods for use of Government departments, etc., would no doubt have some impact on quality control during production.

2. Standard Mark Certification Scheme

The Standard Mark Certification Scheme aims at providing incentives to manufacturers for producing goods that conform to a national standard. Authorized use of the Standard Mark on products indicates that the products conform to a national standard. It is a voluntary scheme, but there are additional incentives for manufacturers to join. Effective promotion and administration of the scheme has been planned as an important function of DQC.

3. Technical Assistance for Quality Control

In the past DGNT only assisted in the identification of the areas where actions had to be concentrated for promotion of quality control in industry. These activities related to the Lot Certification and the Standards Mark Certification Schemes which promote quality control in the domestic industry. However, these schemes would have little impact on quality control if Bolivia did not also consider a number of other means for promotion of quality control activities. Technical assistance services should include:

a) half-day seminars for management support on quality control;

b) training programs on quality control methods and techniques for nominees of industries engaged in the activity; and

c) consultancy services on quality control for industrial units.

In addition to providing assistance for solution of specific problems, the DQC aims at guiding the establishment of systems of control at various stages of manufacture of products to obtain uniform quality in conformance with standards. At first, efforts were concentrated on the following to meet the immediate needs of domestic industry:

a) development of purchase specifications to regulate procurement of raw materials, semi-finished products, etc., for processing;

b) a system of control for incoming material, materials handling, and storage;

c) establishment of a quality control system for manufacture to specified limits;

d) establishment of product standards for the manufacturer;

e) a system for inspection and testing for ensuring conformity of products to establishment standards, for safe packaging and repair services;

f) advice on procurement for maintenance and proper use of testing equipment for quality control; and

g) advice on an organization for quality control within the factory.

In summary, the activities of DGNT for the promotion of quality control in Bolivian industry are:

a) the Lot Certification Scheme,

b) the Standard Mark Certification Scheme, and

c) Technical Assistance for Quality Control.

That, in brief, is a modest presentation of the situation on quality control in Bolivian industry. It is possible to see that DGNT is contributing to the promotion of quality control at the national level.

THE NATIONAL PROGRAM OF METROLOGY IN ECUADOR

By

Mr. Hernan Sotomayor
Chief, Weights and Measures Department
Instituto Ecuatoriano de Normalizacion
Quito, Ecuador

The Instituto Ecuatoriano de Normalizacion (INEN) is the governmental national institution for standardization, quality control, and metrology. To have these three technical activities in the same organization is a great advantage for the country, because related implementations can be simultaneous and well coordinated. Metrology is considered the basis for standardization and quality control, because without a good system of measurement they cannot be implemented.

After some studies of industry and commerce, INEN in 1972 decided to initiate its program of metrology with three main objectives:

(i) to maintain the national standards of mass, length, and volume,

(ii) to promote equity in markets, and

(iii) to implant the international system of metric units, SI.

To recruit new personnel was quite difficult, because metrology is a new discipline and the universities do not offer this subject in engineering curricula, but eventually the Metrology Department secured an engineer, a technician, an economist, and a secretary. This group made an investigation to determine the level of accuracy and precision used in industry, in order to establish the requirements and specifications for the national standards, which were purchased in 1973 with the assistance of the National Bureau of Standards. Additional complementary equipment needed for tests and calibrations of other equipment used in the industry and commerce was also purchased. With this as a basis, the National Metrology Laboratory was created on March 22, 1973. Activities in the areas of mass, length, and volume were immediately established.

To enforce the program of metrology, a Weights and Measures Law was elaborated during 1973 and promulgated in January 1974. It establishes the use of SI in the country for all activities, but allows a period for conversion of 10 years. The Law also makes necessary legal dispositions to achieve equity in markets. One disposition of the Law establishes at INEN the National Directorate of Weights and Measures which is the legal authority in metrology.

In January 1976, the program of metrology was divided into three main fields:

(i) SI conversion

(ii) scientific metrology, and

(iii) legal metrology,

each one handled by a separate department.

The Department for SI conversion during the past two years has been doing many investigations and surveys within industry and commerce in order to elaborate the National Program for Implantation of SI. In this Program all the details are given about the methods to be used in the change of units of measurement, the policies to be followed, and also the dates by which the various activities of the country shall be using exclusively the SI Units. This Department also makes the necessary contacts with industries, organizations, and government institutions in order to organize executive commissions in each sector. These commissions are given the necessary assistance and orientation by the Department so that they can handle the problems and situations created by the change of units. As a complementary activity the Department has to prepare technical information such as conversion tables and standards requested during the period of implantation of SI. Different formats are found effective according to the persons to whom they are to be distributed, such as technicians, engineers, consumers, students, etc. The Department also provides the necessary assistance in the preparation of regulations issued in accordance to the provisions of the Law. It has to organize and conduct publicity campaigns in all the country in order to promote the publications and to help everybody in the usage of the new units of measurement.

The Metrology Department is responsible within the National Metrology Laboratory for the use and care of the national standards, and for tests and calibrations of secondary and tertiary standards. This Department elaborates the necessary standards for laboratory measuring equipment, for example: equal arm balances, one-pan balances or special purpose scales, micrometers, calipers, rulers, tapes, etc., establishing specifications, tolerances, and other requirements in order to enforce type approval of those products, whether manufactured in the country or imported. A special regulation was elaborated mentioning all the procedures to be followed in order to obtain a specially authorized seal of approval. The Metrology Department conducts many investigations in laboratories of the universities and records the metrological capabilities of technical personnel and equipment. It qualifies them as auxiliary laboratories for testing products or materials according to the needs of the Quality Control Program. If these laboratories agree to participate in the Laboratory Auditing Program, necessary instruction of the personnel is given in

the National Metrology Laboratory. The equipment of these laboratories is tested and certified. The expected maintenance of accuracy and precision is established and recorded in control charts for all that equipment. They can be used as accredited auxiliary laboratories for testing, calibration, and certification of weighing and measuring equipment, according to the available facilities. Other important activities of the Metrology Department are assistance provided to industry in the purchase of equipment, in repair and maintenance of equipment actually in use, and generally in a full evaluation of the metrological facilities.

The third department involved in metrological activities is the National Directorate of Weights and Measures, which is the highest authority for all the country. It works basically in two ways, as technical consultant and also as legal authority.

During investigations conducted by INEN in industry and commerce, the principal problems in weighing and measuring were found to be unwarranted use of equipment that does not meet technical requirements of accuracy and precision; complete confidence in equipment that has not been tested, repaired, maintained, or even cleaned; purchase of equipment on the basis only of price without looking at the quality of the instruments or without establishing the real needs of accuracy, precision, minimum graduation, maximum capacity, or other basic technical requirements for selection. Those problems created the need for INEN to elaborate standards for commercial weighing and measuring equipment. They established the main requirements and tolerances that the equipment has to meet whether manufactured in the country or imported. The application of these standards harmonizes with the procedures established for the program of type approval.

The packaging industry has special problems because it has used inadequate procedures and defective equipment. The National Directorate of Weights and Measures is involved in a special project, assisting that industry in the implantation of a Quality Control Program which has three steps. The first establishes the requirements which the weighing and measuring equipment should meet. It also identifies the need for calibration, adjustments, or repair of the equipment actually in use, or the purchase of new equipment. The second step is for personnel of INEN and the industry to work together for a short time establishing the control system and how problems should be corrected. In the third step, the industry initiates a statistical control of the production using charts designed for this purpose. Copies of these charts should be sent to INEN, which audits the program.

Another important activity is the control of the import of equipment for weighing or measuring. In this way, instruments that do not meet the requirements established in the standards can be eliminated. Otherwise industry might buy unauthorized equipment that later must be condemned by INEN.

The legal activities related to the application of the Weights and Measures Law are basically divided into three types. The first is training of other authorities in the application of the Law, and the use of: new techniques of measurement, modern equipment, the new system of units, and other technical aspects of this new field of metrology. The second is to provide assistance in the purchase of new testing equipment and the third is the control of the application of the Law.

The National Directorate of Weights and Measures itself also inspects and tests. For this purpose its activities are divided into three main fields: scales, packaging and labeling, and flow measurement systems.

INEN, as a whole, is affected by a shortage of funding that restricts its activities, contrary to the needs of the country, causing several problems in the development process.

PROBLEMS AND EXPERIENCES IN STANDARDIZING LOCAL SCIENTIFIC AND TECHNOLOGICAL TERMINOLOGIES AND IN TRANSLATING NATIONAL STANDARDS IN ENGLISH INTO AMHARIC--ONE OF THE MAJOR LANGUAGES IN ETHIOPIA

By

Mr. Daniachew Worku
Head, Translation, Publication and Documentation Division
Ethiopian Standards Institution
Addis Ababa, Ethiopia

1. INTRODUCTION

Ethiopian standards are produced in English and then translated into Amharic--the working language which, for implementation, has more operational weight in courts of law than the English language. The point here, however, is neither that Ethiopian standards are being produced and published in two languages nor that one language has more operational weight than the other. Situations like this appear in other national or international standards organizations. For example, the Standards Institution of Israel (SII) and the Arab Organization for Standardization and Metrology (ASMO) produce their standards in Hebrew and English and in Arabic and English, respectively; the International Organization for Standardization (ISO) publishes its standards in English, French, and Russian; certain countries like Sweden, Switzerland, Austria, and Canada are either bilingual or trilingual. What is important here is that the above mentioned national and international organizations seem to encounter little or no problems with regard to terminology and translation as compared with the difficulties faced by the Ethiopian Standards Institution.

European, Asian (except some Third World countries), and American (except some Latin American) countries have languages rich in scientific and technological vocabulary due to long years of exposure to science and technology and due to the influence of the Portuguese and the Spanish languages in the case of the Latin American countries.

Besides, European languages, for example, either by having been derived from the same language family (Germanic or Anglosaxon) or by having the same cultural background, have a lot in common which makes the borrowing of concepts and terms from one language to the other simple and more acceptable, without sounding foreign.

The exact opposite is true, however, for Amharic and English. Besides being from different language families, one is just commencing to

develop its scientific and technological vocabulary while the other is highly advanced in this respect.

Amharic has not been able to catch up even with the languages of its own family--Arabic and Hebrew, for example. Both Egypt and Israel have been able to cope with their terminology problems through the formation of linguistic academies or through publications of individuals engaged in the creation of new words for scientific and technological concepts from the elements of the indigenous languages. Although there is a language academy in Ethiopia, it has not been able, up to now, to accomplish its task properly, partly because of lack of trained staff. Consequently, the indiscriminate borrowing and coining of words into Amharic has been uncommonly heavy. Besides, although Israel and Egypt produce their standards in both the national language and English, it is the former that is accepted as authentic--the English versions are published and issued only as unauthorized copies for interested parties who have no knowledge of the national languages or at the request of other national standards bodies, exporters, and importers.

2. PROBLEMS AND OBSTACLES IN THE SOURCE (ENGLISH) AND RECEPTOR (AMHARIC) LANGUAGES

Cultural and Linguistic Chasm Between the Two Languages

In translating English into Amharic, the translator tries to simulate into the present, with all the time-lag and linguistic shift removed from their substance, culture fragments alien to his own. He struggles to reshape and enlarge Amharic to reach meanings which it has not yet had to grapple with. As much as he is translating the work into Amharic, he should also translate Amharic to and around the new ideas and images. He ought to leave behind him one set of experience symbols and find the corresponding and different set he is seeking.

The Non-Existent Nature of a Term and Its Corresponding Referent in the Receptor Language

The lack of terms to express specific ideas, objects, or events is one of the major problems in coining words in Amharic because most of the time such concepts are outside the realm of the people's experience. Such terms were never before needed and therefore do not exist now. No matter how hard a translator wrenches the receptor language and his operation of thought, the concepts may not be carried over satisfactorily into the receptor language. The translation will only become, even for the translator who knows the source language, a crude lens, for visualizing the right concept. Hence, the translator is expected to domesticate an alien tradition by adjudicating it between

the claims of the source and receptor languages (e.g., cross-section--"Sɣnbɣt Kɣfɣl," literally: "sliced section"; web--"mäkäyäja," literally: "divider").

Even when equivalent words or phrases are found in a receptor language there is always the difficulty of familiarizing the public with its use. Sometimes the form (except proper names), and at other times the meaning, of the word reveals its non-native sources. Hence, the form and meaning have to be adapted to the ways of the local language.

Generic and Specific Vocabulary

In the meaning of words, the translator has at his disposal relatively few close correspondences. To translate at least four different English words, he uses one word (e.g., device, instrument, apparatus, machine--"massaria," literally: "instrument"). This, however, does not do full justice to the specialized technical language. The greater the statistical frequency of a word, the less specific is the information that is actually carried by the word or the unit.

The English language, nevertheless, covers too wide an area of meaning for many words. For example, "packing" may be used to designate the process of putting in a protective container anything from pulses (seeds), raw hides and skins to edible oils. In Amharic, by contrast, we have corresponding but more specific words or phrases, like "marrät" for raw hides and skins, "Kätto mäsfat" for pulses, and "molto maššäg" for edible oils. They must be used to get the meaning across. Hence, a language made up of either only generic or only specific vocabulary does not carry the load of information expected of it.

Most of the times, Amharic terminology has to be qualified and amplified by borrowed words (bromine--"bromin"; degree--"digry" from English or concrete--"beton"--from French; hammer--"märtello"--from Italian). Neologisms can be introduced (material--"sɣrrat", scale--"qäbban"--from Arabic) or obtained by semantic shifts (neutralization--"mäsärrinätɣn yämasogäd tägbar"--literally, "a way of getting rid of hostility"). Finally, circumlocutions can be used ("dowels with double diamond points"--"hulät fit mägatämiya šulät yalläw mɣsmar"--literally, "nail which has joining points at both faces"; steel-- "Aräb bɣrät"--literally, "Arabic iron"). It is obvious that the uncontrolled use of borrowed words from different languages and the system of translating technical material by circumlocution creates inconsistencies not only in the work of a given translator in a given span of time, but especially between documents by different translators.

Problems and Some Solutions in Spelling and Transliteration

Ethiopic script is not perfectly suited for the transcription of European words. As a result, variations of spelling (most of the time confusing) do occur.

Glyceride and million, for example, are written as:

"glisʜrayd; glaysʜrayɣd; gɣlisirid; and gɣlisirin"
"milyon, miliwon"

The lack of initial clusters in Amharic has also made the transcribing of borrowed words difficult:

Scrofula--"ɣskrofula, skrofula"
Spinach --"ɣspinač, spinač"

Sometimes, due to different source languages, the same word has different phonetic shapes:

"laboratwar* (French); laboratori (English); laborator (hybrid)"
"intʜrnašnal (English); intʜrnasiwonal (French)"

There usually are equivalent or near equivalent coinages for concepts like density, "zɣffʜt"; mass, "gʃzʜf"; volume, "yɣzʜt"; and these are easily rendered to Amharic whenever they appear in formulae by taking the initial letters of the Amharic equivalents, e.g.,

acid value = $\frac{vx56.1}{M}$ should be rendered as "yʜasid y zʜt" = $\frac{yx56.1}{"zɣ"}$.

Symbols like °C, °F, °K are rendered by taking the initial letters of the Amharic transcriptions of the English words. Hence, from centrigrade we have "°Se," from Fahrenheit, "°fa," and from kelvin, "°ke." This procedure of transcribing also holds true for units of measurement like cc, cm, mm, kgf, etc.

Greek symbols like ε, μ, π, and λ are transcribed as they are without undergoing any modification in the same manner as English retains them without any change.

Chemical symbols of inorganic compounds are transcribed by taking the initial letters of the individual elements in the order of the formula

---

*The Ethiopian alphabet is phonetic and as such, the vowels and consonants are not written separately but as one character (i.e., ላ ቦ ራ ቶ ሪ--la-bo-ra-t'-wa-r).

The symbols for the seven vowel phonemes of Amharic are ʜ, u, i, a, e, ə, o, in their order in the Ethiopic syllabary.

for the compound. Hence, potassium hydroxide (KOH) shall be "Po.OHa", and sodium hydroxide (Na.OH)--"So.OHa".

Chemical symbols of organic compounds are rather difficult to transcribe because they have definite names which are not readable from the formulae. Hence, an awkward transcription would be "KaHa$_4$" for methene (CH_4), "KaHa$_3$KaOOHa" for acetic acid (CH_3COOH), "KaHa$_3$-KaHaO" for acetaldehyde (CH_3CHO), "Ka$_2$Ha$_5$OHa" for ethanol (C_2H_5OH).

Problems in Translating Larger Units of Discourse

In technical works, knowledge of the subject matter outweighs the linguistic aspect of the translation. Hovering between technical concepts in two languages and trusting only to one's linguistic artificial horizon will not be of much help to the translator. The untiring and proper guidance by a technical specialist is always required.

Sometimes, the translator finds it difficult to disentangle a meaning from an apparently elementary sentence. No matter how hard he tries, its meaning remains annoyingly vague and amorphous. At such times, it will be very difficult, indeed, to get a satisfactory translation from an imprecise feeling for the submerged meaning. (E.g., "Coefficient of cubic expansion"--"yäkubawi nɣrät mälläkiya"--literally: "measurement of cubic expansion.")

So often what is a noun in English must be rendered as a verb in Amharic or vice-versa and Amharic adjectives are verb like. In such instances, Amharic does not have a corresponding method of indicating the given information without heavy circumlocutions and padding.

Amharic employs a tense-aspect system which is quite different from that of English. It does not have any historical connection with English, either by being a member of the same language family or because of historic and cultural associations. Stylistic adjustments or re-translation may not be adequate for transferring the tenses from English into Amharic. (E.g., "The following apparatus shall be used"--"bämikätälut mässariyawoč mätäqäm yasfallɣgal"--which literally means "It is necessary that the following apparatus be used.")

To avoid serious misunderstandings, it is often necessary to make explicit in the receptor language what is only implicit in the source language. (E.g., "arithmetic mean of determination"--"kätädämärä bähuwala tkaflo yämiganaw yäfɣtäšawoč wutet"--literally: "a test result obtained after having been added and divided.") Sometimes this is done by a repetition of constituents ("at least"--"biansɣ biansɣ"--literally: "if it gets smaller and smaller.") At other times, Amharic

may not even have a corresponding method of indicating such information.

Technical expressions usually cannot be translated literally. Literal translation will totally destroy their meaning. The translator should at first try to understand them, and then find a similar expression in the receptor language with the least possible distortion (e.g., in translating "National Reference Standards," the equivalent word for "Standards" has to show clearly the inherent meaning, i.e., "instruments").

At times, a translator's active vocabularies become passive. A word or phrase that he badly needs escapes his mind. No matter how hard he tries, it does not come to the tip of his pen. Yet, this word or phrase for which he has been diligently searching becomes crystal clear in his mind after the work is published--an exasperating discovery! At such times, is the translator excused for having used instead his own coined word? No! He is far too rarely granted the right of violating the rules of usage. It is not considered to be part of his function to push the language to its limit and, if necessary, to overstep it.

3. CONCLUSION

Standards must be clearly understood with a minimum of difficulty. Translators of standards should, therefore, avoid unrestrained coining of new words in the receptor language and irregular use of borrowed words.

At present, in Ethiopia, as well as in some other developing countries, many of the newly coined terms of science and technology have little or no function in the daily life of the population and have little or no currency in the spoken language. Therefore, it is highly desirable for developing countries to solve linguistic problems and to standardize their terminology at the initial stage of standards preparation before the unrestrained coining of new words and the irregular use of borrowed words become rampant and a serious obstacle to communication.

QUALITY CERTIFICATION IN GHANA

By

Dr. L. Twum-Danso
Principal Scientific Officer and Head,
Materials and Engineering Department
Ghana Standards Board
Accra, Ghana

Let me start by going into some history. The Ghana Standards Board was established in 1967 by the National Liberation Council Government and was, until 1973, known as the National Standards Board (NSB). In 1973 the name National Standards Board was changed to the Ghana Standards Board (GSB) as it was felt that the substitution of "Ghana" for "National" would remove all doubts in the minds of people about the identity of the standards organization.

The Board until 1972 had a part-time Director and six scientific personnel consisting of one engineer, two chemists, one food scientist, one sociologist, and one textile technologist. Apart from these there were also six technicians and a similar number of clerical staff.

With the appointment of a full-time Director in 1972, a large scale recruitment drive was undertaken. On September 30, 1976, staff strength stood at 268, made up as follows: 43 scientists and engineers, 58 technicians at both senior and junior levels, 17 administrative personnel in the senior grade, and 150 clerical and other supporting staff.

The Board operates with certain aims and objectives which may be summarized as follows:

(i) to establish and promulgate standards with the object of ensuring high quality of goods produced in Ghana, whether for local consumption or for export;

(ii) to promote industrial efficiency and development;

(iii) to promote standards in public, industrial welfare, health, and safety.

In order to give effect to the realization of these aims and objectives, the GSB thought it necessary to embark upon product certification which was to be made a very important aspect of the Board's activities. Certification as we know, may be voluntary or mandatory. It would be presumptuous to try to advocate one or the other without considering the circumstances of each environment. In a

country with a long tradition of industrialization, manufacturers may wish to carry on their products some marking to indicate that their commodities comply with the appropriate standard or specification. The object would be to invite patronage of the consumer or perhaps to persuade him to choose his product and not that of another manufacturer. This may be considered necessary if the manufacturer is to stay in business, and the whole exercise of obtaining the certification mark may be voluntary. In such cases, there is no need for legislation on the observance of standards provided that the commodities concerned have no health or safety implications in which situation mandatory certification would be expected.

Ghana, like most developing countries, has the problem of little competition in the manufacturing sector; skilled manpower is scarce in both industry and elsewhere; resources are scarce, and technical know-how and expertise are inadequate. In these circumstances, it is important to maximize whatever facilities are available and deploy them for maximum benefit. It is for this reason that certification has been made mandatory in Ghana and this is backed by a Legislative Instrument (L.I. 662:1970). The import of this is that all goods manufactured by an industrial process in Ghana must first be certified by the Ghana Standards Board before such goods can be placed on the market to be sold, exported, distributed, or otherwise disposed of. Goods so certified by the Board must, among other things, satisfy the following conditions:

(a) they must bear code numbers indicating the batches of production to which they belong;

(b) they must be properly labeled;

(c) they must conform to the relevant Ghanaian standard. By Ghanaian standard here is meant a standard which may be Ghanaian, foreign ISO, or other international standard which has been formally adopted and gazetted as the standard in use in Ghana.

Manufacturers whose products meet the above requirements of the law will be granted a license by the GSB to use the certification mark on their products. The license to use the certification mark is valid for one year, renewal exercise being considered almost like a new application. The fee for the license to use the certification mark is minimal: 10 cedis (about U.S.$9) per year.

At this stage it might be useful to take you through the various stages leading to the award of the certification mark. In keeping with the requirements of the law the manufacturer first submits an application to the Board for permission to use the certification mark on his product. A Central Certification Mark Unit (CCMU) exists at the Board which handles all applications in the first instance. From

here the application is referred to the relevant scientific department of the Board for necessary action. The Board at the moment operates through three such scientific departments, namely the:

(i) Materials and Engineering Department,

(ii) Food and Organic Products Department, and

(iii) Drugs and Cosmetics Department.

The department in question will then organize a visit to the manufacturer's factory. At the factory, the officers will be taken through the whole manufacturing process by some responsible person and this will invariably be the Production Manager. The usual criteria for certification apply, namely:

(i) the existence of quality control facilities at the factory;

(ii) the availability of sampling and subsequent laboratory testing of samples;

(iii) the keeping of proper records of tests conducted on product samples.

The Ghana Standards Board has two types of laboratories--a Chemical Laboratory and a Materials and Engineering Laboratory where the staff of the Board conducts most of the tests for purposes of certification. Sometimes, however, where the right type of equipment is not available or where, as it often happens, spares cannot be obtained for equipment that has broken down, the services of other accredited laboratories like the University Laboratories and other research establishments in or outside the country may be employed. The test results are then presented to a Certification Marking Committee of the Board which meets once a month to consider manufacturers' applications for the award of licenses. The Committee comprises the Director of GSB as Chairman, the three Heads of the Scientific Departments, and the Head of the Administrative Department as members. The idea of this Committee is to make certification a collective responsibility.

There is one important aspect of certification which cannot go without further comment--it is the factory inspection. By this exercise, the staff of the Board is able to offer advice to industry on quality control and other aspects of the manufacturing processes including, sometimes, advice on machinery and staffing. In quality control, the need for raw material inspection is usually stressed. This, as you can see, helps the Board in realizing its objective of promoting industrial efficiency and improvement.

It may be mentioned here that one of the main problems facing industry in Ghana sometimes is the woeful lack of technical know-how at the production level. In this connection, we find that the factory visits for certification are doing a great service to the country. This is possible because, on the whole, industry in Ghana recognizes that the training given to standards personnel is meant to equip them sufficiently to offer this much needed advice. It is this spirit of understanding and cooperation between industry and the GSB which has made all the difference in the quality of manufactured products that we now find in our markets as compared with the average quality of a few years ago. It is therefore important that we allow only competent and knowledgeable staff to undertake such factory visits. It is essential to maintain the confidence that industry has in the establishment of GSB.

It may be useful to cite a few examples of the assistance that our Standards Institution has given to industry.

(i) Unsupported PVC Sheeting: Samples of this product failed the test for purposes of certification. This led to the rejection of the manufacturer's application to use the certification mark on doilies. Further visits to the factory by the staff of our Standards Institution brought out clearly the defects in the manufacturing process--the mixture being used was of poor consistency; reproducibility could not be maintained because at no stage in the preparation of the mixture was thought given to the measurement of its viscosity; furthermore, the curing was not being done properly. With our help, the factory is now manufacturing doilies of first class quality.

(ii) Razor Blades: A manufacturer of razor blades had his application rejected because, among other things, the hardness of the steel used was not up to standard. It did not take the GSB staff long to find out that this was the result of malfunctioning thermocouples. Consequently, the temperature could not be properly controlled in the tempering process. Once the thermocouples were changed, the steel attained the right hardness and the firm is now producing razor blades of reasonably high quality.

We could add to this list from the textile and garment industries, the electrotechnical and mechanical engineering industries, building and general construction, food manufacturing industries, etc. My illustrations are only meant to show that industry, in a developing country like Ghana, could benefit a great deal from certification if competent and knowledgeable personnel from the Standards Institution were to undertake this exercise.

This statement does not in any way imply that certification is without its problems. Some of these problems have already been mentioned but one or two questions may be asked. Do we grant the license for the use of the certification mark on all commodities of the same type which conform to the prescribed standards, but performance-wise might not be of the same quality? In other words, in view of the fact that standards generally are minimum standards, do we have to grant the certification mark to each and every product that has fulfilled the minimum requirements of the standard? Or do we reserve this certification mark only for goods of extremely high quality? Should we then make some arrangements like the granting of an Exemption Certificate? In Ghana, this can be done in accordance with the requirements of another Legislative Instrument (L.I. 664:1970). This Exemption could be given for products which satisfy minimum but not certification quality or other requirements like the availability of Ghanaian standards in respect to the products in question.

Finally, what do we do about rejected products? For food items, drugs, or other items with health and safety implications, rejection should also mean that such products cannot be sold. Can we say the same of products like shoes, handbags, shirts, etc.? Perhaps the discussion that ensues may help us find effective and more realistic ways of implementing the provisions of mandatory certification such as we have in Ghana.

STANDARDIZATION IN GUYANA

Dr. Rex B. Woo-Ming
Government Analyst
Department of the Government Analyst
Ministry of Health
Georgetown, Guyana

Guyana, which has an area of 83,000 sq. miles, has a population of only 800,000 with about 90 percent on the narrow northern coastal belt. The Guyanese economy is based on agriculture (sugar, rice), minerals (mainly bauxite), lumber, and industries (chiefly shrimp).

Standardization, which is an essential prerequisite for successful industrialization, has become a powerful tool for national development and planning, industrial production, public health, commerce, and trade. In developing countries we have come to realize this and have started organizing ourselves to initiate this important activity to improve our standard of living. As far back as the early sixties the need for standardization was felt in Guyana, but more so a few years after independence which was achieved on May 26, 1966, when the country started having many more light industries.

Guyana National Bureau of Standards (GNBS) Under the National Science Research Council (NSRC)

Guyana has not been insensitive to the need for a National Bureau of Standards (GNBS). The problem was a question of inadequate financial and limited manpower resources. A National Science Research Council (NSRC) which was set up in September 1972 appointed a Bureau of Standards Committee to advise on the establishment of a Bureau of Standards. There is a firm decision to set up shortly a National Bureau of Standards which will remain under the NSRC during its formative years, to advise the government, and promote the formulation of standards as needed in relation to national development, the protection of the consumer, and the regulation of trade.

The Bureau of Standards Committee consists of at least two members of the Council, of whom one is appointed as the Chairman of the Committee, and other fit and proper persons. It is organized to represent all sectors of the economy, to set up policies and programs for standards development, and to guide the work of the GNBS in its various functions.

The GNBS will promote and encourage the maintenance of standardization in relation to commodities, processes, and practices and will exercise other functions as follows:

1. to make recommendations to the Minister of Economic

Development (through the NSRC during the formative years of the Bureau) in respect to the formulation of specifications and the promulgation and application of voluntary and compulsory standard specifications;

2. to promote research in relation to standardization and to provide for the examination and testing of commodities, processes, and practices;

3. to provide for the registration and use of standard marks;

4. to provide for the examination, testing, and calibration of instruments, appliances, and apparatus in relation to their accuracy;

5. to encourage or undertake educational work in connection with standardization;

6. to make arrangements for the inspection of any operation carried out on any premises in connection with the manufacture, production, processing, or treatment of any commodity, process, or practice for which any standard specification has been declared; and

7. to do such other things as may be expedient or necessary for the proper performance of its functions under this Act.

On August 7, 1974, the NSRC became a legal entity and within a few months Dr. J. A. Campbell, former Deputy Director of the Food and Drug Directorate in Canada, was invited to report on the development and enforcement of standards in Guyana with particular attention to food and drug legislation. In addition, there was held in September 1975 a seminar on quality control.

At the request of the Chairman of the NSRC and through the assistance of U.S. AID, a U.S. National Bureau of Standards (NBS) three-man team led by Mr. Steffen Peiser visited Guyana during the period July 11 to July 17, 1976, to study and advise on standards development. Their final report is expected to be submitted shortly. *

The drafting of a National Standards Act and its Regulations, with interministerial consultation on inputs, is in process. An Organizational Chart (10 year projection) for the proposed GNBS has been drawn up.

---

* Peiser, H. Steffen, Beck, Niels C., and Stephens, Kenneth S., Standardization and Measurement Services in Guyana, NBSIR 76-1180, Office of International Relations, National Bureau of Standards, Washington, D.C. 20234. Issued February 1977.

Laboratories of the Guyana National Bureau of Standards

In the beginning, the GNBS may be able to carry on its activities of periodical and special testing work by making use of the existing laboratory facilities, particularly at the Government Analyst Department and the University of Guyana. However, when the volume of work increases, particularly due to the operation of the certification marking scheme and export inspection, it would be essential for the GNBS to be provided with its own well-equipped laboratories by that time for routine testing work. As regards testing in the fields of textiles and metrology, no adequate facility exists in the country and early steps will be taken to set up these laboratories. It would also be most desirable for the GNBS to have its own accommodation at that time so that the laboratory complex could be built on a permanent basis.

The GNBS' main work would be in the fields of standardization, quality control, measurement services, certification marking, and industrial research and testing. The GNBS will also be involved in the process of metrication.

A number of factories, in which various types of foods, garments, and footwear are manufactured, have been inspected. In many factories, there is great scope and urgent need for the introduction of proper quality control so as to improve the quality, increase the productivity, reduce the cost, and enhance the efficiency, which will be in the interest of producers, consumers, and the country as a whole.

If the manufacturer satisfies the Government Analyst Department and the GNBS that he possesses proper quality control facilities and a record over a long period of high quality finished products, then the producer will be permitted to use the standard mark of the GNBS on his products. Because of the standard mark, consumers will have a positive means of knowing what products are in fact approved by the GNBS and what products are not. The immediate effect will be a new feeling of confidence among shoppers and consumers and a greater competitiveness among producers for higher quality.

Standardization in the areas of vital importance to health and safety of the people, export promotion, and indigenous resource development has been identified as a high priority concern. Suitable technical, sectional, and specification committees will be formed for this purpose and quality control work will be developed. An inventory of testing facilities has recently been completed.

International Cooperation

The GNBS Committee is participating in the standardization activities of the Caribbean Common Market Standards Council. This Council has

one representative from each of the member states in Caricom: Barbados, Guyana, Jamaica, Trinidad and Tobago, Antigua, Belize, Dominica, Grenada, Montserrat, St. Kitts-Nevis-Anguilla, St. Lucia, and St. Vincent. The NSRC has observer status on the Council and Guyana is represented on the Council's Executive Committee by the Government Analyst. The GNBS hopes to become a member of ISO, BIPM, OIML, and IEC and the Government Analyst is the Codex Contact Point of Guyana for the Codex Alimentarius Commission.

Government Analyst Department (Ministry of Health)

The Government Analyst Department is responsible mainly for the administration and enforcement of the Food and Drugs Act of 1971 and its Regulations (the final drafting of which has recently been completed). Four classes of commodities fall within the scope of this Act:

Foods
Drugs
Cosmetics, and
Medical Devices

This statute was enacted with five principal aims:

a) to prevent the sale of any of these commodities which are adulterated, impure, or of low quality;

b) to prevent the sale of any of them which are short in weight, measure, or number;

c) to prevent misrepresentation in the way they are promoted, for example, by labeling and advertisement;

d) to ensure that satisfactory standards of hygiene are practiced in all aspects of commerce in these products, from the raw materials used in their manufacture through the manufacturing process to the final retail distribution of the finished products; and in addition,

e) in the case of drugs to ensure that proper therapeutic use is made of those products which can be very harmful to the consumer, for example, causing dependence, premature death, etc., if improperly used.

If these objectives in fact represent the intentions of the Food and Drugs Act, then two dominant themes emerge from them: preventing and ensuring--preventing, on the one hand, certain things prejudicial to the interest of the consumer, and, on the other hand, ensuring that certain other things in his interests are observed in commerce in these commodities.

This law is concerned with the serious matter of protecting the public health associated with these basic commodities, some of which are consumed or used several times a day by every member of the community. The Act provides for the appointment of analysts and inspectors by the Minister of Health and empowers him to establish two committees: a Drug Advisory Committee and a Food Advisory Committee. These two committees advise him on the making of regulations, including the setting up of standards for any particular food, drug, or cosmetic.

It would be worthwhile to stress that the broad provisions of the Act automatically impose quite effective standards for the manufacture, distribution, storage, etc., of every article of food, drug, etc., whether or not a specific standard has been established for that food or drug. When this is combined with certain general regulations applicable to all foods and drugs, the effectiveness of this particular approach to food and drug standardization in Guyana can readily be shown. Foods and drugs can be seized, manufacturing establishments closed down, and imports can be rejected.

The method for making regulations enables them to be enacted fairly quickly. Once they have been recommended by the Food and Drug Advisory Committees to the Minister of Health, and accepted by the Cabinet, they become law by proclamation in the Official Gazette.

During the period prior to the food and drug regulations being made law, officers of the Analyst Department have been educating and giving technical assistance and free advice on several matters including correct labeling of commodities and proper conditions of manufacture to consumers, prospective manufacturers and manufacturers who are given this period of time "to put their products in order."

The Government Analyst, who is Head of the Analyst Department and a Member of the Bureau of Standards Committee, works very closely with this Committee which has co-sponsored a Workshop on "The Method of Manufacture of Tomato Ketchup" with the Analyst Department. It was the first of a series of planned workshops.

Weights and Measures Division

This Government Division is in the Licensing and Revenue Department of the Ministry of Trade and Consumer Protection. Some scales are adjusted and calibrated but most of the calibration and maintenance work in the sugar industry is performed by a competent technician who is sent periodically by the manufacturer (Avery).

Assistance Required

As our experience and resources are limited, the GNBS and the Government Analyst Department will need considerable technical and

financial assistance from other national and international organizations, particularly in the following fields:

i) Visiting experts to assist in specific projects;
ii) Equipment for testing and metrology;
iii) Training of technical and administrative personnel;
iv) Standard reference materials;
v) Information services including library, public relations, reproduction, and printing; and
vi) Financial assistance to permit attendance at meetings of ISO, IEC, OIML, COPANT, and the Codex Alimentarius Commission.

It is in this regard that the United States with its accumulated experience and advanced state of science and technology can offer invaluable assistance.

Conclusion

It is hoped that the present opportunities offered by the NBS with funding from the Agency for International Development will continue. With continued Government support, cooperation by industry, consumer interests, and assistance from other national and international organizations, our GNBS will be able to achieve its objectives and play a key role in the National Plan for the economic development of Guyana.

STANDARDIZATION AND MEASUREMENT SERVICES IN INDIA

by

Dr. A. R. Verma
Director
National Physical Laboratory
New Delhi, India

Standardization in India has three aspects, viz.,

(i) framing of standard specifications on various consumer goods and engineering items, etc., with the primary aim of ensuring quality, uniformity, and interchangeability of the items,

(ii) scientific metrology which implies custody, development, and maintenance of national standards of physical measurement and the transfer of their accuracies through a hierarchy of standards to the ultimate user of the standard for measurement work, and

(iii) legal metrology which relates to the laying down of mandatory specifications to ensure traceability of the accuracy of measurement to the accuracies with which the national standards are maintained, and also to enforce these specifications.

These three aspects of standardization are looked after by different agencies in the country.

The Indian Standards Institution (ISI) is concerned with the first aspect of laying down of what may be termed as the "paper standards." This Institution has prepared over 8,000 standard specifications covering a wide range of materials, industrial and agricultural products, test methods, and codes for design and construction practices. It collaborates with the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), the Commonwealth Standards Conference (CS), and the Asian Standards Advisory Committee (ASAC). ISI also renders assistance to other developing countries. The countries which have benefited from India in this work include Burma, Algeria, Panama, Ethiopia, Trinidad and Tobago, and The Sudan, to mention only a few. Technical personnel from 20 countries have received training at the ISI.

The ISI prescribes standards specifications of various items for civilian use only. This is done through a system of committees on which representation is given to technical experts from various organizations, persons from the concerned industry, and the users of the end product.

For the second aspect, viz., scientific metrology, the National Physical Laboratory (NPL), New Delhi, is the apex body. It has a statutory obligation of custody, development, and maintenance of national standards of physical measurements at internationally accepted accuracies. This Laboratory maintains the national standards of base units of mass, length, time/frequency, luminous intensity, current and temperature, and of the various derived units of vacuum, force, sound pressure, threshold of hearing, luminous flux, color temperature, etc., and various electronic parameters, viz., voltage, power, impedance, attenuation, and noise, over all frequency ranges covering DC to microwaves. Testing and calibration at NPL is done against these standards at nominal charges.

The Directorate of Weights and Measures (DWM) under the Ministry of Civil Supplies looks after the third aspect, viz., legal metrology. This covers

(i) enactment of the relevant laws,

(ii) laying down of rules and procedures for enforcement of the Acts,

(iii) training of personnel for legal metrology work, and

(iv) drawing of standard specifications of weights and measures.

A major achievement of DWM is the introduction of the metric system after the country became independent in 1947. The NPL also played a significant role in this work by designing the specifications of various weights and measures, and supplying their certified copies to all the states in the country. Specialized training of officers of DWM has also been imparted by NPL. The secondary standards of weights and measures maintained by the various states are periodically calibrated at NPL to ensure high accuracy for the enforcement of the metric system for consumer protection.

A plan has recently been drawn out to integrate the existing testing and calibration services in the country into a system in order to ensure compatibility between the various test centers and to have traceability of accuracies of measurement in any field, to the accuracies with which the national standards of measurement are maintained. NPL will play a pivotal role in this system. While, on the one hand, the national standards maintained by this Laboratory will be tied to the international standards, their accuracies of measurement, on the other hand, will be transmitted to the consumer through a hierarchy of calibration and testing laboratories.

Till recently, NPL was maintaining only the classical standards, viz., a prototype platinum-iridium meter bar as the standard of length; a prototype platinum-iridium cylinder (of length and diameter both equal

to 39 mm) as the standard of mass--the kilogram; and Weston cadmium cells as the standard of voltage, etc. These standards are by no means time-invariant. They necessarily require periodic calibration against the corresponding international standards, and also inter-comparison with the national standards of other countries.

During the last couple of years, NPL has started following the international trend to relate each of the base standards with certain fundamental quantum phenomena. Work has been started on the development of a mono-frequency, iodine-saturated, helium-neon laser for generating a length standard of better accuracy, as compared to the prototype meter bar. Studies have also been started on the Josephson effect for generating a standard of DC voltage. A cesium atomic clock which has an accuracy of $\pm 7 \times 10^{-12}$ and a stability of $\pm 3 \times 10^{-12}$ has been recently installed, replacing a quartz crystal oscillator used hitherto, keeping in view the stringent requirements of Defense, Posts and Telegraph, All India Radio, the Overseas Communication Service, the Indian Space Research Organization, etc., for more accurate time and frequency standards. Till about a year back, NPL was transmitting time and frequency signals under the call sign ATA solely at 10 MHz for only five hours per day. Now this service has been extended to eleven hours per day on all working days of the week and at an additional frequency of 15 MHz besides that of 10 MHz. The plan is to extend this service further to broadcast time and frequency signals round-the-clock, and also to add another frequency at 5 MHz, to meet the requirements of all users at any time of the day throughout the country under all weather conditions. This service caters to the requirements also of other countries in the South and Southeast Asia. This Indian station is the only one transmitting time and frequency signals at high frequencies in this region of the world. The nearest others are in Japan in the east, in Italy in the west, in the U.S.S.R. in the north, and in Australia in the south. The signals transmitted by the Indian station are powerful enough to be heard even in Australia, the United States, U.S.S.R., and a number of countries in Southeast Asia and the Middle East.

To meet the growing demand of the electronics industry, NPL has drawn up a ten-year program for establishing and maintaining very accurate standards for various electronic parameters, covering all frequency ranges from DC to microwaves. The Electronics Commission of India, which was established sometime back to promote the indigenous electronics industry, also assigns a high priority to this program, and is supporting it financially.

For meeting the day-to-day requirements for calibration and testing of various electronic and electrical components, instruments, and equipment, NPL has set up a specialized electronics Center which has been well equipped to carry out tests under various environmental conditions. These include:

(i) dry heat test;
(ii) cold test;
(iii) damp heat test,

(a) accelerated damp heat exposure test,
(b) long term damp heat exposure test,
(c) damp heat (moisture resistance) test;

(iv) transport stresses,

(a) bump test,
(b) shock test,
(c) vibration resonance search test,
(d) vibration fatigue test;

(v) constant acceleration test;
(vi) salt mist test;
(vii) dust test;
(viii) mould growth test;
(ix) low air pressure test,
(x) high air pressure test,
(xi) sealing (airtightness) test;
(xii) rapid temperature test;
(xiii) solar radiation test;
(xiv) rain test;
(xv) assembly stresses (robustness of termination),

(a) tensile test on terminations,
(b) bending test on terminations,
(c) torsion test on axial leads,
(d) torsion test on screw terminals,
(e) soldering test; and

(xvi) endurance test--electrical/mechanical.

In addition, this Center is equipped with special test facilities for

(i) high voltage testing,
(ii) semiconductor testing,
(iii) noise testing of resistors,
(iv) magnetic material testing,
(v) radio and television receiver testing, etc.

The projected program of this Center includes studies on tropicalization of components and equipment and failure analysis, and on obtaining correlation of actual environmental conditions with those of the accelerated laboratory tests. This Center, which serves as a National Center for the Northern Region, is also supported by the Electronics Commission. Similar centers exist at the Bhabha Atomic Research Center, Bombay, for the Western Region, and at the Chief

Inspectorate of Electronics, Bangalore, for the Southern Region. The National Test House, Calcutta, serves the needs for testing in the Eastern Region, but this Test House is primarily concerned with non-electronic items.

Besides establishing and maintaining national standards of physical measurement, and transmitting the accuracies of these standards down the line, the NPL also carries out research on associated areas. A specific mention can be made of the work on the characterization of materials for purity and perfection. The Laboratory has set up facilities for polarography, complexiometry, atomic absorption spectroscopy, spectro-chemical analysis, X-ray fluorescence and diffraction, optical and electron microscopy, electron diffraction, differential thermal analysis, thermogravimetric analysis, infrared spectroscopy, electron spin resonance, Mössbauer spectroscopy, X-ray diffraction topography, preparation of thin films, etc.

The Laboratory has developed a complete Lang camera for X-ray diffraction topography. A demountable microfocus X-ray generator has been developed incorporating several safety devices. A triple crystal X-ray diffractometer has also been developed for absolute characterization of single crystals for perfection, and also for study of diffuse scattering from single crystals.

The Laboratory has an experienced group working on the development of special materials, viz., semiconducting, ferroelectric, dielectric, piezoelectric, magnetic, ceramic, and other materials. For this work, extensive use is made of facilities described above. A number of special materials have been developed and the Laboratory is now well set to undertake the establishment of a library of standard reference materials.

The NPL has a strong group working on radio science, and it undertakes studies on improving radio communication on specific routes and under specific conditions against users' requests. In 1971, an Associate Regional Warning Center was established at the Laboratory as a part of the International Solar and Geophysical Network. The main responsibility of this Center lies in quick distribution of daily solar and geophysical data within the country and to establish efficient channels of interchange of important daily data between stations within India and various Regional Warning Centers in other parts of the world. The following diagrams (Figs. 1 and 2) show the linkage that this Center has with the other similar centers in the world, and also the functions that it performs. A plain language message is broadcast daily on the standard time and frequency service (ATA) on 10 and 15 MHz at 1500 hours and by All India Radio at 2240 hours IST.

ASSOCIATE REGIONAL WARNING CENTRE
(A R W C)

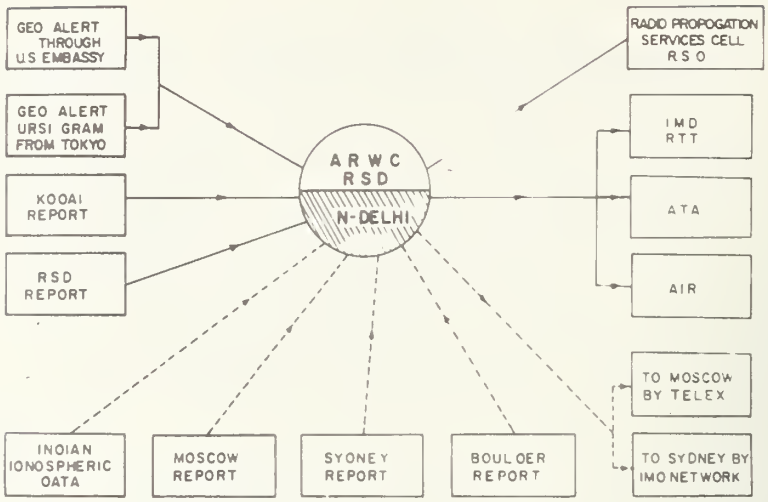

Figure 1.

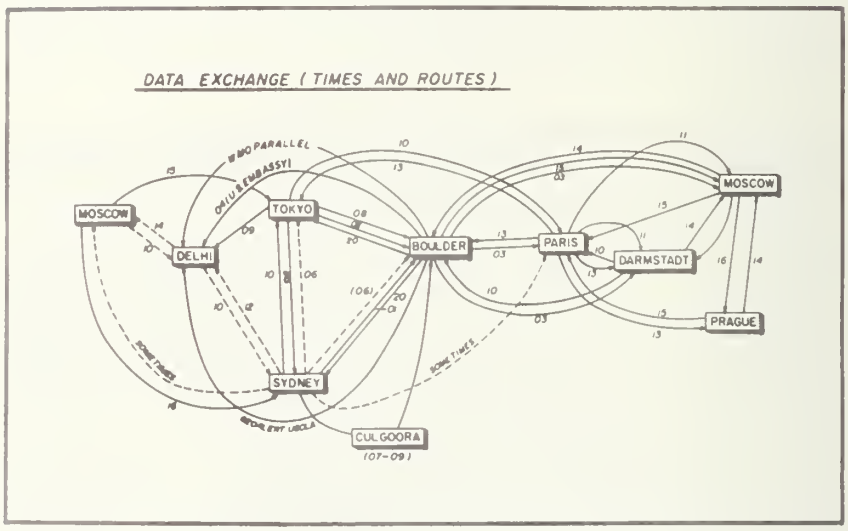

Figure 2.

INDONESIAN APPROACH TO ESTABLISHING A NATIONAL NETWORK FOR CALIBRATION

By

Mr. Herudi Kartowisastro
Director of National Institute for Instrumentation
Indonesian Institute of Science
Bandung, Indonesia

I. Introduction

One of the key national research programs of Indonesia under the direction of the Minister of State for Research, within the framework of the second five year plan of 1974-79, is the development of a national system for Calibration, Instrumentation and Metrology (KIM). In this respect, the Indonesian Institute of Sciences (LIPI) acts as a center for systems management in cooperation with the other institutes concerned. The execution of this project is the responsibility of the National Institute for Instrumentation (LIN). This is a great challenge which needs its best effort and attention.

II. "KIM" and the National Development Plan

KIM is expected to take an active part in the National Development program in agriculture and agriculture-based industries, heavy and mechanically-based industries, the chemical and mining industries, certainly including small-scale manufacturing facilities.

During the last several years it seems that KIM support has not been adequately commensurate with the need. We have not even kept up with industrial development. If the development of KIM continues at the present rate, the gap between need and fulfillment will widen and it will become very difficult to close it. We have to say that the progress of KIM activities is not very spectacular at the moment because the awareness of KIM is not yet widely and fully recognized. The KIM system cannot exist and develop separately from the state of industry and it should be synchronized with the industrialization program.

The Government of Indonesia has promulgated a policy by which industrialization programs will be centered on Jakarta, Surabaya, Ujung Pandang, and Medan. This will cause KIM to concentrate also its activities in these centers and to stress progress appropriate to these regions. Geographically these locations are scattered at great distances.

III. The Present State of Available Infrastructure

The first five year plan started in 1969 and the Government invited foreign, joint-venture, and private companies to invest their capital in industry and other sectors. Government-owned state companies also have invested in support of rehabilitation. It is clear that at that time some technical awareness was lacking and the necessity for KIM was not appreciated. Probably the main reason is that for two previous decades (1951-1969) no meaningful investment had been made.

There are some laboratories with capability in various classes of measurement. However, the level of skill in measurement and the accuracy of the equipment across the entire spectrum of precision measurement capabilities are very uneven. For some types of measurement there are no precision measurement facilities at all. Each organization at best provides the facilities it requires for its own purposes, without regard for the needs of other groups which might also have a need for precision measurement in the same field. There is a lack of coordination on the basis of national needs.

New directions of industrial activity demand corresponding new KIM patterns of activities. We have to take special note of the increase in the following elements in the economic life of Indonesia:

a) foreign and joint-venture investment;

b) new private and government investment;

c) rehabilitation; and

d) small-scale industry.

We have to keep in mind that these pattern changes have also created certain consequences for KIM that have not arisen before. Foreign and joint-venture companies could continue to depend on their mother organizations abroad for their KIM activities. However, this mode would have a direct adverse influence on the Indonesian balance of payments. The Government and new private investment industries do not seem to show any concern for the acquisition of new KIM facilities or equipment, but after a while the lack of some KIM capability is suddenly felt. The need often is in the skill and know-how of technical personnel.

In industrial rehabilitation, KIM is directly involved and sometimes influences the ability to compete or to obtain a good return. The need for KIM's direct impact has been shown in the slowness of the rehabilitation process when the influence of KIM is not available.

Small-scale industries still receive too little attention, although only limited KIM activities are actually needed. We must remember that this sector provides the largest employment. No doubt KIM activities could improve their productivity. Problems that can be solved by KIM also arise at most technical schools, universities, and research and development institutions.

IV. The National Calibration Network

Indonesia does not have a single body or institute which is responsible for national physical standards. In other words, an Indonesian "National Standards Laboratory" does not exist, but there are laboratories with capabilities in various types of measurement. Each laboratory provides for its own requirements. Originally there was no coordination and no traceability to a national focal point.

To support national economic development, a calibration organization on the basis of national need must be established. There are several alternative approaches or models that have been considered. From the local situations and environmental conditions as described above, we decided to take the network approach, that is, we aim at a National Calibration Network (NCN). This idea was introduced and adopted during the KIM-75 Meeting in September 1975. It was attended by participants from private and Government institutions, industries, research and development institutions, and universities. We at LIN are aware that this approach also has limitations and disadvantages, but it will take the least time to achieve effective implementation.

NCN should be made up of institutes or laboratories which have calibration facilities, and the National Calibration Committee (NCC) should be created with the task of coordinating the calibration centers and also that of improving their technical capabilities to serve the users better. The NCC should consist of representatives from institutes having calibration facilities and from KIM users.

In support of NCC, an executive sub-committee should be established to organize the routine tasks. Members of this sub-committee should consist of three to five members of NCC. A secretariat for administration is supported by LIN. Both the executive committee and the secretariat will be located at LIN.

V. Developing the Network

The limitations of most calibration centers lie in their limited technical skill and know-how, the limited accuracy and traceability of the instruments, the lack of an adequate budget, and the imperfect environments of the laboratories.

Although industrial development is increasing swiftly in Indonesia, an awareness of the need for instrument re-calibrations is not widespread. This lack of awareness could be a serious problem when interdependence between industries becomes a more common feature in Indonesia.

For these reasons, NCC, and LIN, as center for KIM activities, will emphasize:

a) the dissemination of awareness of calibration needs, especially to those who are directly or indirectly concerned with calibration;

b) the training on calibration know-how and techniques for technical personnel of the centers;

c) the establishment of procedures for "inter-laboratory checking" among the centers and for the maintenance of "international traceability";

d) the facilities in the calibration centers; and

e) the managerial and technical capabilities of LIN to support the calibration centers.

IRAN'S EXPERIENCE IN STANDARDIZATION ACTIVITIES

By

Dr. Davoud Davoudzadeh
Director, Division of Coordination in Formulation
and Implementation of National Standards
Institute of Standards and Industrial Research of Iran
Tehran, Iran

1. INTRODUCTION

Resulting from a rapid change in the framework of Iranian society adapting itself towards modern technology, the growth of industrialization reached considerable proportions particularly during the last decade. Many efforts have been made to accustom industrial and commercial enterprises to the application of the principles of standardization which should play an important role in national economic and industrial development. The establishment of the Institute of Standard and Industrial Research of Iran (ISIRI) was aimed at facilitating the above development goals.

In the last few years, ISIRI has grown not only in organization and personnel, but also in its functions and duties. At present, ISIRI, with about 1,240 staff members, is a manifold or multipurpose organization which is capable of working in the following:

a) preparation of national standards,
b) implementation of standards,
c) application of quality control systems
d) preshipment inspection of export goods,
e) hall-marking of precious metals (gold and silver for purity),
f) administration of laws of weights and measures,
g) testing of materials,
h) industrial research,
i) metrology,
j) technical documentation,
k) improvement of leather, hides, and skins in Iran.

2. PROBLEM AREAS

A brief account will be given of some functions which are faced with difficulties:

2.1. Preparation of National Standards

ISIRI is seriously faced with a great deal of demand on the part of

government and other consumer interests. The organization is expected to elaborate more and more products standards to cover the principal domestic as well as import commodities, which sometimes are offered with poor quality. In spite of the existence of more than 1,640 existing national standards, which have been prepared during the past few years, ISIRI is forever asked to develop more standards to cover a wide range of items.

As far as the disposition of personnel and financial resources is concerned, ISIRI is following a modified procedure developed by the International Organization for Standardization (ISO) in order to evaluate the priorities of subjects. This procedure could be particularly significant for industrially developing nations. However, in utilizing the "priority equation" we have some problems due to uncertainty and insufficiency of statistical data. With regard to the definitions, there is not a clear distinction between the number of people who are directly in contact with an item and those who are likely to come into contact with that item. Thus, the evaluation of the priority order will be subject to difficulties. There is also an unfortunate lack of an appropriate factor in this priority equation to deal with the effect of national policies. During 1966, ISIRI utilized the priority evaluation method and carried out a survey of more than 1,055 items. In some cases, the order of priority with regard to the experimental background seems to be reasonable.

ISO, as a source of technology transfer for developing countries, can perhaps generalize the procedure which will no doubt help national standards programs.

Another point for the preparation of specifications is to put more emphasis on just a few main characteristics of a product and leave less important factors for future coverage. This idea may serve the immediate needs of most countries, developing or developed, with important savings. It is also an encouragement for producers and manufacturers who have difficulties in supplying high quality goods.

2.2 Implementation of Standards

On the implementation of international standards, a statement was made by Mr. Soroudi, the General Director of ISIRI, during the tenth meeting of the General Assembly of ISO held in Geneva (September 1976). Its thrust is worth being discussed in this Workshop.

As is well understood, most of ISO and other international standards bodies are developed by experts from industrialized countries. It can be safely assumed that these standards are mostly implemented in developed countries. In many instances, it has been found that multinational companies, which strictly implement international standards in their mother plants situated in developed countries, do not do so in their branches in developing countries, where a lower quality of goods is produced.

It may be true that people in developing countries are less quality conscious than those of developed ones. However, it is expected that developed countries undertake the moral obligation to facilitate the transfer of technology and export their know-how to less developed countries to assist their development. In other words, industrially developed countries should have a moral obligation to implement international standards as far as practicable in their economic and industrial collaboration with developing countries.

STANDARDIZATION IN JORDAN

by

Mr. M. E. Khasawneh
Head, Standards Division
Acting Director, Directorate of Standards
Ministry of Industry and Trade
Amman, Jordan

1. Foreword

Jordan is basically an agricultural country. However, the industrial sector has experienced impressive development since the middle of the 1950's when large factories were established in the fields of cement, petroleum, paper, and pharmaceuticals as well as other medium and small size factories. During the period between 1954-1969, the value of production increased seven fold and the income rose by 368 percent. In view of this remarkable expansion in the industrial sector, the Jordan Government recognized the importance of standardization and quality control as an effective tool for promoting industrial development.

Since some domestic industrial products are inferior in quality to similar imported products due to the lack of efficient laboratories, competition, and quality inspection of goods for protecting consumers, the Government in 1960 charged one of the foreign institutes to conduct a thorough study of standardization activities and to formulate the necessary legislation.

As a result, the seven-year plan included some recommendations for the industrial sector; the second recommendation reads as follows:

> "For the protection of consumers and the safe-guarding of quality standards for exports, a Standards Bureau should be set up to report to the Minister of National Economy."

In implementation of the above recommendation, a draft law for standardization was submitted to the Parliament and, when the Jordan Center for Industrial Development was established in 1967, it included a separate section for standards.

In January 1971, the Directorate of Standards was created within the Ministry of National Economy (changed now to the Ministry of Industry and Trade) as a competent national body in all matters related to standardization and quality control. In the next year, the Standardization Law No. 24/1972 was issued.

2. Structure

The Directorate of Standards is a Governmental body completely financed by the Government. It comprises the following five divisions:

1. Division of Standards,
2. Division of Quality Control,
3. Division of Quality Mark,
4. Division of Laboratories, and
5. Division of Weights and Measures.

The technical staff amounts to 20.

3. Nature and Number of Standards

According to Article 14 of the Standardization Law, the Jordan Standard Specifications are voluntary. However, Article 15 stipulates that, on a proposal from the Minister of National Economy, the Cabinet may render any standard mandatory. Up to September 1, 1976, the Directorate of Standards has issued 44 standards of which 10 are mandatory.

4. International Activities

The Directorate of Standards has been a full member in the Arab Organization for Standardization and Metrology (ASMO) since 1968. It is also a full member in the Codex Alimentarius Commission (CAC), a Correspondent Member in the International Organization for Legal Metrology (OIML), and a Correspondent Member in the International Organization for Standardization (ISO).

5. Standardization and Quality Control Project

5.1 Objectives

In an effort to further promote standardization activities and to ensure the efficient operation of the Directorate of Standards, the Government of Jordan, in collaboration with the United Nations Development Program (UNDP) and the United Nations Industrial Development Organization (UNIDO), started in July 1973 the execution of a large-scale Standardization and Quality Control Project.

The ultimate objective of the Project is to strengthen standardization and quality control activities in Jordan at the in-plant and national levels with a view to contribute substantially to the improvement of the national economy through the efficient use of local raw materials, reduction of production costs, increase of efficiency, raising the quality of locally produced goods, ensuring fairness in trade and commerce, control of imports, and promotion of exports.

The immediate objectives of the Project are:

a. In the field of standard specifications:

(1) to organize and strengthen the operation of the Directorate of Standards related to the elaboration of national standards;

(2) to elaborate and implement a national program for standardization activities; and

(3) to bring about the effective application of national standards and to assist in the establishment, organization, and operation of standards departments in industrial enterprises.

b. In the field of quality control:

(4) to set up, organize, and operate Industrial Testing and Quality Control Laboratories (ITQCL);

(5) to organize the proper relationship between the ITQCL and the testing facilities in Jordan;

(6) to develop a national quality control scheme with a view to improve the quality of goods and products on the domestic and export markets, thereby protecting the consumers and and promoting the export trade of Jordan;

(7) to develop quality consciousness among the public and industrial establishments; and

(8) to organize and operate a national quality certification scheme whereby the standards and quality marks would be granted to products complying to national standards.

c. In the field of standard weights and measures:

(9) to establish, organize, and operate a central standards laboratory in Amman and district weights and measures offices in the main governorates of Jordan to accommodate reference standards;

(10) to plan, organize, and implement national metrological services; and

d. Common to all fields:

(12) to set up an information center for the dissemination of technical information relating to standard specifications, testing, quality control, certification marking, and legal metrology;

(13) to train national personnel in the fields of standard specifications, testing, quality control, and legal metrology; and

(14) to develop the participation of Jordan in regional and international organizations in the fields of standardization, testing, quality control, and legal metrology.

5.2 Duration

The duration of the Project is four years. The execution started, as was previously scheduled, in July 1973 and will be accomplished by the middle of 1977.

5.3 Costs

The total costs of the Project are about two million dollars contributed as follows:

a) The Government contribution of $1,500,000 consists of the provision of:

(1) personnel
(2) land and premises (3,000 m^2 floor area)
(3) chemicals and glassware
(4) office and laboratory furniture
(5) other operating costs

b) The United Nations contribution of $1,100,000 consists of the provision of:

(1) Foreign advisors including:

one project manager
two experts
three associate experts
six consultants

(2) Nine fellowships:

one in organization and administration of national standardization and quality control activities
two in statistical quality control
one in certification marking
two in instrumental methods of chemical analysis
two in physical and mechanical testing
one in legal metrology

(3) Equipment for:

inorganic analysis
organic analysis
food analysis
paints testing
paper and packaging testing
leather testing
textile testing
metallographic testing
mechanical testing
standardization of weights and measures

(4) Library references

(5) Other operating costs

5.4 Staff

At the end of the Project, standardization and quality control activities will be operated by a Jordanian staff composed of 60 as follows:

1	director
4	heads of divisions
17	engineers, chemists, analysts, and physicists
8	laboratory assistants
1	chief inspector
14	inspectors
1	draftsman
1	librarian
13	administrative supporting personnel
60	

It is hoped that this Project--which will be accomplished by the middle of 1977--will provide a strong impetus to the development of standardization and quality control, and hence to the national economy of Jordan.

STANDARDIZATION AND METROLOGY IN KENYA

By

Mr. Raila Odinga
Group Standards Manager, Engineering Section
Kenya Bureau of Standards
Nairobi, Kenya

I. INTRODUCTION

The Kenya Bureau of Standards (KBS) was established by an Act of Parliament in 1973 (Standards Act 1973) after efforts to establish a similar institution on an East African basis, i.e., embracing Kenya, Uganda, and Tanzania, had failed. Under the said Act, the functions of KBS are:

(a) to promote standardization in industry and commerce;

(b) to make arrangements and provide facilities for testing and calibration of precision instruments, gages, and scientific apparatus, for the determination of their accuracy by comparison with standards approved by the Minister on the recommendation of the Council, and to issue certificates in regard thereto;

(c) to make arrangements and provide facilities for the examination and testing of commodities and of any material or substance from or with which these commodities may be manufactured, produced, processed, or treated, or of the manner in which they are so manufactured, produced, or treated;

(d) to control, in accordance with the provisions of this Act, the use of standardization marks and other distinctive marks;

(e) to prepare, frame, modify, or amend specifications and codes of practice;

(f) to encourage or undertake educational work in connection with standardization;

(g) to assist the Government or any local authority or other public body or any other person in the preparation and framing of any specifications or codes of practice;

(h) to provide for cooperation with the Government or the representatives of any industry or with any local authority or other public body or any other person, with

a view to securing the adoption and practical application of standards; and

(i) to provide for the testing at the request of the Minister, and on behalf of the Government, of locally manufactured and imported commodities with a view to determining whether such commodities comply with the provisions of this Act or any other law dealing with standards of quality or description.

II. EXISTING POSITION ON STANDARDS AND TESTING AT NATIONAL LEVEL

A number of official organizations in Kenya are already engaged in the preparation of standards and in inspection and testing work. In the main, these activities are specific to sectional needs. Thus, the laboratory of the Government Chemist, a branch of the Ministry of Home Affairs, carries out chemical analyses required under several Acts of Parliament on a wide range of foodstuffs, on drugs, on water for industrial use and domestic supply, on metals, plastics and rubber, and on various goods coming under the surveillance of the Customs and Excise Authority. Orders for medical supplies, with attendant specifications, are prepared and issued by the Medical Stores Superintendent's Department of the Ministry of Health. Testing work is undertaken on a limited scale in some departments of the University of Nairobi, and at the Kenya Polytechnic. At the University of Nairobi, there is an interest in the setting up of physical standards other than those for mass, length, and volume, these latter being the prerogatives of the Weights and Measures Department of the Ministry of Commerce and Industry. The Weights and Measures Department is, indeed, currently involved in the plans for change to the metric system in Kenya. Other departments of the Government are also concerned in applying specifications in purchasing, and in examination of the materials and products offered to supply their particular needs. KBS is collaborating with these institutions and the local industries in preparing national standards for quality.

III. TOWARDS ESTABLISHMENT OF A METROLOGY CENTER

In Kenya, the problems of legal metrology, i.e., providing for equitable weights and measures that assure correct and clearly understood quantities of commodities bought or sold, are dealt with by the Weights and Measures Department. This service is a basic requirement for a healthy development of commerce and industry. Hence, the development of the legal metrology program was given early attention. However, the major problem which has impeded the proper development of the weights and measures activity is the lack of a National Metrology Laboratory where the national primary and secondary standards can be kept and properly maintained by calibrating and tracing the accuracy of field and working standards. Similarly, a shortage of reference and working standards available for verification

purposes has slowed down the progress of the weights and measures program.

Essential to the national legal metrology program are the physical standards of weights and measures. National reference standards and working or secondary standards are necessary for enforcement of legal requirements. It is necessary, initially, to provide primary standards of mass, length, and volume. These would serve as the national standards. Commercial measurements and legal determinations should be traceable to the national standards. Primary reference standards are essential to provide the basis for an equitable level of accuracy in commerce. To provide traceability and the link between commercial measurements and the national standards, adequate field standards of weights and measures should be employed. These should include standard weights, capacity measures, linear standards, electrical standards, temperature standards, gage blocks, and other measuring instruments. Calibration of field standards against national standards will not necessarily ensure that measurements are accurate since other aspects of the measurement process may not be under adequate control. As the measurement practices in Kenya become more sophisticated, attention will have to be given to the entire measurement procedure in order to be sure that systematic errors are minimized.

It is because of the foregoing reasons that the establishment of an environmentally controlled National Metrology Laboratory to house the national standards and laboratory instruments is planned. This Metrology Center will be a part of KBS and its main responsibilities will be:

(a) to provide and maintain the national physical standards which, to assure accuracy, will be compared at regular intervals with national physical standards of major industrial nations or international primary standards;

(b) to develop and provide calibrated verification equipment for the Weights and Measures Department, for use in legal enforcement activities;

(c) to plan, institute, and operate a nationwide educational program for consumers and farmers so that the public can know and identify the correct type of measurement and also exercise self-protection when selling or buying agricultural or industrial products;

(d) in cooperation with other organizations, to do research and find solutions, if possible, to problems involved in developing accurate and standardized measuring devices for replacement of traditional ones;

(e) to develop standards of performance, accuracy limits, and other requirements for testing commercial devices for an orderly commercial weights and measures program;

(f) to provide annual calibration services for verification of instruments used by the Weights and Measures Department;

(g) to develop test procedures for weights and measures inspectors to apply to commercial as well as scientific measuring devices;

(h) to assist in developing laws and regulations covering weights and measures;

(i) to provide calibration services to industries, universities, and research institutions; and

(j) to train scientists, inspectors, and technicians of different laboratories as necessary for metrology.

The Weights and Measures Department will therefore concern itself with metrication activities as well as conducting systematic periodic calibration and verification of measures and measuring instruments used in commerce and industry.

MODERNIZATION OF NATIONAL MEASUREMENT SYSTEM IN KOREA

Progress Review of Korea Standards Research Institute

By

Dr. Wun Jung
Vice President for Metrology
Korea Standards Research Institute
Seoul, Korea

I am very happy to be in this Workshop to represent the Korea Standards Research Institute. On behalf of our country and our Institute, I wish to express our deep gratitude to Mr. H. Steffen Peiser, organizer of the Workshop, and to the U.S. Agency for International Development for kindly providing the opportunity for me to visit the National Bureau of Standards (NBS) and meet distinguished colleagues from all over the world.

Our present effort to modernize the National Measurement Standards System in Korea may represent a somewhat unique and perhaps interesting example for developing countries like Korea to establish an advanced measurement system on a relatively moderate budget and in a limited time span. The Korea Standards Research Institute (K-SRI) came into being as a central body of the National Standards System last December. The target date for full operation is January 1978.

It was at the 1974 Workshop (November 4, 1974) that Dr. Zae-Quan Kim, then the Director of the National Industrial Standards Research Institute (NISRI), outlined the rapid industrial growth of Korea at the time and the increasing need for modernizing the National Standards System. Dr. Kim pointed out that Korean industry had developed so far that a higher level of measurement precision was now needed to sustain its further growth.

Modernization of the National Measurement System in Korea has been under study for ten years. An NBS team, including Mr. Peiser, was invited to Korea to assess the situation in 1967, and again in 1972 under his leadership. Following its recommendation USAID financed an independent feasibility study by a General Electric TEMPO team for a period of eight months--September 1974 to May 1975. The team concluded that the situation called for a very drastic measure--the expansion of the existing organization simply would not be adequate. It recommended that the responsibilities for the National Measurement Standards be separated from the testing/inspection functions of NISRI, and that an autonomous new organization be created to modernize the metrology standards system.

Based on the report of the feasibility study, a detailed plan for the establishment of the new Institute was laid out to strengthen the National Standards System and to maintain the traceability to the international standards system. The definition of the mission of the Institute, its objectives, organizational structure, staff qualifications, instrumentation, and facility requirements, as recommended by the GE-TEMPO study, were described by Dr. Kim in the Regional Seminar in Singapore, May 19-20, 1975.

A long-term loan of five million dollars from USAID was negotiated, Dr. Kim was appointed the first President of the Institute, and so the Korea Standards Research Institute was established in December 1975 as the central body of the National Standards System of Korea. As I said earlier, the target date for full operation is January 1978. We are now in the midst of the implementation of the plan. The ground-breaking ceremony was held on September 23, 1976, at the construction site in the heart of the new Science Town in the central part of Korea.

At the same time, recruitment for about thirty senior scientists and preparation for the procurement of equipment are getting under way in earnest. In all phases of the activity, the guidance and the cooperation of NBS under a Memorandum of Understanding are playing an important role. The specifications of the recommended instruments, for example, are being carefully reviewed by experts at NBS. Consultation on the design of the laboratory building, including the environmental control in particular, and the orientation and training of the core staff are being carried out right here on the campus of NBS.

At this point, I would like to touch briefly on the questions raised during the review process for the specifications. The GE-TEMPO report provided a sound basis for equipment selection. However, the rate of growth of the Korean industry, in the heavy machinery sector in particular, far exceeded the projection of the feasibility study. As a result, K-SRI will have to provide a higher level of measurement standards than anticipated. And even at this stage, the needs are shifting more and more toward the future requirements of the industry.

Moreover, recent advances in the state of the art of instrument technology are making some of the originally recommended equipment outdated. One such example is the development of a Josephson junction voltage standard. In collaboration with an NBS expert, a firm in California has just perfected a commercial unit in time for us to reconsider. Another example in the same category is an inductive divider bridge which advanced the precision of AC measurements by two orders of magnitude. A contrasting example is the dead weight force calibration system we visited this afternoon. As the system is

incapable of eliminating oscillations or responding to stepwise dynamic forces, I was told that NBS is phasing out the program. The level of Korean industry, however, still requires this kind of calibration service. Other cases where concurrence was hard to reach were the selection of fixed point temperature standards and the candela standards at the freezing point of platinum. Without going into further technical details, these are the kinds of problems we are facing in the specifications review process. We are carefully weighing every facet of the situation and revising the specifications as needed.

Recruiting and training of properly qualified scientists for each job function is another aspect of the implementation on which we are proceeding cautiously. While we want to assemble the core staff by early 1978, we would like to leave openings for the best qualified personnel for future consideration and so maintain the level of excellence. Concurrently a more thorough survey to identify the changing needs of the industrial measurements is being planned for April 1977. Coordination with existing standards laboratories is also being carefully planned.

Thanks to the outstanding cooperation of NBS, the project is coming along well so far. However, we still have a long way to go. By good matching of the dedicated efforts of capable staff with advanced instrumentation and modern laboratory buildings, we hope to achieve the goal of a high quality service in measurement standards to help the industrial growth of Korea. We are looking forward to the dedication ceremony in May 1978. We will be most happy if all of you could come to Korea and celebrate the occasion with us.

OVERVIEW OF STANDARDIZATION IN NIGERIA

By

Mr. F. P. A. Obi
Assistant Director
Nigerian Standards Organization
Federal Ministry of Industries
Lagos, Nigeria

Standardization is comparatively young and progress slow in Nigeria. It was only in 1970 that the administrative base of the Nigerian Standards Organization (NSO) was established as an arm of the Federal Ministry of Industries. The organization was to prepare Nigerian Industrial Standards Specifications for products, materials, and processes, and to foster interest in the recognition and maintenance of acceptable standards by industry and the general public. It was then very well recognized that standardization would provide a necessary rational basis for advancement of the country's fast growing industrial and commercial activities. In 1971, the Federal Military Government provided a legal backing for the establishment of the NSO with a Decree (Decree No. 56) which defined the exact scope and responsibilities of the Organization. The Decree was framed to cover the economic and social needs of the country. It spelt out unequivocally the functions of the Organization with those of its governing council and laid down the procedure for the establishment of industrial standards and for enforcing compliance with them. In accordance with the Nigerian Standards Organization Decree, the Organization is governed by a Standards Council charged with the following responsibilities:

1. To advise the Federal Military Government generally on national policy on standards specifications, quality control, and metrology.

2. To designate, establish, and approve standards in respect of metrology, materials, commodities, structures, and processes for certification of products in commerce and industry throughout Nigeria.

3. To provide the necessary measures for quality control of raw materials and products in conformity with standard specifications.

4. To determine the overall policy of the Organization, in particular with regard to the financial, operational, and administrative programs of the Organization and to ensure the implementation of the said policy.

Subject to the above, the NSO, which is responsible to the Federal Ministry of Industries, has authority:

1. To organize, test, and do everything necessary to ensure compliance with standards designated and approved by the Council.

2. To undertake investigations, as necessary, into the quality of facilities, materials, and products in Nigeria, and establish a quality assurance system including certification of factories, products, and laboratories.

3. To provide reference standards for calibration and verification of measures and measuring instruments.

4. To foster interest in the recommendation and maintenance of acceptable standards by industry and the general public.

5. To develop methods of testing materials, supplies, and equipment.

6. To undertake the preparation and distribution of standards.

7. To register and regulate standard marks and specifications.

8. To establish and maintain laboratories, to compile and publish scientific data important to science or manufacturing interests.

9. To coordinate all standardization activities, cooperate with corresponding national and international organizations in such fields of activity as NSO considers necessary with a view to securing conformity in standards specifications.

The Organization is also empowered to undertake such research as may be necessary for the performance of its duties.

The NSO, under the Decree under review, is endowed with the powers to enter premises and obtain information related to its activities. The Decree stipulates that:

1. If any person required to furnish returns pursuant to appropriate sections of the Decree fails to furnish those returns as required, he shall be guilty of an offense and liable on conviction to a fine not exceeding ₦400 or imprisonment for a period not exceeding six months.

2. Any person who willfully obstructs, interferes with,

assaults or resists any NSO officer or servant shall be guilty of an offense and liable on conviction to a fine not exceeding ₦200 or imprisonment for a period not exceeding three months or both.

From the foregoing, it can be seen that the Nigerian situation is somewhat unique in the normal standardization practices all over the world. Quite unlike conditions prevalent amongst many standards bodies, particularly in developed countries, the following aspects are highlighted in the general scope and responsibilities of the NSO:

1. Whereas in some countries standardization, quality control, certification marking, and metrological services are functions of different functionaries, the Nigerian situation admits to a single body carrying out these various functions as well as having a legal right to carry out inspection of factories and obtain such data as it deems necessary for its activities.

2. The Organization is authorized to carry out some research insofar as that would foster standardization activities in the country; this aspect of the scope of the responsibilities imposed on the Organization provides for original work in standardization effort to be done in pertinent areas, which fact means that room for effective and original work on standardization is emphasized.

3. The most important aspect of the Nigerian Standards Decree is perhaps the mandatory nature stressed therein. It can be seen here that enforcement of standards is emphasized, which in effect augurs well for a young and developing economy like Nigeria in which actual implementation of standards poses some difficulties. The machinery for standardization efforts to meet the needs of the country was thus established. The NSO is now faced with the problems of an effective implementation of the ideals set up in the Organization Decree. Nigeria's position is no different from that of any other developing country. We have aspirations but we have problems, too. We want to achieve economic and industrial development in the shortest possible time. We want to utilize the technology already perfected in the developed countries of the world without wasting time and resources trying to discover what has already been established.

PRESENT SITUATION

Despite the very well identified general problems facing all developing countries like inadequate supply of facilities, manpower, etc., the Organization has continued over the years to carry out its responsibilities, but perhaps in a rather modest manner.

Standardization - In establishing standards, the consensus approach has been followed although some details of the process are being modified to meet emerging needs and demands, particularly to quicken the pace of standards writing and to keep a happy harmony with the ISO. Essentially, however, established National Industrial Standards (NIS), which now number slightly over 70, are mostly product standards which stress performance requirements rather than anything else.

Standards Implementation - The Standards implementation program best suited to Nigeria has been a subject of continued Council debates for some time. While voluntary standards have been generally favored, a cautious approach to mandatory standards has now been recommended for adoption. The Nigerian Council felt that large-scale adoption of mandatory standards would present a lot of problems because of the constraints under which the Organization now operates. For instance, facilities for scientific evaluation of product quality and its performance are lacking and designated laboratories which have hitherto fulfilled this role are not considered adequate in view of great demands on them which a mandatory system would create.

So far, no NIS Standard has been made mandatory but some will soon be made so because it is felt that such a measure appears to be the only way to force compliance to established standards. The use of a certification mark, which is generally encouraged and happily adopted in many parts of the world, does not appear to be attracting favorable response from Nigerian industries. Although to date eight industrial concerns have been permitted to use the NIS Mark on their products, only one of them has actually started doing so; this is not very encouraging.

PRESENT PROBLEMS

Standardization problems vary in nature from country to country. Amongst the developing countries these problems are practically identical. There are problems of identification, of priorities, problems of finance, problems of facilities, and problems of expertise or know-how. Experience in Nigeria shows that there are other added problems amongst which are the problems of winning public confidence in locally manufactured products and, even amongst government circles, creating the necessary awareness of the need and advantages of standardization. Every effort is being made to tackle problems relating to public relations as well as quality control, but those relating to facilities and manpower are bound to remain with us for a while.

FUTURE PLAN

In the final analysis, the question of determining priorities and directing the course for future actions will depend solely on general

policy decisions of the Standards Council. However, short- and long-term plans of the Organization include the following:

1. To prepare and develop standards in as many industrial areas as possible, and in so doing, adopt as far as possible ISO Standards where they are found to meet local needs.

2. To become more involved in international as well as interregional standardization by establishing more active cooperation with the ISO, IEC, and other such institutions and organizations actively concerned with standardization in developing nations.

3. To implement the standards mark and certify products, services, materials, and commodities which conform to valid Nigerian industrial standards.

4. To consolidate and expand the quality control instruction seminar program of NSO for personnel in industry. It is the best means of instilling quality consciousness into the minds of manufacturers.

5. To continue and intensify factory inspection tours and to collect quality control data and samples for analyses with a view to analyzing such data and establishing quality levels of products over long periods of time for future considerations in the review of standards.

6. To expand our quality control laboratory facilities for quality tests of products and services to industry, and to prepare the foundation for basic research work in local raw materials necessary for future standardization activities.

7. Since by our Decree metrology has been added to the responsibilities of the NSO, to establish a physical laboratory for metrological services.

8. To intensify the training of personnel engaged in standardization work.

To realize this plan, the Organization has embarked upon an expansion program under which three branch offices are being created and new headquarters are being erected to accommodate modern laboratory facilities (including those for metrology) as well as enlarged library services. To this end, a number of experts under UNIDO technical assistance are being engaged to help the Organization, both in planning and execution of vital activities.

MEASUREMENT SERVICES

In conclusion, I wish to put in a word or two on measurement services as they relate to Nigeria. Although the scope of responsibilities of the NSO covers metrology, effort in this direction so far has been restricted to mere compiling of inventory of available metrological materials in the country as the basis for determining metrological service requirements. Under a UNIDO technical agreement now coming into force, it is expected that a metrological laboratory will soon be established, equipped, and run by the NSO. At the moment, however, metrological services offered in Nigeria are perhaps those practiced in trade and those which are legally controlled by the Weights and Measures Division of the Ministry of Trade. Another aspect of measurement services consideration worth mentioning is the country's change-over to the metric system which was begun in 1971 and is expected to last up till 1977. Industrially and perhaps educationally, the country could be said to be over 80 percent metricated, but there is the problem of motivating the general public to use metric measures and units in their day-to-day operations.

UNITS OF WEIGHTS, SCALES, AND MEASUREMENTS IN THE YEMEN ARAB REPUBLIC

by

Mr. Jawdat Nazer
Economic Expert
Ministry of Supply
Sana, Yemen

Units of weights, scales, and measurements known and widely used in the Yemen Arab Republic were different from other units found in the Arab world and varied in Yemen itself from one district to another, depending on the influence of other neighboring states on that particular area.

Most of these units were taken from the Greeks, Romans, Persians, Byzantines, and Indians during the pre-Islamic era. Later they were adapted to Arab customs during the Turk and Imam reigns. The first Imam who issued rules giving a basis for these units was Imam "Yahya bin Al-Hussein Al-Hadi." He was the first Imam to rule Yemen in the Islamic era. During his time, units of weights, scales, and measurements were copied from Africans, Indians, French, and British, and subsequently "Arabized" until they became the official units in the country.

Despite the fact that these units were official, in practice differences persisted in weights, scales, and measurements from one area to another, depending upon the diligence and responsibility of the rulers of those particular areas. Anyhow, these units were also different in shape, design, and manufacture, depending on the areas of the country.

A description follows hereunder:

1. Units of Weights and Scales

Units of weights and scales are unified for grains (cereals), raisins, and coffee in one unit called "Kadah." It is cylindrical in shape and made of wood; it is similar to the bushel in the United States and the Sa'a in some other Arab countries. The Kadah was legalized to weigh and measure grains, cereals, and raisins which should be taxed by all the people as Zakat. The Zakat is a 1/10 part of all farm production which must be paid by each Moslem to the Government's main stores according to the Holy Book (Kura'an).

While the weights of grains and cereals are different according to their size, mass, and density of the different varieties, a system was put into effect for collecting the Zakat which is payable by everybody

in the nation in the form of various kinds of farm products, such as grains, cereals, etc., so the Kadah in Sana, the capital, is as follows:

a.	Amount of Kadah for Maize	=	32 kg
b.	Amount of Kadah for Millet	=	28 44/64 kg
c.	Amount of Kadah for Sorghum	=	29 kg
d.	Amount of Kadah for Wheat	=	31 12.8/64 kg
e.	Amount of Kadah for Barley	=	25 6.4/64 kg
f.	Amount of Kadah for Lentils	=	360.75/64 kg
g.	Amount of Kadah for Broad Beans	=	34 0.75/64 kg
h.	Amount of Kadah for Coffee	=	29-38 kg
i.	Amount of Kadah for Raisins	=	49-51 (Yemeni Ratel see below)

So, up to now the Kadah has been mostly used for weighing grains, cereals, coffee, and raisins, and it is widely known and officially taken to be such that one Kadah equals 64 Nafar, so that one Nafar is 1/64 of Kadah.

The Nafar is also a small weight and scale measure made of wood and is cylindrical in shape and is subdivided into a half, a third, a quarter, and an eighth.

There is some difference in the weight of a Kadah in the Sana district from the Kadah in the Sa'dah district in the north, or in the Al-Mahweet district in the southeast, or the Bani Hoshaish in the outskirts of Sana and other areas. The weight of the Kadah in the above mentioned areas is more in mass than the Kadah is in Sana. It is called Al-Kadah Al-Siri or Al-Kadah Al-Hadi in the name of Imam Yahia Ibn Al-Hussein Al Hadi (the first Imam) in Yemen.

The other units of mass are called Ratel (pound). The Ratel is considered as an official unit in the country, and it also differs in weight, so it depends upon the required goods to be weighed. The description follows:

1. The "small Ratel" (Cirkali Ratel--means English Pound) for weighing spices and thin silk threads = 16 Oqia.

2. The "medium Ratel" for weighing coffee, husk coffee, vegetables, fruits, and meats = 20 Oqia.

3. The "large Ratel" for weighing ghee, cooking oil, and kerosene = 24 Oqia.

The Oqia is 28.4 grains in all Ratels; it is sometimes more or less than 28.4 grains (it depends on the honesty of the seller).

There also exists a piece weight made of iron called Farasleh; it equals 20 small Ratels.

2. Measures for Fluids

Measures for weighing fluids such as cooking oil, rose water, vinegar, and kerosene have been prepared and differ in size and volume and are made from tin based on the weight of the Ratel equaling 24 Oqia.

3. Measurements of Lengths and Areas

The units of measurements of lengths and areas vary from one area to another; for instance, in some areas the arm, which is called Dera', or two arms' length plus the shoulders' length, called Ba'a, are used for measures of cloth materials and ropes. Sometimes sellers use their own arm, or their arms and shoulders. In other areas, the Hadi Dera' length is used. It equals 66 cm. In other areas the yard is used for measuring materials made out of velvet. There is also the Waar, which is a measure equaling 90.75 cm. The Hadi Dera' and the Waar are made of iron and are subdivided into halves, thirds, and quarters.

For measurement of areas in the Sana District, the Libnah is used indicating 10 Dera's length squared, and in the Taz District the Kasabah is used. It indicates 10 Dera's length squared, i.e., the same as Libnah, while in the Hodeidah District, the Ma'ad is used and almost equals 800 Al-Hadi Dera' length squared.

4. Measurements of Silver and Gold

With regard to gold and silver, the Tola is used as a unit of weight and it equals 11.5 g. Its origin is Indian.

Weights, scales, and measures are made by persons who have inherited this art from their forebears, the Kadah and the Nafar are made from wood, but the other weights and measures are made from iron, copper, and lead, and rarely checked and stamped by the Government of the State, so it is always low.

This is just a brief insight into units of weights, scales, and measurements found in the Yemen Arab Republic. All are still common and widely used. In 1974, we started to change and replace these weights, scales, and measures by the Metric system. For this purpose, we issued new regulations and rules necessary for applying this metric system. However, due to difficulties of enforcing them quickly, it will take a very long time to succeed, because of objections encountered from some quarters such as religious elders and people in positions to profit from the difference in weights and scales when they buy or hand back the Zakat. They receive the Zakat from the people in different areas where the weights of the Kadah is more,

while they hand back to the State the weight of the Sana'ni Kadah which is less. The difference is pocketed by them.

I hope in this brief study there are enough facts to benefit us all.

EVALUATION SESSION

By

Mr. Edward M. Glass *
Technical Assistance Expert

The principal objective of the Evaluation Session was to re-examine the experiences of the past two weeks of the Workshop. During that time, the major emphasis was in four areas related to the national administration of standards:

1. maintenance of national standards of measurement compatible with SI (the international system of units of measure), and the transfer of these standards to local institutions;

2. field surveillance of weights and measures in the marketplace;

3. procedures for the development of standards concerned with safety, consumer protection, building codes, etc., as well as compatibility standards for such items as pipe threads;

4. inspection and quality control of production. This includes sampling, tolerances, control charts, etc.

The modus operandi of the Workshop was to bring the participants into close contact with activities and organizations which were heavily involved in these four areas. Through visits, lectures, demonstrations, and discussions, it was the purpose of the program to pass on information on how standardization and related activities are administered in the United States.

Upon the completion of the Workshop, it was decided that an evaluation session would be appropriate. This would provide a basis for improving future workshops based upon the first-hand experience of the participants. Accordingly, an attempt was made to review the workshop activities to determine what useful lessons had been learned and what changes in content and emphasis might be made in the future. Some of the questions posed were:

1. What was really gained from this experience and how will it be applied in developing countries?

---

* deceased April 1977

2. Was it really worth the investment in time and money?

3. What were the beneficial highlights?

4. What important areas were neglected?

5. What were the principal shortcomings?

In this session, an attempt was made to obtain the reactions to the Workshop while the impressions were still fresh in the minds of the participants. In addition, a detailed questionnaire had been prepared by participants of prior Workshops. Each of the current participants was asked to complete this questionnaire upon return to his home country.

General Reaction

The group reaction was excellent. Everyone participated actively in the discussions and they appeared to be pleased to be able to describe their reactions. Almost all were very articulate in English, which contributed to a very lively session.

There was general agreement that the task of planning and designing this Workshop was extremely difficult because of the wide variation in background, experience, and interests of the participants. Overall, the group felt that an excellent job had been done to develop a most useful program which held the interest of the group in spite of this difficulty. The effectiveness of the administrative arrangements received many plaudits.

Benefits Derived

The principal benefits derived by the group were the opportunities to observe how a developed country administers and executes its national standardization program. The participants were vitally interested in the institutional linkages which have been created in the U.S. among government, private industry, and educational and non-profit organizations, a situation which is relatively rare in developing countries. This was illustrated dramatically during the visit to the Hughes Aircraft Company, where the cooperation between Hughes and the National Bureau of Standards is extremely close under voluntary arrangements.

The general consensus was that relatively few specific items were directly transferable to their own countries. What they did receive was a good grounding in the fundamentals of standards and measurements. It would now be possible to translate these basics into specific programs to meet the development needs of individual

countries. A number of attendees felt that the benefits of the Workshop would not be known for some time to come. Many standardization programs are in the planning stage or in their infancy in these countries. As they develop and mature, many facets of the program presented would become more relevant and usable. They considered themselves highly stimulated and motivated as a result of the information they had gained and were anxious to see how they could apply the principles learned to local situations.

Finally, a number expressed the opinion that the Workshop provided a basis for lasting relationships among the countries represented within the group. Living together for two weeks provided opportunities for exchanges of experiences among participants and a better understanding of one another's problems and solutions. Fruitful communication was expected to continue for some time to come.

Changes Suggested

There was a general feeling that inadequate time had been scheduled for discussion periods. It was thought that more time should have been set aside for greater verbal interchange of ideas among the participants, possibly toward the end of the first week.

Many of the developing countries are concerned with the standardization of a wide range of products from primitive to sophisticated. Naturally, the Workshop emphasized the higher technology end of the spectrum and this was appreciated by the group. However, it was emphasized that standardization organizations of many of the countries represented were heavily involved in the more traditional, basic needs of the people. More emphasis was suggested in the presentations and discussions on standardization and measurement related to food, clothing, shelter, and medical care.

A seller's market exists in most developing countries. Such a market environment does not encourage quality assurance and standardization programs. As a result, the government has had to be the driving force in the creation and execution of a national program aimed at protecting the public and assuring adequate safety, health protection and product performance. Many of the participants were interested in obtaining better insights into ways of improving the government's role and performance in the national administration of standards. Of particular interest were techniques to gain greater acceptance and participation of local industries.

There appeared to be interest in enlarging the discussions on the question of voluntary versus compulsory standards in developing

countries. Related to this is the role of standards organizations with respect to consumer movements.

The question of cultural activities was raised. Several participants would have liked to learn more about American culture during their free time. This could include attendance at an evening stage play or concert; group visits to museums or other cultural exhibitions; or suggestions and assistance on free day activities. There was general disappointment that some free time was not available while in San Francisco.

There was unanimous recognition that two weeks is the optimum for the length of the program. Many could not have attended if the Workshop were longer. To accommodate some of the suggested changes, it was felt that some adjustments would have to be made in the planned program rather than lengthening the program. One of the modifications suggested was the possibility of compressing some of the NBS presentations at Gaithersburg.

A number of attendees expressed interest in follow-up regional workshops and seminars designed to cover specific technical subjects in greater detail.

QUESTIONS AND ANSWERS ADDRESSED BY PARTICIPANTS
OF THE NBS/AID WORKSHOP
OCTOBER 1976

A. Relevance to your Programs in your Country.

Question:

1. What fraction of the presentations had any relevance to your

   a. present needs?

   b. future needs (as seen by you now)?

Answers:

a. present needs?

Mr. Mohammad Kabir NAZIRI: Weight and measures, and quality control.

Mr. Mohd. Abul Bashar KHAN: (1) Standardization and certification of industrial products, food and miscellaneous items. (2) Standardization, calibration and administration of weights and measures.

Mr. Hernan SOTOMAYOR: All the presentations related to basic metrology.

Dr. Lawrence TWUM-DANSO: 80-90 percent.

Dr. A. R. VERMA: Only those presentations which dealt with physical measurements were of direct interest to me personally.

Dr. D. DAVOUDZADEH: Weights and measurements, environmental pollution, and building.

Mr. Raila ODINGA: 60 percent.

Dr. Wun JUNG: One half.

Mr. F. P. A. OBI: 4/11; presentations on Oct. 18, 20 and 25, part of Oct. 21 and 22.

b. future needs (as seen by you now)?

NAZIRI: In the future first of all, we have to build an establishment for the purpose of measuring and testing

the quality of products and for training the vocational and administrative personnel.

KHAN: Setting up of national metrological services center within the umbrella or as an integral part of the Bangladesh Standards Institution.

SOTOMAYOR: Applied metrology in industry will be our future field, also dimensional measurement, physical properties, and characteristics of materials.

TWUM-DANSO: 80-90 percent.

DAVOUDZADEH: Computer science and reference materials.

ODINGA: 60 percent.

JUNG: One half.

OBI: In terms of long-term needs all of the presentations.

Question:

2. Which presentations could have been omitted

   a. in Gaithersburg?

   b. in Boulder?

   c. elsewhere?

Answers:

a. in Gaithersburg?

NAZIRI: In my opinion none.

KHAN: All were useful and informative, so none should have been omitted.

Mr. Jose PAREDES: None.

SOTOMAYOR: None.

TWUM-DANSO: None.

ODINGA: Dinner and talk by Dr. C. Weiss.

JUNG: Institute and Division overviews had some overlaps.

I appreciate the emphasis in most of the overlaps. Some could have been replaced by actual laboratory visits.

OBI: None anywhere; no knowledge is a waste.

b. in Boulder?

SOTOMAYOR: None.

TWUM-DANSO: None.

ODINGA: None.

JUNG: None.

c. elsewhere?

KHAN: Visit to the Transportation Test Center, Colorado.

SOTOMAYOR: None.

TWUM-DANSO: None.

DAVOUDZADEH: Transport Testing Center, Pueblo.

ODINGA: Transport Testing Center, Pueblo.

JUNG: None.

Question:

3. Which presentations were too brief

a. in Gaithersburg?

b. in Boulder?

c. elsewhere?

Answers:

a. in Gaithersburg?

NAZIRI: As the NBS Workshop was organized for a period of two weeks, it was required that presentations be brief.

SOTOMAYOR: None.

DAVOUDZADEH: Standards Application and Analysis Division, International Standards.

JUNG: None.

OBI: All presentations were overviews and therefore precise and not too brief as such. However, executive sessions were rather brief.

b. in Boulder?

PAREDES: Yes.

SOTOMAYOR: None.

VERMA: Visit to cryogenics laboratory would have been most welcome in order to see the facility and work.

JUNG: None.

c. elsewhere?

SOTOMAYOR: None.

TWUM-DANSO: Needed more time at Stanford Research Institute.

DAVOUDZADEH: Stanford Research Institute and Stanford University.

ODINGA: At Hughes Aircraft Corporation.

Question:

4. What presentations should have been added?

Answers:

NAZIRI: The presentation time was not sufficient for the two weeks; in the future if possible more must be added.

PAREDES: The Food and Drug Administration.

SOTOMAYOR: Maybe the executive sessions should be longer in number and in time, because it will give us the opportunity to evaluate the programs conducted in our own countries with the assistance of the NBS experts and all the participants.

VERMA: Perhaps some on the calibration of instruments, etc., and an actual example.

DAVOUDZADEH: Quality control and technological aspects of light

industry such as Foods, Clothes, Drugs, etc.

ODINGA: a) Brief session about the U.S., b) standard specifications.

JUNG: More laboratory visits. But I realize that other participants may feel otherwise.

OBI: A full discussion session on problems of developing nations.

Question:

5. Did you appreciate the presentations from other participants to such an extent that you wish more time should have been devoted to them

   a. by longer sessions?

   b. additional sessions?

   c. reduction of other presentations?

Answers:

a. by longer sessions?

NAZIRI: Yes.

PAREDES: Yes.

SOTOMAYOR: Yes.

ODINGA: No.

JUNG: I think it was adequate.

OBI: Yes.

b. additional sessions?

KHAN: Perhaps yes for interaction between fellow participants and U.S. leaders.

SOTOMAYOR: Yes.

TWUM-DANSO: Yes, by way of discussions.

DAVOUDZADEH: Yes.

ODINGA: No.

OBI: Yes.

c. reduction of other presentations?

SOTOMAYOR: Could be.

ODINGA: Yes.

OBI: Not necessarily, except where time becomes a major factor.

B. Quality of Presentations and NBS/AID Program

Question:

1. Which presentation was the best for you

a. in Gaithersburg?

b. in Boulder?

c. elsewhere?

Answers:

a. in Gaithersburg?

NAZIRI: Materials research, basic standards, instruments shops, weights and measures, and library division.

SOTOMAYER: All the presentations were extremely important.

DAVOUDZADEH: Measurement Services, Institute for Material Research.

ODINGA: Talk by Dr. A. A. Bates.

JUNG: All.

OBI: Metrology/measurements.

b. in Boulder?

NAZIRI: Basic standards.

VERMA: Time and frequency.

DAVOUDZADEH: NBS.

JUNG: All.

c. elsewhere?

NAZIRI: Philadelphia (ASTM); Stanford Research Institute.

TWUM-DANSO: Prof. Ireson's presentation (Stanford University.

VERMA: Hughes--Space Simulation Laboratory.

DAVOUDZADEH: Stanford Research Institute and Hughes Aircraft Company.

ODINGA: Talk by Prof. Ireson of Stanford.

JUNG: Impressed by Hughes visit.

Question:

2. Do you plan in the future

a. to request NBS literature?
b. to request US standards literature?
c. SRM's?
d. a guest worker stay at NBS for yourself?
e. a guest worker stay at NBS for others?
f. to suggest to your Government to invite a Survey?
g. to suggest to your Government to seek to send trainees?
h. to recommend that others from your country go to NBS/AID Workshops?
i. to recommend that others from other countries go to NBS/AID Workshops?
j. to recommend that your country host a Regional Seminar?

Answers:

	a.	b.	c.	d.	e.	f.	g.	h.	i.	j
NAZIRI	Yes	Yes	---	---	---	---	Yes	Yes	---	---
KHAN	Yes	Yes	No	No	Yes	Yes	Yes	Yes	---	---
PAREDES	Yes	Yes	---	---	---	---	Yes	Yes	---	---
SOTOMAYOR	Yes	Yes	Yes	Yes	---	---	Yes	Yes	---	---
TWUM-DANSO	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
VERMA	Yes	Yes	Yes	---	---	---	Yes	Yes	---	Yes
DAVOUDZADEH	Yes	Yes	---	Yes	---	---	Yes	---	---	Yes
ODINGA	Yes	Yes	Yes	No	No	Yes	No	Yes	---	Yes
JUNG	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
OBI	Yes	Yes	Yes	---	Yes	---	Yes	Yes	Yes	Yes

Question:

3. What suggestions would you make for the organizational arrangements for NBS/AID Workshops?

Answers:

NAZIRI: The program was very useful especially for developing countries. I suggest that NBS cooperate in the field of standardization in the future.

SOTOMAYOR: None.

TUUM-DANSO: Program was too crowded. Some time could be given to other non-technical things like visits to museums, attendance at theater, etc. Financial arrangement could have been simplified by paying the per diem and leaving participants to spend it the way they wished.

DAVOUDZADEH: 1) To visit those factories whose products are more relevant to developing countries, and 2) to allocate more time for the Executive Session.

ODINGA: The participants should have a free afternoon for consultation and private reading or there should be fewer evening dinners.

JUNG: Well organized and well executed. I have the highest admiration for the thorough arrangements.

OBI: Yes. Every exposure counts.

C. Personal Questions

Question:

1. Did you (a) enjoy the NBS/AID Workshop?
   (b) regret attending the NBS/AID Workshop?

Answers:

(a) enjoy the NBS/AID Workshop?

NAZIRI: Yes.

KHAN: Yes.

PAREDES: Yes.

SOTOMAYOR: I enjoyed very much being a guest of such an

important institution.

TWUM-DANSO: Yes.

VERMA: Yes, only it was a bit too busy. But that was to be expected and inevitable.

DAVOUDZADEH: I am deeply impressed by the fully scheduled program.

ODINGA: Yes.

JUNG: Yes, indeed.

OBI: Yes.

(b) regret attending the NBS/AID Workshop?

TWUM-DANSO: No.

VERMA: Not at all.

ODINGA: No.

JUNG: Certainly not.

Question:

2. Did you profit professionally in some way?

Answers:

NAZIRI: Yes, I did. During the two weeks which passed I learned many things about standardization which will be useful for my future activities in my country.

KHAN: Yes.

PAREDES: Yes, experience.

SOTOMAYOR: To attend the NBS/AID Workshop really means a lot to me.

TWUM-DANSO: Yes.

VERMA: Yes.

DAVOUDZADEH: It was fruitful and helpful.

ODINGA: Yes.

JUNG: Yes.

OBI: Yes. Every exposure counts.

Question:

3. Do you feel you have established personal and useful contacts

   a. with NBS staff?

   b. other US colleagues?

   c. with other Workshop participants?

Answers:

   a. with NBS staff?

      NAZIRI: Yes.

      KHAN: Yes.

      PAREDES: Yes.

      SOTOMAYOR: I established contact with Mr. Joseph Hilsenrath from the computer division, who offered us assistance with our program in information processing.

      TWUM-DANSO: Yes.

      VERMA: Yes.

      DAVOUDZADEH: No, because of the shortage of time.

      ODINGA: Yes.

      JUNG: Yes, in many ways.

      OBI: Yes.

   b. other US colleagues?

      KHAN: To some extent.

      PAREDES: Yes.

      TWUM-DANSO: Yes.

      DAVOUDZADEH: No, because of the shortage of time.

ODINGA: Yes.

JUNG: Not quite.

OBI: Some.

c. with other Workshop participants?

NAZIRI: Yes.

KHAN: Yes.

SOTOMAYER: I have to send some information on metrology to Dr. Rex B. Woo-Ming, Guyana.

TWUM-DANSO: Yes.

VERMA: Yes.

DAVOUDZADEH: Yes.

ODINGA: Yes.

JUNG: Yes, indeed.

OBI: Yes.

Question:

4. Do you feel your country should have sent someone else of

a. greater seniority (in job)?

b. lesser seniority (in job)?

c. greater technical experience?

d. lesser technical experience?

Answers:

a. greater seniority (in job)?

KHAN: It is decided by our government.

PAREDES: Yes.

TWUM-DANSO: No.

VERMA: No.

DAVOUDZADEH: Same seniority.

ODINGA: No.

JUNG: Not certain. But in some respects, a decision and policy making person might have profitted more.

OBI: No, none could have attended anyway. Participants should be of high seniority since essentially the Workshop was merely inspirational and could be of advantage to those who are in a position to suggest, create, or innovate.

b. lesser seniority (in job)?

KHAN: No.

TWUM-DANSO: No.

ODINGA: No.

OBI: No.

c. greater technical experience?

NAZIRI: Yes.

TWUM-DANSO: No.

ODINGA: No.

OBI: No.

d. lesser technical experience?

TWUM-DANSO: No.

ODINGA: No.

OBI: No.

D. Any other Remarks

KHAN: Developing countries export more agricultural and food products than engineering products. So balance should be made, if possible, to include the agricultural and food products besides engineering products.

Problems of developing countries as stated in the papers presented during discussion may be compiled along with the recommendations/suggestions for solutions, if any, at the end of the report separately.

The final printed report may be made available to each participant as early as possible, also to the government of his country.

VERMA: On the whole excellent. NPL India and other institutions would like to participate in the future also.

Perhaps a little time for seeing towns like San Francisco would have been very welcome.

It was a very rewarding session. It has given me a chance to visit NBS laboratories and discuss the collaborative programs.

DAVOUDZADEH: As you are aware, most of the developing countries have been involved not only in preparation of national standards, but also implementation of the national standard. Thus, more emphasis must be put on the applicability of the standard drafts with special reference to process quality control and production management.

Concerning the Workshop program, it may be more effective to avoid a fully and heavily scheduled program which prevents the concentration of the participant to pick up the highlight of the daily program.

ODINGA: I enjoyed attending the NBS Workshop. It was beneficial to meet people from different countries and share experiences with them. The visits to U.S. institutions and industries were stimulating. It is a pity that the AID Mission in Kenya does not take much interest in the field of standardization. Upon my return to Kenya, I shall write a report and recommend that we host a similar workshop in the future. We would be very pleased if NBS/AID would assist us in establishing our metrology and quality control laboratories. In conclusion, I would like to thank Mr. Steffen Peiser and all those in the NBS/AID who made it possible for me to attend this very useful Workshop.

OBI: I have already suggested cutting down travel time where possible and concentrating visits.

It might well be useful to allow time for participants to see where they have traveled so far to see, namely that where possible participants should have some time to themselves when a new station is visited.

Time allocated to executive session was not enough with the result that full discussions on papers presented were not held. In this regard, participants should be encouraged to attend fully prepared to avoid ad hoc sessions and rushed-up papers.

Perhaps it may help the organizers to ask for special areas of interest ahead of time for possible inclusion in presentations to ensure that everybody's interest is covered as far as possible.

Senior officials normally like to spend freely as they like without bothering to give account of every penny spent, some of which they may forget or not even bother to note as being trivial. Therefore, it is a better arrangement to hand over approved

stipends and have officials use their discretion in spending. It is a fact that most people hardly find enough time later to study documents gathered during workshops; therefore, I should like to suggest that participants be allowed enough free time during which some private studies of such documents could be carried out by serious minded participants.

NBS-114A (REV. 7-73)

U.S. DEPT. OF COMM. BIBLIOGRAPHIC DATA SHEET	1. PUBLICATION OR REPORT NO. NBSIR 77-1385	2. Gov't Accession No.	3. Recipient's Accession No.

4. TITLE AND SUBTITLE

REPORT TO AID ON AN NBS/AID WORKSHOP ON STANDARDIZATION AND MEASUREMENT SERVICES

5. Publication Date: December 1977

6. Performing Organization Code

7. AUTHOR(S) H. Steffen Peiser, Charles C. Raley, Cathy M. Schroyer Editors:

8. Performing Organ. Report No.

9. PERFORMING ORGANIZATION NAME AND ADDRESS

NATIONAL BUREAU OF STANDARDS
DEPARTMENT OF COMMERCE
WASHINGTON, D.C. 20234

10. Project/Task/Work Unit No.

11. Contract/Grant No. PASA TA (CE) 6-71

12. Sponsoring Organization Name and Complete Address *(Street, City, State, ZIP)*

Agency for International Development
Department of State
Washington, D.C. 20523

13. Type of Report & Period Covered: Final

14. Sponsoring Agency Code

15. SUPPLEMENTARY NOTES

16. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)*

From October 16-30, 1976, a Workshop was held at the National Bureau of Standards, Gaithersburg, and at selected universities, research institutes, standards developing organizations, test centers, and industrial companies, under the sponsorship of AID. The object of the Workshop was to give standards officials of industrializing nations insight into the standards and measurement systems of the United States and the role of the National Bureau of Standards, so that these officials might consider what parts of the U.S. system might usefully be adapted to conditions in their home countries. An exchange of standardization experience in each of the participant's countries was presented by delivered papers which are reproduced here. Countries represented included Afghanistan, Bangladesh, Bolivia, Ecuador, Ghana, Guyana, India, Indonesia, Iran, Jordan, Kenya, Korea, Nigeria, and Yemen.

17. KEY WORDS *(six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons)* AID;assistance;developing economies;foreign relations; industrializing nations;international relations;LDC's;measurement services; standardization

18. AVAILABILITY

[X] Unlimited

[ ] For Official Distribution. Do Not Release to NTIS

[ ] Order From Sup. of Doc., U.S. Government Printing Office Washington, D.C. 20402, SD Cat. No. C13

[X] Order From National Technical Information Service (NTIS) Springfield, Virginia 22151

19. SECURITY CLASS (THIS REPORT)	21. NO. OF PAGES
UNCLASSIFIED	112
20. SECURITY CLASS (THIS PAGE)	22. Price
UNCLASSIFIED	$6.50

USCOMM-DC 29042-P74