PD-AAJ 590

931-0243

PROJECT EVALUATION SUMMARY (PES) – PART I

Report Control Symbol U-447

1. PROJECT TITLE	2. PROJECT NUMBER	3. MISSION/AID/W OFFICE
Standardization in LDCs	931-0243	DSB

4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) Terminal

☐ REGULAR EVALUATION ☒ [illegible] EVALUATION

5. KEY PROJECT IMPLEMENTATION DATES	6. ESTIMATED PROJECT FUNDING	7. PERIOD COVERED BY EVALUATION
A. First PRO-AG or Equivalent FY 76	A. Total $ 640,000	From (month/yr.) Aug. 1976
B. Final Obligation Expected FY 78	B. U.S. $ 640,000	To (month/yr.) Sept. 1980
C. Final Input Delivery FY 78		Date of Evaluation Review

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. Disseminate Executive Summary to AID/W offices and USAIDs.	R. Moeller	8/1/81
2. Distribute full report to USAIDs in principal countries cited in report and to USAIDs with Private Sector Development Officers.	R. Moeller	8/1/81

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

☐ Project Paper ☐ Implementation Plan e.g., CPI Network ☐ Other (Specify) None

☐ Financial Plan ☐ PIO/T

☐ Logical Framework ☐ PIO/C ☐ Other (Specify)

☐ Project Agreement ☐ PIO/P

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

A. ☐ Continue Project Without Change

B. ☐ Change Project Design and/or ☐ Change Implementation Plan

C. ☐ Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

Roger D. Moeller, DS/AGR
Edward Brady, NBS

12. Mission/AID/W Office Director Approval

Signature [signature]

Typed Name William M. Feldman, DS/FNR

Date June 29, 1981

AID 1330-15 (3-78)

STANDARDIZATION IN LDCs

An Evaluation of A. I. D. Project No. 931-0243

and

Suggestions Regarding Follow-On Project Activity

Submitted in Fulfillment

of

Purchase Order No. DAN-1406-0-00-1016-00

by

James L. Roush
3800 N Fairfax Drive, #1214
Arlington, Virginia 22203

Cost: $7,783

Table of Contents

EXECUTIVE SUMMARY

Introduction

The scope of work for this evaluation calls for the Contractor to discuss the role of the National Bureau of Standards (NBS) in increasing the effectiveness of specific LDC (less developed countries) standards institutions, including their effectiveness in providing standardization and measurement services which benefit small farmers and urban workers. In addition, this report is to indicate if there is a basis for the design of a possible future role for NBS in support of the Agency's programs. The effectiveness and efficiency of the NBS and AID management of the project is also to be discussed, including the comparative effectiveness of various alternative resource allocations among the various project elements.

To facilitate the contractor's evaluation of the "Standardization in LDCs" project, AID contracted with NBS (through a RSSA arrangement) to prepare a questionnaire and solicit information on the results of the project from the various participants in the different activities of the project. The NBS RSSA also provided for NBS to contract with an expert knowledgeable in NBS programs and facilities who would visit at least three LDCs that had participated in the program and provide a written report to NBS, AID and the contractor on his findings in the three countries (Annex E). The Contractor participated with the NBS-contracted expert, Mr. Daniel De Simone, in the visit to Panama and Ecuador. Mr. De Simone also visited Sudan.

The Standardization in LDCs project began in 1976 and terminated in 1980. However, the project was a follow-on to the Industrial Standards project which was begun in 1971 and which included the same activities as the follow-on project plus some that were dropped from the new project. Although the focus of this evaluation is on the Standardization in LDCs project, many of the materials relating to the earlier project, including a

comprehensive evaluation of the project, were also reviewed. There was a special focus on Ecuador, where the principal NBS support was provided under the earlier Industrial Standards project, because Ecuador provided a particularly interesting case study of the stages of development of a standards institution. It also illustrated the trials and tribulations that most such institutions seem to have to face.

The Standardization in LDCs Project Paper states that U.S. technical assistance is for "improving their (LDCs) competence and institutional capabilities in the fields of standardization, quality control and metrology." The scope of activities that may flow from standardization, quality control and metrology include the following:

-- unified definitions of terms of trade and greater use of an international system of measures;

-- calibration services for instruments and physical standards -- for retailers, wholesalers, industry, government inspectors and laboratories, industrial research laboratories, regional or other subordinate standards facilities, etc.

-- production of standard reference materials certified to represent a physical or chemical property accurately for use in calibration or for comparison of the same property in other materials for quality control;

-- dissemination of standard reference data about the characteristics of materials for use in engineering design and measurement of material properties;

-- preparation of national standards and harmonization of national and international standards;

-- quality control of products for domestic consumption and export;

-- restriction of unnecessary proliferation of manufactures sizes;

-- quality certification and information labeling;

-- introduction of uniform weights and measurements for greater equity in domestic commerce;

-- establishment of measurements related to safety, fire prevention, disaster avoidance, pollution control, and wholesomeness of food;

-- building and computer technology and services; and

-- import and export controls related to standards.

Relevance of the Project to Development

In the process of conducting this evaluation, with the country visits and the reviewing of a large number of documents, the Contractor has become convinced of the importance of the general components of this project (measurement, standardization and quality control/assurance) in the economic and social development of developing countries. However, the Contractor, when he was Director and Program Officer in USAID missions, never gave any consideration to these components in the design of AID projects. It seems appropriate, therefore, to justify the conclusion that the project is important to LDC economic development and to consider why the activities of the project have had so little support. This is done in Section II. A. The relevance of the project to development is discussed further in the General Conclusions section (especially III. F. 2 and 3).

Measurement services are basic to internal commerce as well as international trade. They are basic to assuring equity in the marketplace. Standardization is very important to exporters of raw materials as well as to exporters of industrial products. Standardization can help the industrialist, and agriculturist to some extent, in terms of the equipment and materials used to produce the product that is marketed. Standardization can result in keeping a smaller inventory of tools, less time involved in training mechanics, more rapid and reliable production processes, less frequent checking of the production process during production and the production of a more marketable product.

Quality control (or quality assurance as it is being called increasingly) becomes of importance in an LDC economy rather early on in at least three ways: (1) for safeguarding export markets, e.g., the detentions in U.S. ports by the Food and Drug Administration have caused serious problems to a number of LDCs,[1/]

1/ Detentions in FY 1980 were $63.6 million for 10 Latin American countries.

problems that are surmountable only through standardization and quality control; (2) insuring the safety and nutritional value of food products; and (3) guarding against poor quality imports -- in this case, it requires checking to see that foreign exporters are not shipping in inferior products because the local inspection system is not as effective as that of the exporter's home country.

Are the LDCs Interested in Standards Assistance?

The answer to this question is clearly yes at both a general and specific level. At the general level, the LDCs have been seeking for years increased assistance from the industrialized countries in science and technology. Metrology and standardization needs were specifically cited in the 1979 UN Conference on Science and Technology for Development. The LDC interest in assistance for standardization was made explicit in the MTN Agreement on Technical Barriers to Trade (standards code). The U.S., as a signatory to the Agreement, is obligated, if requested, to advise LDCs on the preparation of technical regulations (Article 11.1). Other provisions provide for mutually agreed technical assistance regarding the establishment of national standardizing bodies, the participation in international standardizing activities, and the establishment of regulatory bodies or certification bodies. One country has already inquired about assistance from the U.S. under the Agreement.

At a more specific level, the attitude of past participants toward a continuation of the NBS program was overwhelmingly positive. Of 31 respondents from the LDCs, 29 (18 countries) were categorically positive and none were negative. The UNIDO advisors responding also strongly endorsed a continuation of the program, which they apparently saw as complementary to their own. The LDC nationals in charge of metrology, standardization and quality control activities of the Organization of American States (OAS) also supported a continuation of NBS activities. They felt that increased NBS-OAS collaboration would be feasible and desirable.

Is It in the U.S.G.'s Interest

It is in the U.S.G.'s interest to maintain a program of support to LDC standardization for reasons of political, economic and scientific interests and international development strategy. This position is elaborated in Section II. C.

Evaluation of the "Standardization in LDCs" Project

This section is devoted to an evaluation of the project utilizing AID's design and evaluation methodology as set forth in Handbook 3 and other documentation. In the main report, there is a listing of what was projected in the Project Paper, followed by a description of what actually took place in terms of project inputs, outputs, purpose and goal. This is followed by a general conclusion section covering project achievements, management of the project and other "lessons learned." For purposes of this summary, the principal activities of the project are listed below in Table ES-1. Immediately following, an annotated list of the general conclusions is presented.

Table ES-1

A Summary of Project Activities and Country Participation

Countries	Workshops			Surveys[1]				Seminars[2]			Courses[3]			Total Partic.
	76	77	78	76	77	78	79	77	9/78	10/78	76	78	79	
Ethiopia											x			1
Ghana	x	x						x			x			4
Kenya	x	x	x					x		x	x	x		7
Lesotho										x				1
Liberia													x	1
Nigeria	x												x	2
Tanzania			x							x				2
Africa	3	2	2					2		3	3	1	2	18
Argentina		x	x					x		x		x		5
Barbados			x							x				2
Bolivia	x	x						x			x			4
Brazil			x					x		x	x			4
Columbia											x			1
Ecuador	x				x			x				x		4
Guyana	x		x	X	x					x				5
Honduras													x	1
Jamaica											x			1
Mexico													x	1
Panama			x							x	x	x		4
Latin Amer.	3	2	5	1	2			4		5	5	3	2	32
Afghanistan	x													1
Bangladesh	x	x						x						3
Hong Kong									x					1
India	x		x						x	x			x	5
Indonesia	x	x	x		X	x		x	x	x	x	x		10
Iran	x	x						x						3
Korea	x	x	x		x		x	x	X	x	x	x		10
Malaysia									x					1
Pakistan			x				X		x	x				4
Philippines		x						x	x	x	x	x		6
Singapore										x				1
Sri Lanka							x		x				x	3
Thailand		x			x			x	x				x	5
Asia	6	6	4		3	1	3	6	9	6	3	3	3	53
Egypt		x				x		x					x	4
Jordan	x		x							x	x	x		5
Morocco						x						x		2
Saudi Arabia			x							x				2
Sudan			x			X				x		x	x	5
Tunisia			x							x			x	3
Turkey										x				1
N. Yemen	x													1
Middle East	2	1	4			3		1		5	1	3	3	23
TOTALS	14	11	15	1	5	4	3	13	9	19	12	10	10	126

1/ X = country being surveyed; others participated with NBS team.

2/ 1977 at NBS: Standardization in Support of Development; 9/78 in Korea: Metrology in Industry and Government; 10/78 at NBS: The Technological Knowledge Base for Industrializing Countries.

3/ All in U.S. 1976 by Denver Research Institute: Specification and Procurement of Instrumentation; 1977 and 1978 managed by NBS: Weights and Measures Services

General Conclusions Regarding Standardization in LDCs Project

1. NBS did not follow the Project Paper in one important element -- but it turned out well.

   The Project Paper called for concentration on approximately 10 countries, 8 of which were mentioned in the Project Paper. This was not done. However, not concentrating made sense in terms of the international political environment. The USG was on the defensive in international fora regarding technology transfer to the LDCs. The NBS program was practically the "only show in town" and it was in the U.S. interest to be forthcoming to LDC needs for assistance in the standardization area on as broad a front as possible. This was encouraged by the Department of State's coordinator for the U.S. participation in the August 1979 UN Conference on Science and Technology for Development.

2. NBS project activities contributed to AID development goals when there was a concentration of effort over an extended period of time.

   Examples include Philippines, Korea, Ecuador. The comparison between Ecuador and Panama illustrates the importance of consistent support.

3. Standardization can make a substantial contribution to a USAID's effort to help the rural and urban poor.

   In Ecuador, the standards institute is concerned about equity in the marketplace and is active in trying to assure the safety and wholesomeness of foods and pharmaceuticals. It is also concerned with quality control for exports. And well it should be since the Food and Drug Administration detained nearly $10 million of Ecuadoran exports to the U.S. in FY 1980. AID needs to be concerned about the need for standardization, quality control and measurement services in agriculture, nutrition, health and rural industry/small industry programs.

4. Individual participants benefitted from NBS programs.

   Based on questionnaire responses: 30 affirmative out of 36, only 1 negative.

5. Project documentation was sloppy.

   Internal consistency, use of Logical Framework concepts, relation of the Project Paper to RSSA.

6. NBS personnel performed well. Were they doing the right things?

   The question refers to the NBS focus, which seemed designed to maximize the positive political impact of the project rather than the development impact. The Contractor believes that AID would have more support for its development effort if it were a little more forthcoming occasionally in furthering broader, albeit shorter term, foreign policy goals.

7. AID's supervision of the project was minimal.

   Which was probably sufficient if one accepts the NBS focus.

8. The country survey has been useful, but it can be made more effective.

   A number of suggestions are made for improvement of the survey's effectiveness.

9. Other project activities should be re-examined, and generally modified somewhat, before being included in any new project.

   Suggestions and ideas of the Contractor, Mr. De Simone and/or respondents to the questionnaire.

Possible Follow-On Activity

LDC needs are discussed, making a distinction between the technologically advanced LDCs, the intermediates and the beginners. There is also presented a number of ideas suggested by NBS to the stillborn Foundation for International Technolgocal Cooperation/Institute for Scientific and Technological Cooperation.1/ Taking into account the various U.S. interests that could be served by a follow-on project, the Contractor recommends a centrally-funded project to serve the goal "To improve LDC technological infrastructure needed to import, adapt and utilize foreign technology in the area of metrology, standardization, and quality control." The project could be entitled Equity in the Marketplace and have as its purpose: "To improve the quality, safety, reliability and accuracy of measurement of (a) the principal marketed products of concern to the poor and (b) the principal products in LDC-US trade."

The project would have three principal components: (1) respond to requests for technical assistance under the MTN Agreement on Barriers to Trade (standards code); (2) undertake an informational/support type activity for standardization with USAIDs and LDC governments; and (3) support regional standards organizations and other regional cooperation actions in the standards field. The informational support activity would:

a) develop (through surveys and possibly small research grants) and disseminate, both to USAIDs and LDC governments, information showing how standardization and measurement services serve economic and social development, with cost/benefit calculations where feasible, and suggesting means of integrating standardization and measurement into development projects;

b) review up-coming projects at both the PID and PP stages to suggest when standardization and measurement components would strengthen projects; and

c) provide assistance to USAIDs in designing the standardization and measurement component for a project and in providing or arranging for technical backstopping of standardization and measurement activities in approved USAID projects.

1/ See Table IV-1 beginning page 52.

How might this suggested centrally funded Equity in the Marketplace Project be implemented? What would be an appropriate NBS role? The most logical implementation mode would call for RSSA/PASAs with NBS and with the Food and Drug Administration plus contracts with one or more private contractors to work on the informational activity mentioned and to serve as general back-up to the two agencies. However, this method of implementation would require a stronger project management role by AID, and this seems unlikely given recent history and projected cuts in AID/Washington personnel. The most logical alternative would be to have a RSSA/PASA arrangement with NBS, and have NBS assume responsibility for arrangements with FDA and for contracting with one or more U.S. firms to support the project.

Since the proposed project is supposed to incite and support additional USAID activity in the measurement services area, NBS would need to receive more field-oriented AID input into project implementation planning. This suggests that the NBS Project Director would need to meet periodically with an advisory committee which included regional bureau representation.

Regardless of the implementation mode, it is suggested that plans be made to provide briefings to USAID Directors, perhaps at regional Directors' meetings, and give seminars in selected countries after some of the studies have been completed, on the value of measurement services components in development projects. It is also recommended that the current PASA arrangement with the National Technical Information Service (NTIS) be expanded to provide for the dissemination through the NTIS system overseas of ASTM, ANSI and other U.S. standards documentation that may be requested by LDC standards bodies.

I. INTRODUCTION

A. Scope of Work

The scope of work for this evaluation was established in Purchase Order No. DAN-1406-0-00-1016-00, Amendment #1, of February 13, 1981, issued to James L. Roush (hereafter referred to as the Contractor). Under the terms of the Purchase Order, the Contractor is to discuss the role of the National Bureau of Standards (NBS) in increasing the effectiveness of specific LDC (less developed countries) standards institutions, including their effectiveness in providing standardization and measurement services which benefit small farmers and urban workers. In addition, this report is to indicate if there is a basis for the design of a possible future role for NBS in support of the Agency's programs. The effectiveness and efficiency of the NBS and AID management of the project is also to be discussed, including the comparative effectiveness of various alternative resource allocations among the various project elements. The scope of work section of the Purchase Order is reproduced as Annex A. The Contractor's curriculum vitae is appended as Annex B.

B. Modus Operandi

To facilitate the Contractor's evaluation of the "Standardization in LDCs" project, AID contracted with NBS (through a PSSA arrangement) to prepare a questionnaire to solicit information on

the results of the project from LDC participants in the different activities of the project. A description of the activities is provided in C below. A copy of the questionnaire is attached as Annex C. The responses to the questionnaire have been made available to the Contractor and are summarized in various parts of the report.

The NBS RSSA also provided for NBS to contract with an expert knowledgeable in NBS programs and facilities who would visit at least three LDCs that had participated in the program and provide a written report to NBS, AID and the Contractor on his findings in the three countries. NBS contracted with Daniel De Simone, President of the Innovation Group and a former employee of NBS, Office of the Science Advisor to the President, and Congress's Office of Technology Assessment. The Contractor joined Mr. De Simone in the visit to Panama and Ecuador. Mr. De Simone also visited Sudan. Mr. De Simone's curriculum vitae is attached as Annex D. Mr. De Simone's report is attached as Annex E.

The Contractor has also reviewed project files in AID and NBS; reviewed the reports of the various workshops, surveys, seminars and courses; and interviewed a number of people who have been involved in the program or have knowledge about or interest in elements of the program or activities closely related thereto. A number of the reports include summaries of the participants' evaluation of the course or workshop. In addition, the 1977 seminar on Standardization in Support of Development was devoted primarily to a review of the utility of the NBS

program (see NBS Special Publication 507). The files also include evaluative information on the program and individual components of the program.

The Standardization in LDCs project began in 1976 and terminated in 1979, except for some report writing which was continued into 1980. The project was a follow-on to the Industrial Standards project which was begun in 1971 and which included the same activities as the follow-on project plus some that were dropped from the new project. Although the focus of this evaluation is on the Standardization in LDCs project, much of the materials relating to the earlier project, including a comprehensive evaluation of the project, were also reviewed. There was a special focus on Ecuador, even though the principal NBS support was provided under the earlier Industrial Standards project, because Ecuador provided a particularly interesting case study of the stages of development of a standards institution. It also provided a good illustration of the trials and tribulations that most such institutions undergo.

C. Definitions/Inclusions

The Standardization in LDCs Project Paper states that U.S. technical assistance is for "improving their (LDCs) competence and institutional capabilities in the fields of standardization,

quality control and metrology. Listed below are definitions/ explanations of the foregoing terms.

METROLOGY is the science and technology of measurement in support of other sciences, technology, and trade. Metrology deals with the quantitative comparison (measurement) of attributes of objects or events with indications on instruments or with physical or chemical reference standards displaying attributes that are similar in kind and quantitatively defined in terms of units of measurements. (The International System of Units, SI, is an almost universally used system in terms of which even the U.S. Customary units are defined.) Two important features and an integral part of metrology are:

1) The knowledge of the uncertainties in measuring instruments and standards, and

2) The selection and confirmation of appropriate reproducibilities of the comparisons by which confidence in the usefulness of the measurements is obtained.

STANDARDIZATION is the methodology by which the expected performance of goods, services, and persons (manufacturing goods, giving services, or activities affected by either) is described in terms of written codes and engineering, product, environmental, safety, and information standards. Standards for individual purchase contracts are commonly called specifications. Many codes and standards depend on metrology to assure compliance, which may be assured by accredited test laboratories or quality marking schemes subject to surveillance. Companies, industry associations, national, regional, or fully international standards and codes may be mandatory or voluntary, but even the "voluntary" ones can be subject to binding agreements between vendor and purchaser or by local governmental authority, e.g., in the avoidance of fraud in retail markets or in the protection of health and safety of the public.

QUALITY CONTROL is the method by which uniformity of raw material, reproducible production behavior, and the expected performance of a finished product can be assured. Such control is invariably referred to specific standards or codes and is exercised on behalf of the manufacturer, the purchaser, or governmental authority. Use is often made of accredited test laboratories and quality marking schemes.

The scope of activities that may flow from standardization, quality control and metrology include the following:

-- unified definitions of terms of trade and greater use of an international system of measures;

-- calibration services for instruments and physical standards -- for retailers, wholesalers, industry, government inspectors and laboratories, industrial research laboratories, regional or other subordinate standards facilities, etc.

-- production of standard reference materials certified to represent a physical or chemical property accurately for use in calibration or for comparison of the same property in other materials for quality control;

-- dissemination of standard reference data about the characteristics of materials for use in engineering design and measurement of material properties;

-- preparation of national standards and harmonization of national and international standards;

-- quality control of products for domestic consumption and export;

-- restriction of unnecessary proliferation of manufactures sizes;

-- quality certification and information labeling;

-- introduction of uniform weights and measurements for greater equity in domestic commerce;

-- establishment of measurements related to safety, fire prevention, disaster avoidance, pollution control, and wholesomeness of food;

-- building and computer technology and services; and

-- import and export controls related to standards.

There will usually be one governmental organization in each country that is charged with defining the basic weights and

measures to be used in the country. However, not all AID-assisted countries have such an organization. Even where such an organization exists, there may be more than one set of weights and measures in use, e.g., metric, British, traditional. Even if there is one organization responsible for basic weights and measures, there may be several others that will be charged, or have assumed the responsibility, to establish standards in various fields -- they may be private or governmental organizations. Quality control certification and services may be provided by the standards organizations and/or by other governmental or private organizations.

II. IMPORTANCE OF PROJECT ACTIVITY

A. Revelance of Project to Development

Observations on the field visits, a review of the responses to the questionnaires and USAID replies to AID/Washington's request for support for the proposed but never held 1979 workshop indicate that limited achievements under this project reflect in part the low priority that most standards institutions receive from their governments. Similarly, measurement and standarization have generally been given no priority in USAID programs.

In the process of conducting this evaluation, with the country visits and the reviewing of a large number of documents, the Contractor has become convinced of the importance of the general components of this project (measurement, standardization and quality control/assurance) in the economic and social development of developing countries. However, the Contractor, when he was Director and Program Officer in USAID missions, never gave any consideration to these components in the design of AID projects. It seems appropriate, therefore, to provide some information to justify the conclusion that the project is important to LDC economic development. It seems important, also, to consider why many standards institutes have had so little support from LDC governments and USAIDs. This is relevant to the decision on the desirability and feasibility of a follow-on project, and it can provide insights regarding the design of any follow-on

activity. It has a bearing also on the results of the project being evaluated.

1. Measurement Services

Measurement services are basic to internal commerce as well as international trade. It was so recognized by the framers of the Constitution of the United States, Congress was given specific powers to establish a system of weights and measures. The importance of measurement services was stressed in a report to the U.S. Congress in 1821,[1/] a portion of which is reproduced below -- this portion was also quoted by Mr. Abdulla Fadlalla, the Assistant Secretary General of the Arab Organization for Standardization and Metrology, in the 1978 NBS Workshop on Standardization and Measurement Services:

> "Weights and measures may be ranked among the necessaries of life to every individual of human society. They enter into the economical arrangements and daily concerns of every family. They are necessary to every occupation of human industry; to the distribution and security of every species of property; to every transaction of trade and commerce; to the labors of the husbandman; to the ingenuity of the artificer; to the studies of the philosopher; to the researchers of the antiquarian; to the navigation of the mariner, and the marches of the soldier; to all the exchanges of peace, and to the operations of war. The knowledge of them, as in established use, is among the first elements of education, and is often learned by those who learn nothing else, not even to read and write. This knowledge is riveted in the memory by the habitual application of it to the employments of men throughout life."

1/ From Secretary of State John Quincy Adams

If they are so basic, why then are there so few supporters for up-grading measurement services? The Contractor has seen no study on this, but suggests the following as a partial explanation:

a. Inadequate orientation and understanding of the role of measurement services by planners and budgeteers, due in part to the fact there generally are no relevant classes in the educational system and in part to the fact that there are few, if any, relevant econmic studies. Even in the educational systems of more advanced (economically) societies, where many LDC leaders receive training, basic measurement services are taken for granted so relevant cours ; or course elements are unlikely to be found there either.

b. Elites in LDCs are less dependent upon the vagaries of primitive measures, e.g., the metric kilogram measure in a North African market of a rock, a bolt and a spark plug. Elites will probably buy more in retail outlets with more modern weighing devices (not necessarily more honest), will tend to buy more imported goods which frequently, but not always, are subject to standardization and quality control, and hence measurement is probably not a problem.

c. The development of reliable measures and instruments for testing various measuring devices frequently is quite technical and not easily understood by the planners and budgeteers, let alone the general public (in the U.S. also). To illustrate, the following is excerpted from Vanneavar Bush's foreword to Measures for Progress: A History of the National Bureau of Standards:

> "How long is a second? Do you just take the time for the earth to revolve on its axis, and divide this by 86,400? The earth does not turn uniformly. Shall we use the time for the earth to complete a path around the sun? This depends, to a slight degree, on what other planets are doing in the meantime. How about the time for light to travel a measured distance? This would be in a vacuum no doubt, and the technique is difficult. There is even a possibility of becoming involved with questions of special relativity. Shall we use the time necessary for some specified atom to emit a certain number of vibrations? Now we are on sounder ground, but not entirely out of the woods. We have to be sure we have the right atom, and that we can count correctly. I am of course not attempting in this example to really explore this problem. I merely wish to indicate how deep an apparently simple question can lead."

d. The foregoing also illustrates another potential problem: what degree of accuracy is needed? If the metrologists strive for too great a degree of accuracy or insist unnecessarily on developing their own measuring devices, their requests for resources can seem unreasonable in terms of the utility provided. The metrologist's priorities should take into account the state-of-the-art in his own country, not necessarily

that in the highly industrialized countries, and his country's development priorities (sectors and activities within sectors). Also, he should use reference materials from abroad when the cost is reasonable and the materials are relevant; to do otherwise can delay his program and make it even more difficult to get support from those who control his budget.

e. Consumers are not aware of inequities in measurement, whether or not intentional, or do not believe they can be changed -- either for lack of knowledge on how to effect change or assumed lack of influence.

f. Because of opposition of powerful commercial interests.

g. With regard to USAID missions, the lack of interest may in part reflect host government attitudes, but general policy guidance from AID/Washington contributes to USAID disinterest. Americans tend to take for granted basic measurements and adequate controls thereof. The lack of useful studies on the social and economic benefits of measurement, standardization and quality control, and inadequate information on LDC needs and problems in measurement contribute further to the AID apathy toward the provision and/or improvement of measurement services.

2. Standardization

In addition to being a basic requirement for economic exchange, instruments for providing weights and measures services are usually essential for carrying out a program of standardization. Standardization is important to agriculture and industry. Many LDCs continue to be exporters of raw materials and the existence of standards helps producers and exporters to provide what is expected by the international market, thus generally obtaining a better return. In like manner, standardization is important for the export of industrial products. In addition, standardization can help the industrialist and agriculturist in terms of the equipment and materials used to produce the product that is marketed. Standardization can result in keeping a smaller inventory of tools and spare parts, less time involved in training mechanics, more rapid and reliable production processes, less frequent checking of the production process during production and the production of a more marketable product.

So why isn't there more support for standardization? Many of the reasons set forth under Measurement Services would apply here as well. In addition, the process of developing standards, if it is to be effective, requires the active participation and cooperation of industry --

commerce to a lesser extent. In some countries the government and private sectors do not have a history of working together. In addition, because of salary scales, it is often difficult for the government to hire and keep sufficiently highly trained personnel that industry would have confidence in them.

Much of the standards work in the U.S. has been done by private sector-sponsored organizations. However, these organizations have relied heavily on the NBS for measurement services and technical back-up, particularly in the more technologically advanced sectors. Similarly, even if the private sector were to take the lead in developing national standards in sectors of priority interest to industry, there would still be a need for a national standards institution to backstop the effort and review the process from the viewpoint of consumers and other economic sectors.

3. Quality Control

Quality control (or quality assurance as it is being called increasingly) becomes of importance in an LDC economy rather early on in at least three different ways: (1) for safeguarding export markets, e.g., the detentions in U.S. ports by the Food and Drug Administration have

caused serious problems to a number of LDCs,[1/] problems that are surmountable only through standardization and quality control; (2) insuring the safety and nutritional value of food products; and (3) guarding against poor quality imports -- in this case, it requires checking to see that foreign exporters are not shipping in inferior products because the local inspection system is not as effective as that of the exporter's home country.

B. Are the LDCs Interested in Standards Assistance?

The answer to this question is clearly yes at both a general and specific level. At the general level, the LDCs have been seeking for years increased assistance from the industrialized countries in science and technology. While continuing to press for the transfer of technology in greater quantities and on better terms, the LDCs during the dialogue came to appreciate more their need for an improved science and technology infrastructure as a means of selecting technology wisely and making maximum use of it after acquiring it. While a metrology and standards-making capability has not always been specifically mentioned in the UNCTAD fora, such a capability is a necessary element of a rational technology infrastructure. Metrology

---

[1/] Detentions in FY 1980 were $63.6 million for 10 Latin American countries.

and standardization needs were specifically cited in the 1979 UN Conference on Science and Technology for Development.

More recently the LDC interest in assistance for standardization was made explicit in the MTN Agreement on Technical Barriers to Trade (standards code). The U.S., as a signatory to the Agreement, is obligated, if requested, to advise LDCs on the preparation of technical regulations (Article 11.1). Other provisions provide for mutually agreed technical assistance regarding the establishment of national standardizing bodies, the participation in international standardizing activities, and the establishment of regulatory bodies or certification bodies. One country has already inquired about assistance from the U.S. under the Agreement.

At a more specific level, the attitude of past participants toward a continuation of the NBS program was overwhelmingly positive. Of 31 respondents from the LDCs, 29 (18 countries) were categorically positive and none were negative. A substantial number of the respondents provided suggestions on how to improve the NBS program, including suggestions for additional activities. The UNIDO advisors responding also strongly endorsed a continuation of the program, which they apparently saw as complementary to their own. The LDC nationals in charge of metrology, standardization and quality control activities of the Organization of American States (OAS) also supported a continuation of NBS activities. They felt that increased NBS-OAS collaboration would be feasible and desirable.

C. Is It in the U.S.G.'s Interest?

It is in the U.S.G.'s interest to maintain a program of support to LDC standardization for reasons of political, economic and scientific interests and international development strategy.

1. Political Interests

The unwillingness of the U.S. and other industrialized countries to be more forthcoming in the transfer of technology has been a source of contention with the LDCs, especially the more technologically advanced LDCs, for a number of years. The continuation of a program of assistance for LDC standardization is only a minimal response to LDC demands. However, the NBS program has been well received by the LDCs. Thus, it can provide the basis for an improved dialogue on other aspects of technology transfer. Furthermore, it permits the USG to be associated with, and supportive of LDC development programs which, over time, can lead to more productive relationships. On the other hand, not providing support to standardization after the U.S.G. has become a signatory to the MTN Agreement on Barriers to Trade (standards code), which provides for such assistance to be furnished when it is requested, would clearly be a setback in relations with the LDCs. Such unresponsiveness would be used by some LDCs to foment or intensify future confrontation.

In looking at the political interests, it is relevant to categorize the LDCs somewhat. There are LDCs just beginning to establish standards and measurement institutions. There are others that are in an intermediate stage and others that have been referred to as the more advanced technologically, e.g., Argentina, Brazil, Colombia, Venezuela, Mexico, Nigeria, India, Indonesia, Philippines, Korea, Taiwan, Singapore, Hong Kong, Algeria, Egypt, Israel. Some of the most vocal in the North-South dialogue are to be found in the latter group. It is especially important, from a political interest viewpoint, that the more technologically advanced be included in the standardization support program, even if the terms of that participation are less favorable than for the less developed countries.

2. Economic Interests

The LDCs are increasing in importance as a market for U.S. exports. The more technologically advanced generally are the LDCs with the largest actual and potential markets. Assistance in the standards area increases the likelihood that participating countries will adopt standards that are based upon, or at least compatible with U.S. standards. This in turn facilitates future U.S. exports to the country. This fact is recognized by two of our important trade competitors, Germany

and Japan, both of which are quite active in providing their standards to LDC institutions and in bringing LDC scientists and technicians to their countries for training and exposure to their laboratory equipment and procedures.

A number of the LDCs are important sources of raw materials that are of importance to the U.S. economy. Participation of such countries in a U.S. standardization program can serve U.S.G. interests in two ways: (a) the LDC is more likely to be willing to remain a reliable source of supply; and (b) the quality of the products included in the standardization program are likely to be of better quality on a more consistent basis.

The U.S. imports many products from the LDCs, including especially food items. Often large quantities of these imports are detained at ports of entry because they do not meet U.S. standards, especially health standards administered by the Food and Drug Administration (FDA). U.S. support of standardization in LDCs can result in an improvement in the quality of the LDC exports to us. This decreases the likelihood of importing a health problem (for people, plants or animals) and reduces the detentions. Detentions are costly to the LDC and frequently are a source of contention in our bilateral and multilateral relations, i.e., having a negative effect on U.S. political interests.

In much of its procurement, the Department of Defense (DoD) requires the manufacturer to demonstrate that the calibration of the firm's production equipment is traceable to NBS standards. This suggests the importance of strengthening standards institutions in countries where significant offshore procurement by DoD would be of significant economic or political importance.

3. Scientific Interests

In some areas, LDC scientists (especially in the more technologically advanced countries) are working on subjects of interest to our own scientists. Often there are cooperative programs with U.S. institutions. Such cooperation in some technical areas would be facilitated under a standardization support program.

4. International Development Strategy

Measurement services, standardization and quality control are basic to rapid economic and social development. Unfortunately, this has not been generally recognized within AID, so assistance in these areas generally has not been provided in bilateral programs until the need was already felt strongly by the LDC. This felt need often came only after costly mistakes or the development of chaotic conditions in the sector. The final loan of some of the "graduate" countries has been a Science and

Technology loan, part of which was used for support to measurement and standards institutions. A centrally funded program could help bring about an earlier realization by the LDC governments and the USAIDs of the need for improved measurement services and standards as a support for economic and social development. In addition, measurement and standards components could be included in bilateral projects in health, education, agriculture, rural industry, etc., thereby increasing the chances of success of those projects. (Discussed further in III. F.3. below.)

Even the more technologically advanced countries still have large numbers of poor people and still need help with development, modernization and management of resources. These include areas in which U.S. work in measurement and standards could be particularly useful.

Some of the more technologically advanced countries are providing technical assistance to their less developed neighbors. The Standardization in LDCs project fostered this through the surveys and workshops. Even more could be done in a follow-on program.

III. EVALUATION OF THE "STANDARDIZATION IN LDCs" PROJECT

A. Introduction

The terms project input, output, purpose, goal, and end-of-project status will be used as they are defined in AID's evaluation system as set forth in Handbook 3 and other AID documentation on evaluation methodology. Basically, the system provides that in project design the designer begins at the broadest level (goal) and defines a project with a specified purpose which, if achieved, will make a positive impact on the project goal. The end-of-project status indicates the conditions that should obtain to conclude that the project purpose has been achieved. It is postulated that certain project outputs are necessary to achieve the desired end of project status. An estimation is then made of the inputs to the project that will be needed to obtain the desired outputs.

Evaluation methodology calls for starting at the input level and determining whether plans were carried out, then testing the validity of the input to output to purpose to goal postulation and the validity of the assumptions regarding other relationships or contributions to the project. The system also calls for looking for unexpected benefits or problems, whether or not related to project design. In general, the evaluator is looking for "lessons learned" as well as making an appraisal of project accomplishments -- both projected and unanticipated ones.

The following sections list what was projected in the Project Paper and describe what actually took place in terms of project

inputs, outputs, purpose and goal. This presentation is followed by a general conclusions section covering project achievements, management of the project and other "lessons learned."

B. Inputs

Set forth below are the planned inputs, as set forth in the Project Paper approved October 1976, followed by a description of the actual inputs. Where there is a discrepancy between the narrative in the Project Paper and the Logical Framework (Annex B of the Project Paper), the narrative information is presented and the discrepancy noted.

1. U.S. and regional orientation and theme workshops - 6*
   * 4 in Logical Framework

   NBS carried out 3 Workshops in the U.S. in 1976, 1977 and 1978 plus three seminars, 2 in the U.S. and 1 in Korea. The scope, date and report number for each is listed below:

   Oct 76 Workshop on Standardization and Measurement Services -- NBSIR 77-1385

   One week at NBS for visits to laboratories and attend seminars.
   One week visiting: American Society for Testing and Materials in Philadelphia; Transportation Test Center, DOT, Pueblo, Colorado; Institute for Basic Standards, NBS, Boulder, Colorado; Stanford Research Institute; Stanford University; Hughes Aircraft Company, Los Angeles.

Oct 77 Workshop on Standardization and Measurement Services -- NBSIR 78-1712

One week and two days visiting: Lawrence Gatterer Associates of Denver; Hewlett-Packard Company of Loveland, Colorado; Institute for Basic Standards, NBS, Boulder; Solar Energy Research Institute of Golden, Colorado; Colorado School of Mines of Golden; Dana Corporation of Ottawa Lake, Michigan; Chemical Abstracts Service of Columbus, Ohio; Toledo Scale of Columbus; Department of Food Science and Nutrition, Ohio State University, Columbus; GenRad, Inc. of Concord, Mass.; Massachusetts Institute of Technology, Cambridge; AMP, Inc. of Harrisburg, Penn; Bureau of Standard Weights and Measures, Department of Agriculture, Commonwealth of Pennsylvania, Harrisburg.
Three days at NBS for visits to laboratories and to attend seminars.
Attend special 2-day seminar (see next item).

Oct 77 Seminar on Standardization in Support of Development -- NBS Special Publication 507

This 2-day seminar was co-sponsored by the American National Standards Institute and the American Society for Testing and Materials. The titles of the two sessions were:

Six Years of NBS and AID Programs
Standardization in the U.S.A. -- A Resource for Development

Sep 78 Seminar on Metrology in Industry and Government: How to Find Out Who Needs What Services -- NBS Special Publication 539

A 2-day regional seminar held in Dae Duk, Korea by the Korea Standards Research Institute. The session titles were:

1. Quantitative Measurement is the Basis for All Science and Technology
2. Measurement is Needed to Select Raw Materials, Control Production, and Assure Quality of Products
3. A National Capability in Metrology is Essential to Industrial Development

Oct 78 Workshop on Standardization and Measurement Services -- NBSIR 80-2021

Three days attendance at the National Conference of Standards Laboratories at NBS (Optional).
Five days visiting: American National Standards Institute, NYC; Polytechnic Institute of New York, Brooklyn; Bureau of Standards of R. H. Macy & Company, NYC; Weights and Measures Section of the Maryland Department of Agriculture, College Park; Technical Association of the Pulp and Paper Industry of Atlanta; Georgia Institute of Technology, Atlanta; Scientific Atlanta, Atlanta; Southern Research Institute of Birmingham, Alabama; University of Alabama in Birmingham; Texas Instruments, Inc., Dallas, Texas; University of Dallas; Johnson Space Center Calibration Laboratory, Houston, Texas.
Three days and a half at NBS visiting laboratores and attending lectures and seminars.
Two days at NBS attending special seminar -- see next item.

Oct 78 Seminar on The Technological Knowledge Base for Industrializing Countries -- NBS Special Publication 543

A 2-day seminar to explore needs for the technological knowledge base for industrializing countries and procedures for acquiring and applying it in the areas of:
- Measurement capabilities and services required by technological industry;
- National and international standards that must be satisfied by industrializing nations;
- Knowledge required for industrial quality control;
- Knowledge required to enable a country to acquire commercial industrial technology;
- Managerial responsibilities and technical knowledge.

Co-sponsors included the Office of Technology of the Department of Commerce and the U.S. Coordinator in the Department of State for the United Nations Conference on Science and Technology for Development subsequently held in Vienna in August 1979.

2. National standardization surveys by international team - 3

NBS carried out 3 surveys as summarized below:

Indonesia -- May 30-June 11, 1977 NBSIR 78-1583

The survey team was composed of nine members: 3 from NBS, 1 from the Food and Drug Administration (FDA), the Science and Technology Officer in the USAID mission in Indonesia and standards experts from Ecuador, Korea, Thailand and Guyana. The team made some 80 visits, mostly on Java. The team was divided into subgroups. These subgroups provided observations and recommendations in the following areas:

-- Food and Food Safety
-- Building and Construction
-- Quality Control in Industry
-- Safety Standards
-- Calibration, Instrumentation, and Metrology
-- Measurements in Industry

Sudan -- February 25-March 8, 1978 NBSIR 80-2020

The survey team was composed of ten members: 3 from NBS, 1 from the U.S. Department of Agriculture (fiber and yarn technology), 1 from FDA, the Secretary General and the Assistant Secretary General of the Arab Organization for Standardization and Metrology, standards/metrology experts from Morocco, Indonesia and the United Kingdom. The team made some 50 visits, including to Port Sudan, Medani (Gezira Research Station) and Khartoum-Omdurman. The team's subgroups provided observations and recommendations in the following areas:

-- Food Industries
-- Weights and Measures
-- Chemical Industries
-- Standards and Quality Control
-- Textiles

Pakistan -- January 12-25, 1979 NBSIR 80-2051

The survey team was composed of six members: 3 from NBS, 3 standards/metrology experts from United Kingdom, Sri Lanka and Korea. The team made almost 40 visits, with almost half being to industrial plants. The visits were in Islamabad-Peshawar, Lahore and Karachi. The final team report was never approved for publication, but the report of the survey provides summaries of the visits and some conclusions and recommendations as presented in Pakistan by various members of the team.

NBS also carried out a one-week survey in Guyana in July 1976. This was prior to the formal approval of the project, but the survey apparently was at least partially funded from the project. The Guyana survey is summarized below:

Guyana -- July 11-17, 1976 NBSIR 76-1180

The survey team was composed of three members: 1 from NBS, 1 retired AID Industrial Development Officer and a faculty member of the Georgia Institute of Technology. The principal objective of the survey was to advise the GOG on the means of establishing a national bureau of standards.

3. Follow-up and problem-solving NBS advisory services -- unquantified

There is no report or single file which documents project-funded NBS advisory services. Furthermore, NBS contends that advisory services provided by NBS to less-developed countries, even if not funded by the Standardization in LDCs project, should be included as a project contribution because one of AID/Washington's objectives was to promote through the project other funding for NBS

activities in support of standardization in the LDCs. There follows a listing of activities that have been suggested by the former director of the project as being representative of this item of project input.

-- Visit of Dr. Peiser to Honduras May 20-26, 1979 to advise the Honduran Department of Engineering and Standardization in the Ministry of Economy on a proposed project for a national system of standardization, quality control and metrology.

-- Visits to the Philippines by a number of NBS personnel, especially in relation to building technology which would be resistant to earthquakes and high winds.

-- Based on the work done in the Philippines, advisory services were provided to Indonesia, Peru and Nicaragua.

-- As a follow-up to the 1976 Regional Seminar (Latin America) on OMNITAB II, a simplified computer program that can be used in the local language, Dr. David Hogben conducted a seminar in Bolivia and provided advice to the Ministry of Labor, the Ministry of Planning and the National Computer Center. The trip was partially funded by the Organization of American States.

-- LDC participants in country survey missions were selected from standards institutions in countries which previously had had surveys. This was considered as an important means of providing follow-up to previously surveyed countries.

-- An indirect means of providing advisory services was provided through the distribution of publications, e.g., the publications resulting from NBS's National Measurement System studies and documents of the Center for Building Technology. In addition, NBS responded to many technical inquiries, e.g., to answer questions on the foregoing publications or to give advice on the

design of laboratories (e.g., the Pakistan National Physical Laboratory) and the specifications of laboratory instruments.

-- The Institute of Computer Science and Technology of NBS provided advice to AID under the project.

-- NBS provided advisory services through attendance at regional standardization and metrology meetings. NBS also contracted under the project with the American National Standards Institute (ANSI) to participate in meetings of COPANT, the regional standards organization of Latin America and the Caribbean.

-- In May 1977 NBS sent a 3-person team to Korea to help the Korean Standards Research Institute plan an industrial survey to help determine more accurately the calibration and standards needs of Korea industry.

4. Standards and measurement training courses in LDCs and U.S. - 6

In the Milestones or Critical Performance Indicators (CPI) chart (Annex C of the Project Paper), the projected six courses are listed:

Instrument Specifications
Measurement Assurance
Weights and Measures
Chemical Analysis
Agricultural Engineering Standards Development
Quality Control

NBS contracted with the Denver Research Institute to give the course on instrument specifications. This was a two-week course given in November 1976. There is no report on the course itself, providing information on the participants and on the course outline. However, NBS did issue NBSIR 78-891, Guidelines for Specification and Procurement of Measurement Instrumentation, which is based on the DRI course.

Only two additional courses were given and these were both Weights and Measures courses organized by NBS; they are summarized below.

Jun-Jul 78 Course on Weights and Measures Services — NBSIR 79-1721

Two days of seminars at NBS.
Three days with the Bureau of Standard Weights and Measures of the Pennsylvania Department of Agriculture, Harrisburg for seminars, visits to laboratories and observation of actual tests at retail level (food and gasoline), truck scale.
Three days with Weights and Measures Section of the Division of Product and Industry Regulation of the Virginia Department of Agriculture and Commerce for review of activities at the State level, including visits to a petroleum terminal and an iron and metal yard; witnessing inspections of a vehicle tank meter, a bulk plant meter, an LPC meter, a railroad track scale, a vehicle scale and a warehouse scale; witnessing in a food store the inspection and operation of a UPC weigher and labeler, a digital deli scale, an electronic cash register/scale at check-out and a random weight package checkweighing; observe in a food store the operation of mechanical hanging scales and mechanical cash registers/scales at check-out; witness the inspection and operation of a gas pump with digital indicating elements equipped with remote readout; witness the inspection of a retail motor fuel dispenser -- single product and blended product.
Five days attending the 63rd National Conference on Weights and Measures "Changing Dimensions and Directions in Measurement Assurance."

Jul 79 Course on Weights and Measures Services — NBSIR 80-2022

Two days with the Department of Weights and Measures of the County of Los Angeles (program similar to above Virginia program).
Two days with Autonetics Marine Systems Division of Rockwell International of Anaheim, California involving a series of technical sessions subject matter in metrology.

One day visiting the John Fluke Manufacturing Company of Mountlake Terrace, Washington and the Society of Photo-Optical Instrumentation Engineers of Bellingham, Washington.
One week attending the 64th National Conference on Weights and Measures plus a series of presentations by various NBS staff members.

5. NBS assistance in standards (sic) equipment procurement (unqualified)

As indicated above, NBS contracted with Denver Research Institute to present a course on the procurement, installation and maintenance of laboratory instruments. There is no documentation regarding other assistance in equipment procurement financed under the project. However, there are indications in the NBS files that individual NBS personnel have provided informal advice on equipment procurement.

6. Host government contribution in form of staff time and international travel for workshops, surveys, training, and related professional collaboration; logistic support within the country; and equipment procurement.

In the listing of the inputs in the Project Paper no figures are given for the value of host government contributions. The Facesheet of the Project Paper also shows no figures for host government contributions, even though the Summary Cost Estimate and Financial Plan shows a host country contribution of $640,000, i.e., equal the U.S. contribution. There are no data on host government contributions, and it is not clear how the figures in the Project Paper were arrived at. Nevertheless, it appears likely that the

actual contribution was considerably less than projected. The bulk of the bost country contribution ($360,000) was allocated to Advisory Services and there is no information indicating that host countries made large contributions to these costs. There probably was some shortfall also in the host country contribution to workshops, because the files indicate that a number of exceptions were made to the rule that the host government was to pay international travel. On the other hand, the substantial contribution by host governments to the costs of country surveys appears to have been met.

Although the host government contributions to the project appear to be less than projected, they appear to have been significant and reasonable -- given that many of the invited participants to workshops and seminars were from countries where the need for a strong standards/ metrology unit was not yet accepted.

C. Outputs Projected and Obtained

Set forth below are the projected (planned) outputs according to the Logical Framework (Annex B of the Project Paper), followed by a tabulation of actual results. The Logical Framework is used rather than the Project Paper narrative, because the former is more complete and provides some quantitative targets.

1. Train 50 national standards leaders from 10-15 national standards institutions

To determine whether this output was achieved, a tabulation was made of the participants in the three workshops and the September 1978 seminar in Korea. In addition, LDC standards leaders who participated in one of the three surveys was included. There were also a few people who attended the 1977 and 1978 seminars at NBS that did not attend the workshops that preceded the seminars. The tabulation is summarized on the following page.

The target was exceeded somewhat in terms of leaders participating in the program. The number of countries participating was twice the target figure; in a number of cases, more than one institution in a country participated. In one sense the figure for Asia (and hence the totals) is understated because the figures do not include Koreans who participated in the seminar in Korea -- 30 from the Korean Standards Research Institute and another 86 from various Korean government agencies and departments and from the private sector. Although a large number of countries participated in the program, nearly one-fourth of the participants came from four countries: Korea (6), Indonesia (4), Philippines and Thailand (2 each).

Table II-1

Standards Leaders Trained

Region	# of Leaders	# of Instit.	# of Ctries	Multiple Participation # of Leaders	Multiple Participation # of Ctries
Africa	7	4	4	--	2
Asia	27	20	13	4	9
L.A. & Caribbean	12	7	7	2	5
Middle East[1/]	8	7	7	--	1
ASMO[2/]	3	1	NA	1	1
ISO[3/]	2	1	NA	--	1
TOTALS	59	40	31	7	19

1/ Includes Turkey and North Africa (including Sudan)

2/ Arab Organization for Standardization and Metrology

3/ International Organization for Standardization

NA = Not applicable

2. Prepare three national standardization plans

It should be noted that the narrative portion of the Project Paper calls for: "Plans for improving effectiveness of national standards." The latter could be met by offering suggestions for improving the standardization and metrology program, whereas the Logframe statement of preparing standardization plans would imply a more detailed report with time-phased targets, etc. In the implementation of the project, NBS followed the narrative portion of the Project Paper, i.e., it carried out surveys, generally of two-weeks duration, and offered a number of suggestions and/or recommendations for improving the country situation. Apparently, AID concurred with the NBS interpretation of the Project Paper. As indicated previously, surveys were carried out in three countries (four if one includes the one-week survey visit to Guyana before the official start of the project).

3. Provide guidance on national standards planning and implementation in 10 countries

Including the countries where surveys were undertaken and those receiving follow-up and problem-solving NBS advisory services (B. 3. above), more than 10 countries received NBS guidance on standards planning and implementation. However, the Project Paper does not say any 10 countries; rather, it states that the project is to

focus on 10 countries and specifically mentions eight. It states that the other two will be selected within six months after the project commences. The eight are broken into those proviously targeted from the predecessor project (Bolivia, Philippines, Thailand and Ethiopia) and those "very likely candidates" (Indonesia, Pakistan, Ghana and Panama). Of the foregoing eight, Indonesia, Philippines, Pakistan and Thailand were strong participants in the standardization in LDCs project; Ghana, Bolivia and Panama participated on a moderate basis and Ethiopia participated in only one course. There is no indication that the other two countries were chosen or that conscious decisions were made to focus attention on the foregoing countries.

4. Train 60 standards supervisors and staff

To determine whether this output was achieved, a tabulation was made of the participants in the two Weights and Measures Courses and the special course given by the Denver Research Institute on Specification and Procurement of Instrumentation. Since the names and organizations of the participants in the latter course were not available to the Contractor, it was not possible to determine whether or not some of the participants in the latter course also attended one of the Weights and Measures

courses. Therefore, the total number of participants may be slightly overstated. The tabulation by region follows.

Table II-2

Weights and Measures Training

Region	# of Trainees	# of Instit.	# of Countries	Multiple Participation # of Countries
Africa	7	6	6	1
Asia	9	8	6	3
L. A. & Caribbean	10	9	9	1
Middle East[1/]	6	5	5	1
TOTALS	32	28	26	6

1/ Includes North Africa and Sudan.

There is a substantial shortfall in the numbers trained in relation to the project targets. This is understandable, because there was a shortfall in the number of courses carried out.

5. Improved instrumentation procurement decisions

No information is available to determine whether this output was achieved. A course on instrumentation procurement was given by Denver Research Institute which

was attended by personnel from 11 countries. Assuming the course was a good one and that the participating institutions had some procurement to do subsequently, there should have been some improved decisions. NBS provided assistance to the Korean Standards Research Institute in instrumentation procurement; this was financed by the USAID's bilateral loan to Korea.

D. Achievement of Project Purpose

The project purpose is set forth in the Project Paper as follows:

> "To increase the effectiveness of 10-15 LDC standards institutions, including significant efforts by those institutions on standardization and measurement services which benefit small farmers and urban workers."

In the presentation which follows, attention will be given first to the general statement of project purpose. Subsequently, the outreach to benefit small farmers and urban workers will be discussed.

The conditions that would indicate that the purpose has been achieved are set forth in the End of Project Status. Observations and comments about the achievement of the three conditions set forth in the End of Project Status are given below with a statement of each of the conditions.

1. Increased LDC government commitment to standardization and measurement responsibilities

According to the Logical Framework, a review of national budgets, salary scales and staffing for

national standards institutions would be the means of verification of this condition. Unfortunately, information on these items are not generally available in Washington, D.C. This question was partially addressed in the questionnaire sent to participants in the program and in the questionnaire sent to directors of standards institutions which had had participants in the program. The relevant question was:

> "Did your institution gain increased resources of funding or manpower from its parent ministry or other sources as a result of participating in the (NBS) program? In what way did the NBS program help?"

As of the date of the drafting of this paper, the Contractor had received 42 questionnaires providing information on 17 countries and 2 regional organizations (the Caribbean Industrial Research Institute and Andean Pact organization). The larger number of individual respondents in relation to the number of countries represented was due to (a) multiple respondents from eight countries; and (b) responses from UNIDO experts and experts from more advanced countries who had participated in surveys or served as resource persons at seminars and who had received the questionnaire. The table below summarizes the responses on the above question by country. Panama, Ecudaor and Sudan have been included in the table also, but this is based on the trips to the

country by the Contractor and Mr. De Simone -- no questionnaires have been returned from these countries. Target countries per the Project Paper are asterisked below.

Table II-3

Questionnaire Results -- Increased Resources

No Increase	Not Addressed	Increased Resources Received or Expected
* Panama		Ecuador (but primarily earlier -- survey helped)
Kenya	Caribbean Ind.	* Philippines (survey helped)
Tanzania	Research Inst.	Jordan
India	Singapore	Egypt
Morocco	Peru	Brazil (with USAID help, but continuing)
* Pakistan		Argentina (implied)
Guyana (not yet)		Mexico (increased equipment)
Barbados (but expect in coming year)		Korea (1 inst. but no from another)
Sudan		Vietnam (with USAID help)
		* Thailand (got to keep lab fees)

Twelve countries have received (or expect to receive) additional resources. However, of the target eight countries cited in the Project Paper, responses have been received to date from or about only four, (information on one country is from a UNIDO expert who served there), and only two of them received increased resources. Of the target countries not heard from, the participation of three (Bolivia, Ghana and Ethiopia) has been minimal

and internal political and economic conditions have not been conducive to initiatives in the development area. Therefore, it is probably safe to assume that the response from these countries would be negative.* The eighth country, Indonesia, has participated fully in the program and some institutions may have increased resources. Even there, however, it is not sure because there are a number of institutions in the standards field and the government has been unwilling or unable to resolve the problem of overlap of functions.

Of the eight non-target countries with favorable responses, three are non-AID countries during this period (Argentina, Mexico and Brazil) and theoretically not part of the program, one is no longer independent (South Vietnam) and one got the bulk of its help from a bilateral loan rather than under the program (Korea -- also Brazil).

2. Qualitative and quantitative improvements in standards preparation, including better industry cooperation and participation.

According to the Logical Framework, this could be verified by reference to annual reports of the national standards institutions. Unfortunately, such reports are not available in Washington, D.C. and quite likely do not exist in all cases. The questionnaire did not ask for specific data on standards preparation. The

* A late response from Ghana: no increase.

closest was to ask: "Do you consider that the NBS program has helped your institution support industry in your country?" The responses to that question are summarized by country in the table below. Again, Panama, Ecuador and Sudan have been placed in the table based on the judgment of Mr. De Simone and the Contractor as a result of their visits to the country.

Table II-4

Questionnaire Results -- Industry Support

No Help to Ind.	Indirect Help	Helped Institution to Support Industry	
Guyana (not yet)	India	Argentina	Jordan
* Pakistan (no action yet)	Morocco	Brazil	Kenya
	Sudan	Barbados	Korea
Peru		Caribbean Industrial Research Institute	Philippines *
* Ghana			Singapore
			Tanzania
		Egypt	Vietnam
		Ecuador	Panama *

* Target countries mentioned in the Project Paper

There are still only two target countries clearly meeting the second prescribed condition of the End of Project Status. However, there is a much larger number of countries that have increased their services to industry. It seems reasonable to assume that at least part of the increase in services will have been related

to the development of standards. Furthermore, even if the support to industry referred to the provision of services in calibration and in up-grading quality control laboratories in industrial firms, this would help improve the climate for subsequently working with industry in establishing standards.

3. Training services available for staff and clients on standardization, quality control and measurement.

Information on this subject generally is not available. None of the questions in the NBS questionnaire elicit information on training services provided by the standards institution. Based on the field visits, the Contractor would question whether the provisions of training, at least in a formal sense, is a necessary condition to fulfillment of the project purpose.

4. Benefits to small farmers and rural workers

As indicated previously, the Project Purpose calls for "significant efforts by those institutions (10-15 LDC institutions whose effectiveness is being increased by the project) on standardization and measurement services which benefit small farmers and urban workers." In the Project Paper "significant" is defined as follows: "At least 20 percent of the effort will aim toward directly and immediately benefitting the rural and urban

poor through improved weights and measures and related measurement services." Examples of project activity in the previous project which were deemed relevant were the weights and measures survey in rural areas of Ethiopia and the survey in Thailand which dealt mainly with agricultural commodities. The Project Paper states further that the new project is to do more for the poor in developing countries than the previous project. Examples of how this was to be achieved were also given:

> "For example, in each of the six training courses, a part of the program will be devoted to discussion of opportunities and means for improving measurement services affecting the rural and urban poor, such as increased accuracy in measures of weight, length, and volume involved in daily market transactions, and increased quality and safety of domestic products purchased by the bulk of the people. Also in each of the national standards surveys and in each of the U.S. and regional workshops some part of each program will be oriented to these concerns. In the case of surveys, specifically, the matter of improved procedures to strengthen national weights and measures functions will be explicitly considered."

Given that this matter had been an issue to be resolved before the new project could be approved, one would have expected that the End of Project Status would include at least one condition directly related to the concern for the small farmer and urban worker. Even though none is listed, given the importance of the issue, it seems appropriate to present such information as is available regarding the NBS effort to carry out the stated intent of the project.

Regarding the six training courses mentioned in the excerpt above, only three courses were actually given. At least 20 percent of each course would appear to meet the criteria established. This element of the course could have been enhanced in the 1979 training course by including a speaker from the Food and Drug Administration in the special NBS program held during the National Conference on Weights and Measures.

With regard to the workshops, there was minimal input in the course that would meet the criterion set forth above; virtually nothing in the U.S. and regional seminars was directly relevant.

The scope of the surveys of standardization and measurement services in the various countries was primarily determined, as it should be, by the sponsoring country. Therefore, NBS's ability to inject concerns for the poor was largely limited to the influence it could have during the survey planning session. It should be noted, however, that the food industry generally was of concern to the sponsoring country and was included for review in the surveys. This would appear to be the sector of primary concern to the poor. In addition, the former NBS project director states that the survey teams raised issues related to problems or needs of the poor.

They also focused on workplace safety when they visited industrial plants.

In the NBS questionnaire, one question was designed to obtain some relevant information: "Do you consider that the NBS program has helped your institution support the health and safety of your people? Fairness to both buyer and seller in trade?" Most respondents did not address the question, but positive responses were received from respondents from Korea, Mexico, Brazil, Kenya, Philippines, Vietnam and Barbados. From the evaluation team's visits to Ecuador, Panama and Sudan we have established that all three of these countries are working to improve standards in the food industry. Ecuador is particularly active in trying to improve the quality of milk products.

E. Impact on Project Goals

The sector goal is stated as follows:

> "To improve living standards and increase employment by enhancing equity in domestic commerce and stimulating export expansion through better standardization and quality control services."

The measures of goal achievement are given as:

"1. Important consumer goods have better quality or lower prices resulting from standardization services.

2. Farmers increase income from greater equity in commodity transactions.

3. Employment increases in industry and agriculture."

Of the three measures of goal achievement, only the third is likely to be ascertainable from the data available in Washington, D.C. However, even for that measure, data are not available which could demonstrate a link between the improved performance of a country's standards institution and changes in employment statistics for the eight target countries mentioned in the Project Paper. In the countries visited, little effort had been made by the standards institutions to demonstrate or calculate the benefits from their programs. Although some examples were cited of activities that had led, or could lead, to greater equity in commodity transactions, the leaders of the institutions were not convinced that they could demonstrate yet a signficant contribution to the types of goal achievements cited in the Project Paper. Given the foregoing, and the inability of the Contractor to demonstrate more than partial achievement of the Project Purpose, there would seem to be minimal utility in gathering only partially meaningful or incomplete data to determine the extent to which the project has impacted significantly on the project goals.

What appears to be of greater utility is to discuss the appropriateness of the goal statement and the measures of goal achievement. As stated in the Project Paper, there are a number of factors required generally to obtain industrial production increases (presumably a prerequisite to increased employment), and that it is not possible to distill out the benefits from a

single factor such as measurement and/or standardization. Therefore, it is difficult to understand why "increase employment" is even in the goal statement.

Even with "increase employment" deleted from the goal statement, two goals or objectives still remain: (1) improve living standards by enhancing equity in domestic commerce; and (2) stimulating export expansion through better standardization and quality control services. One might ask why both need to be included, especially since the designers of the follow-on project supposedly were striving for greater specificity to meet the concerns expressed in the previous evaluation report.

Even if one accepts the goal statement as is, the measures of goal achievement do not seem well stated. For example, consumer goods are to have better quality or lower prices from standardization services. Possibly so, but unlikely without efficient inspection services and improved quality control. In Ecuador, for example, the standards for milk products have been published, with industry cooperation; yet, the standards institution recently found that only three producers out of 18 were consistently meeting the standards.

Measure 2 states farmers will increase income from greater equity in commodity transactions. Hopefully so, but it is also quite possible that an even greater increase in income would come from better standards if, through improved quality control, the farmers could meet the standards. Unfortunately, it is also

possible that better standards could result in lower incomes for smaller producers who were unable to improve the quality of their products.

Even within the general area of standardization, improved inspection is usually a prequisite to obtaining an impact at the goal level. However, inspection is seldom a responsibility of the standards institution (by design if countries follow NBS's recommendation). Thus, it is essential to build into the program, or insure that it is being covered in some other way, an improved inspection capability -- at least in targeted commodity or service areas. However, the project purpose refers only to improving the effectiveness of standards institutions and there is no assumption regarding the availability or capability of inspection services.

Even if an inspection service exists, extremely low pay scales, possibly coupled with corruption, can defeat the best laid plans for a smoothly functioning integrated system. This points up once again the importance of a careful selection of the countries which will be the focus of the project.

F. General Conclusions

This section will include conclusions on how the project was carried out and on the overall effectiveness of the project; comments on specific project activities; and suggestions for future programs.

1. NBS did not follow the Project Paper in one important element -- but it turned out well.

The project purpose calls for increasing the effectiveness of 10-15 LDC standards institutions. This implies the need to concentrate on a few countries, and this is made explicit in a number of places in the Project Paper. Eight countries are listed as likely target countries, and it is stated that two additional countries will be chosen within six months. This appears never to have been done; certainly, there was no concerted effort made to concentrate on the cited countries. NBS personnel and the former NBS-project director seemed surprised to learn that the Project Paper called for NBS to concentrate its attention an a small number of countries. On the AID side, neither the project officer who took over shortly after the project was approved in 1976 nor his successor offered an explanation for the digression from the Project Paper or the lack of any mention of the digression in AID files. However, they defended the outcome.

Actually, the lack of concentration made sense in terms of the international political environment of the times. As indicated in II. C. above, the U.S. Government was on the defensive in international fora for not being more forthcoming in the transfer of technology to the LDCs. The NBS program was practically the "only show in town" in terms of U.S. responsiveness to the LDC's complaints. Thus, it would have been reasonable, in terms of U.S. political interests, to have had an NBS project whose purpose was to be forthcoming to LDC needs for assistance in the standardization/metrology area on as broad a front as possible, including especially middle income countries -- even if they were not regular AID recipients. The AID environment at the time, however, was such that it would not have been possible to get approval for a project that was so structured. It appears that the AID project officers had the broader U.S. interest in mind, regardless of the language of the Project Paper. For example, the October 1978 seminar on the Technological Knowledge Base for Industrializing Countires was co-sponsored by the U.S. Coordinator in the Department of State for the up-coming United Nations Conference on Science and Technology for Development (August 1979 in Vienna, Austria). Furthermore, with inadequate resources to do all of the project activites,

priority was given to the workshops and seminars over the courses. This facilitated contact with more and higher level LDC personnel and with representatives of LDC regional organizations.

Since it appears that the project was implemented very heavily in terms of meeting the broader U.S. political goal rather than the narrower development goal, it seems appropriate to appraise the success of the project in that context. In terms of coverage, 42 countries and 2 regional organizations participated in the activities of the project between 1976 and 1979. That the NBS activities were well received is attested by the responses to the questionnaires, the evaluations at the end of each activity, correspondence in NBS's and AID's files and conversations of the Contractor and Mr. De Simone in the three countries visited. Of particular note, in the context of serving a broader foreign policy goal, is a December 1, 1978 memorandum to Ambassador Wilkowski, the State Department Coordinator for the U.S. participation in the August 1979 U.N. Conference. The memorandum, the text of which follows, was from a member of her staff who had just returned from one of the regional conferences which were held preparatory to the Vienna Conference:

> "In my talks in New Delhi, I encountered universal praise for the NBS Assistance Programs with LDCs in metrology, standardization and quality control. I think we should try to double or triple the size of the program. It would be sound policy, yielding important dividends to the U.S. in trade and investment, and would be exceedingly well received by the developing countries at Vienna."

If one believes that shifting the emphasis of the project to serve a broader, shorter term goal was appropriate, as the Contractor does, then the evidence available suggests that the project was successful. If one is to evaluate the project solely in terms of the Project Paper, the available evidence suggests that the project was moderately successful. However, there is insufficient information available on the situation in some of the "target" countries to be categorical. Although project implementation seemed more designed to further U.S. political goals than development objectives, the implementation method pursued did engender widespread enthusiasm for NBS assistance in the standardization area and fostered a cooperative spirit that can be helpful to AID in working with the LDCs if a follow-on project should be approved.

2. <u>NBS project activities contributed to AID development goals when there was a concentration of effort over an extended period of time</u>.

This conclusion is based on a review of the cumulative results of the project under review plus its predecessor.

As indicated above, there has been little deliberate concentration within the current project. Two apparent exceptions with positive achievements are Korea and the Philippines, both of which have participated heavily in the latest project. Both were also recipients of surveys under the previous project, and it is clear that accomplishments during the 1976-79 time period owe much to the earlier survey and to NBS contributions funded from other sources both before and during the later period. A June 26, 1979 cable from Korea (Seoul 9374, subject: NBS/AID Programs 1971-79) attests to the value of the NBS assistance when concentrated in one country over a period of time. It also illustrates the importance of USAID support for the NBS effort. The text of the telegram follows:

> "The benefits of the NBS/AID programs have been relevant and extremely valuable for Korea, especially since one of our AID technical assistance loan projects has been the establishment of an effective national metrology standards system. We note on the attachment to Ref Airgram (AIDTO Circ A-93) that Korea is the only country, world-wide, which has participated in every annual workshop from 1972 to 1978. Korea recognized that a system to insure the reliability of industrial measurement was a necessity for their future as an export country. Thus in 1974 they contracted with General Electric-TEMPO for a feasibility study which led to the AID loan in 1975.
>
> NBS has been the technical advisor to the Korea Standards Research Institute (K-SRI) assisting in training of K-SRI staff and procurement of calibration equipment. The NBS/AID programs sponsored by DS/ST have augmented project activites

> provided under the loan. The Korea participants to the NBS/AID workshops, seminars, surveys and courses have directly and almost immediately utilized the benefits of this training. Since the Korean participants were actively engaged in establishing national measurement standards, the NBS/AID programs were most meaningful and beneficial. GLEYSTEEN"

The visits of the Contractor and Mr. De Simone to Ecuador and Panama also provided evidence of the importance of country concentration. The utility of USAID support and of the country surveys was also evident. Ecuador had a survey in 1972 and a follow-up mini-survey in 1974. The former Director (1970-80) of INEN (the Ecuadoran standards institute) participated in the 1972 workshop, three other country surveys, the 1977 seminar at NBS and two regional seminars. Other staff members attended three workshops and a weights and measure course. INEN also received some resident NBS technical assistance financed by the USAID during INEN's formative period. The importance of the NBS assistance, including particularly the survey, was emphasized by a staff member of INEN who has been with the institute since it was established. This thesis was supported in a separate conversation by the Deputy Program Officer of the USAID, an Ecuadoran who was the USAID officer responsible for the earlier USAID contribution and who has continued to follow developments at INEN.

The contrast between INEN and COPANIT (the Panamanian standards institute) is striking, especially since Panama is listed as one of the target countries in the Project Paper. COPANIT was not the recipient of a survey, and it appears to be badly needed. A recent director of COPANIT attended the 1978 Workshop and Seminar. COPANIT had three other participants in NBS programs, but none are currently with the institute. An NBS officer paid a short visit to Panama enroute to a conference in the area, but there had not been a sustained contact with COPANIT. There has been no USAID support.

Both INEN and COPANIT were established in 1970. INEN still needs help and is not equipped to achieve its mission fully. Yet, it is considerably ahead of COPANIT. For example, INEN has its own building; COPANIT is in two places -- part in the Ministry, part at the University. The Director of INEN has access to his Minister; the Director of COPANIT does not -- nor does the Minister have any interest in COPANIT. INEN has over 90 employees; COPANIT has less than 20. INEN's 1980 budget was around $740,000 plus earnings of $30,000; COPANIT's budget was less than $100,000. INEN has issued over 600 standards and had 300 in process in February 1981; COPANIT had issued 274 at the end of 1980. INEN has a larger

laboratory and library. INEN is well known throughout the country and generally well respected. Recently, the Chamber of Industry of Ecuador approved a resolution encouraging the Government of Ecuador to increase the budgetary resources allotted to INEN. COPANIT is struggling for survival.

3. Standardization (including metrology and quality control) can make a substantial contribution to a USAID's effort to help the rural and urban poor.

As indicated in III. C. above, the project purpose of the Standardization in LDCs project calls for increasing the effectiveness of 10-15 LDC standards institutions, "including significant effort by those institutions on on standardization and measurement services which benefit small farmers and urban workers." Significant was further defined as being at least 20 percent of the institutions' efforts. To the NBS project implementers and the AID project monitors/supervisors, this seemed arbitrary and also meaningless. And indeed, there is no way an evaluator could determine the level of effort without going to each of the target countries. Even then, considerable definitional problems would arise that appear not to have been thought through. Because of this, and the previously discussed emphasis on meeting a broader political goal of encouraging widespread participation in NBS activites, it

appears that the concern for the rural and urban poor did not get the level of attention that might have been expected from a reading of the Project Paper. If concern for the rural and urban poor would have been of major concern, more resources would have been devoted to the proposed courses (only half were carried out) and less to the workshops. Surveys might also have been oriented differently -- subject to the concurrence of the country being surveyed.

Given the foregoing situation, and the apparent general feeling in AID that standardization relates to industry and is therefore irrelevant to the main thrust of the AID program, the Contractor was particularly anxious in the country visits, to see if and how standardization was relevant to the main thrust of AID activities. The visit to Ecuador was particularly rewarding in this respect. There, we found that INEN (the standards institute) was very much concerned about equity in the marketplace, and especially about the safety and wholesomeness of foods and pharmaceuticals. Although the Ministry of Health has primary responsibility for inspection, INEN has established appropriate standards and, on its own can take samples from the marketplace and advise the Ministry of Health or the principal governmental administrator of the results. Furthermore, INEN is in a position to advise the Ministry of Health or local

governments on the type of laboratory they need for inspection purposes, give advice on the type of equipment to order, provide methodology on the types of tests to run and provide training to the inspectors taking samples and the laboratory personnel running the tests. INEN is currently working with the Ministry of Health on draft legislation. INEN would like to send some of its personnel to some of the training courses of the U.S. Food and Drug Administration so its personnel could be better qualified to give training to other governmental personnel.

The USAID is considering a new project in rural health. It would do well to consider the importance of the safety and wholesomeness of local foods in the local market as either directly relevant to health problems or indirectly relevant through their effect on nutrition. If the safety and wholesomeness of local foods is relevant to the health problems of the area, the USAID should consider including in its project laboratory equipment and training for appropriate regional officials and employees. It should also consider funding training for INEN personnel and contracting with INEN to provide training and technical assistance to the Ministry of Health and local governments, inspectors, laboratory personnel, and their supervisors.

Ten Latin American countries had over $1 million of detentions at U.S. ports of entry in FY 1980 because of failure to meet requirements monitored by the Food and Drug Administration.[1/] Ecuador's detentions were the third highest, totaling slightly under $10 million. A significant problem related to the freezing/packaging and transporting of shrimp, an activity in which small fishermen and small industry are involved. In this case, the benefits of standardization and quality control to the economy are obvious. It should also be obvious that the impact on the rural (in the case of agricultural and frequently marine products) and the urban poor is only slightly more indirect.

AID strategy calls for concern for employment, particularly in rural areas. It is also well documented that smaller industry generates much more employment per dollar of invested capital. But how can AID expect small entrepreneurs to have a chance in the market if they know nothing of standardization and quality control. Even if they are aware of the need for quality control, the smaller firms often cannot afford to establish the small laboratory that would be necessary to have an effective quality control program. This was a problem encountered in Ecuador. An INEN official said that the small business group tried to get together to establish a laboratory

---

1/ Total detentions for the 10 were $64 million.

that would support them all, but negotiations broke down over the allocation of the costs of construction and operation among the firms. Frequently, an outsider such as AID can act as a catalyst to bring such a project to fruition.

At the present time, INEN is able to involve itself in the food chain at the level of the food processor -- dairy, canning or processing plant, etc. It is felt, however, that there is a need to move further back in the production process to improve the standards and quality control at the level of wholesalers -- and producers in some cases. This clearly is relevant to AID's target group. Greater concern with the marketing of rural production, which seems long overdue, should automatically lead to concern for standardization and quality control. This in turn could lead to modifications in many of the agricultural research programs that AID supports to make them more concerned with factors of importance in marketing and not just concerned with yields per hectare.

In summary, the visit to Ecuador in particular convinced the Contractor that there is a much greater need than is generally recognized in AID or in host governments for higher priority to standardization and quality control in development projects. These needs will in turn impact

on the metrological base and on industrial and agricultural research. Additional pragmatic studies are needed to make this more evident to planners and controllers of budgetary purse strings.

4. Individual participants benefitted from NBS programs.

The NBS questionnaire had a question "Did you personally gain knowledge or skills as a result of participating in the NBS program that have been useful in your subsequent career?" Of the 36 responses from LDC participants, 30 were affirmative, 1 negative and 5 no response. Some mentioned having gotten promotions.

5. Project documentation was sloppy.

AID's design methodology calls for starting with a fairly broad goal and then developing one or more projects that should have a favorable impact on the desired goal. In the case of the Standardization in LDCs project, it appears that the designers started with the inputs as given, i.e., a certain amount of NBS talent, and built a project up from the assumed inputs.

Although the Logical Framework is conceptually sound, there is frequently much debate about definitions -- what is an input, what is an output? The Contractor would have been much more comfortable considering the workshops, courses, surveys and a certain level of provision of

advisory services as outputs. By doing so, the Objectively Verifiable Indicators under the Magnitude of Outputs in the Logical Framework would not necessarily have changed. What would have changed would have been the statement of inputs. It should have led to realistic estimates of the person-hours of NBS personnel and other funding needs to achieve the outputs (e.g., workshops, surveys, etc.). This could have led to increasing the funding or reducing the scope of the program at the outset. In other words, the inputs would have been geared to the project budget as well as to the outputs and would also have been structured similar to the annual budgets submitted by NBS for funding under RSSA.

In some cases, the Project Paper is internally inconsistent, sometimes incomplete. For example, the Project Paper calls for different inputs in the project narrative from what is included in the Logical Framework (Annex B of the Project Paper). The statement of project purpose calls for efforts to help the urban and rural poor, but there is no End of Project Status condition that is related to this aspect of the project purpose. The only place the titles of the proposed training courses are given is in the Milestones chart (Annex C of the Project Paper) -- no wonder the former NBS Project Director didn't realize he had not followed the Project Paper in relation to the course offerings.

There was no new RSSA agreement prepared for the new project. There was merely a statement in one of the annual budget agreements that the Project Paper would be referred to for guidance. Particularly given the inconsistencies within the Project Paper, it would have been appropriate to have provided a written document to NBS which highlighted the parts of the Project Paper to which NBS was to give greatest attention.

6. NBS personnel performed well. Were they doing the right things?

One has the same difficulty in appraising NBS's project management as in appraising the overall effectiveness of the project. What were NBS's marching orders -- maximize the positive political impact or maximize the developmental impact? If one assumes the former, then NBS gets an A-. NBS ran a tight ship and tight schedules in their seminars and workshops -- too tight for some of the participants. They performed their chores for AID well, even doing AID's work in some cases. In most workshops, there were some people who would have liked more or less time on a particular subject, but this is normal.

Based on participant evaluations, questionnaire responses and interviews of participants in the countries visited, it is possible to suggest changes in some of activities (see 7 and 8 below) and to suggest the addition

of new activities (see IV. A. below) and giving some activities less frequently. In general, however, the program was well received, and NBS received high marks for the management of the activities. The principal area of frustration to participants was the delay in obtaining survey reports. This seems due in part to the system used for preparing and obtaining clearance for the reports (see 7. d. below), in part to either a shortage or misallocation of NBS personnel assigned to the project. AID requested an additional NBS position for the project; NBS eventually agreed and then reversed itself when it found out that AID was not going to continue the project beyond 1979.

If one assumes that NBS was to give priority to AID development goals, and to the Project Paper in particular, NBS would rate closer to a B- or C+ -- in part depending upon what guidance NBS was receiving from AID. There is, for example, the lack of country concentration previously discussed. There is also the lack of enthusiasm for trying to direct the program towards AID's target group -- rural and urban poor. Time could have been allocated in workshops, seminars and courses to focus specifically on this problem and draw out the participants on what was being done, what was feasible and what was needed in the way of outside assistance. Emphasis could have been given

to the courses rather than the workshops, since the former were clearly designed to meet the "help the poor" requirement. NBS could have sponsored a regional seminar devoted to the subject of measurement services of greatest benefit to the poor.

Regardless of the implementation strategy followed, AID got its money's worth from NBS -- in part because NBS covered some of the costs of the project from its own budget, in part because the project manager of NBS gave more time to the project than the one-sixth funded in the RSSA budget.

7. AID's supervision of the project was minimal.

If one assumes that the project should have held more closely to the Project Ppaer, then one must conclude that the project was inadequately supervised by AID. If, on the other hand, one assumes that it was deliberate to stray from the Project Paper along the lines discussed in II. F. 1. above (i.e., go for maximum political impact), then supervision was adequate. For the future, the Contractor suggests that 10 percent of a Project Officer's time for supervision of the project, as called for in the project under review, is inadequate. How inadequate will depend upon the mode of implementation chosen -- some implementation options are discussed in IV. C. below.

8. The country survey has been useful, but it can be more effective.

Some of the responses to the questionnaire gave credit to the country survey as a turning point in getting an effective standards institute going. The survey's utility was reconfirmed in Ecuador. The lack of a survey was evident in Panama. Both the Contractor and Mr. De Simone are convinced of the utility of the country survey as a means of obtaining a wider recognition within the country of the need for standardization and quality control. This, in turn, is essential to getting the resources necessary to do the job.

Although the utility of the country survey is clear, the surveys have not always been successful. In addition, there have been some expressions of concern about the method of planning the survey, about their implementation and about the preparation and distribution of the survey report. An early activity in any follow-on project should be convening of a seminar of appropriate officials from survey recipients along with some of the LDC participants in the survey mission to discuss means of making the survey more effective. Some ideas for discussions are:

a. Make more effort to tailor-make each survey, including in particular being prepared to allot more time for the survey.

b. Plan initially for at least three visits:

(1) A pre-survey planning visit -- preferably with two or three people. One should be able to focus on the possible economic ramifications of improved/increased standardization and quality control while the other(s) focused on technical aspects and on logistical requirements of the survey mission.

(2) The principal survey mission. A draft report (preferably a final one) should be left behind. A final report should be submitted within one month at the outside. It should be quite clear from the pre-survey planning visit what the principal objective of the survey is, e.g.

(a) To sensitize policy officials and industry (commerce to a lesser extent) of the need for standardization, quality control and a supportive metrology base;

(b) To give the standards, quality control and metrology organization(s) a better view of the needs of the economy for their services; or

(c) to give advice to the metrologists on their laboratories and to the standards and quality control people (both in government and in industry) on their procedures and programs.

It may be possible and desirable to do some of all of these, but generally one would be of higher priority and should be emphasized. The others could be dealt with more thoroughly in the follow-up visit.

(3) A follow-up visit. This can give the standards officials some leverage in pushing for action within the government on survey recommendations. It also helps the survey mission by providing some feedback regarding the feasibility/propriety of its recommendations and the means available to the country to implement them. To the extent possible, the timing for the follow-up visit should be determined at the time of the principal survey visit. However, the project surveyors should try to be as flexible as possible on timing, so they can provide maximum assistance to the surveyed country.

c. The membership of the survey team would vary depending upon the primary objective to be served, the industrial structure of the country and the interest in consumer protection. However, it would appear that the teams generally would be more effective if they included an industrialist who practiced quality control and an economist who could quantify some of the benefits that could be gained from standardization, quality control and improved systems of weights and measures. The foregoing would be particularly important where the primary objective of the survey was sensitization of policy officials and industry. It would probably be even more effective if the industrialist and the economist were from an LDC -- or at least could give examples from LDC situations. FDA participation would generally be desirable.

d. NBS has stressed in its publications that the surveys are led and partially staffed by the host country sponsoring agency. This has led to the need for host country clearance of the report. And if all agencies of the government know that a host government organization will clear the report, the approving agency is more

sensitive to the wording in the report than it would be if it was presented strictly as the report of an international group. Furthermore, the survey reports are issued as public NBS reports. It would appear far less cumbersome, and more useful to the receiving institution, if the reports were clearly the report of the visiting team, were prepared in limited copies, and distribution outside of NBS and AID left entirely to the sponsoring institution. Furthermore, the report should be more explicit about the purpose of the survey, and should omit general philosophizing and generalized background material that would be common knowledge to the readers. If the latter was desired for reference within NBS, it could be attached to or referenced in NBS copies.

9. Other project activities should be re-examined, and generally modified somewhat, before being included in any new project.

NBS generally had the participants in each workshop, seminar or course provide an evaluation of the program at its conclusion, and in some cases, these participants' comments led to changes in the format, structure or implementation of the activity. A number of additional suggestions have been received during

this evaluation, especially in the responses to the questionnaires. These should be reviewed by AID and NBS before finalizing any follow-on program. To facilitate such a review, there follows some of the comments about the different project activities that the Contractor thinks are especially noteworthy. Some are from the responses to the questionnaires and some are the Contractor's suggestions. Suggestions for new types of activities are included in IV. B. below.

a. Workshops

One participant suggested a reduction in frequency -- perhaps every other year. In any case, it is clear that the LDCs are thirsting for more hands-on training than for orientation type exposure. An annual workshop might be justified if there were sufficient funds to finance all the other new activities and an expanded program of courses.

Participants also suggest that there be less traveling within the U.S. This becomes very tiring, given the tightness of the schedules. Related to that complaint, participants would like more time at some of the stops, permitting them to go into matters in more depth. The desire for hands-on participation was expressed in this

connection. In addition, a common complaint was that insufficient time was available for participants to discuss among themselves and with NBS or other experts possible solutions to their specific problems. This apparently was particularly frustrating because NBS had encouraged participants to come with a short written article, or be prepared to make an oral presentation on some aspect of the standards activity in their country.

Other suggestions included: (1) adding a management component; (2) lengthen the time period for the workshops; (3) ensure that the participants are of comparable technical background; and (4) present a conceptual system of minimal sophistication. Regarding the time period, it might be desirable to provide for a core program of perhaps a week and a half and another week and a half of tailored program. To get at the differing background levels, the workshop one year might be designed for heads of divisions in larger institutes and heads of smaller institutes, with the alternating years for heads of more advanced institutes and members of national councils of science and technology,

research councils or university researchers working closely with standards institutes.

b. Seminars

A UNIDO expert suggested that seminars should include a "how to" session after having presented general theories or ideas. This would suggest that seminars be of longer duration -- perhaps a week. This would also permit time for greater attention to individual participant's needs and problems. In general, seminars should be held in regions. This permits a larger attendance from the region at less cost than would be possible in a stateside seminar (except possibly for participants from Latin American and the Caribbean). Furthermore, it permits a large number of participants from the host country.

A number of respondents to the questionnaire suggested additional topics for future seminars: standardization, technology administration, technological information systems, technology transfer, quality control, and technology forecasting. In Panama and Ecuador interest was expressed in the seminar held in Singapore in 1975: Testing and

Certification for Export Products in Industrializing Countries. Because a number of standards institutes appear to need more local government and/or industry support, a seminar on means of promoting local support for standardization and standards institutes should be considered. Seminars by FDA would also be desired.

c. Courses

The Contractor did not see any evaluative material on the DRI course on procurement of instrumentation. Therefore, the comments which follow relate to the weights and measures courses: (1) add topics -- pattern approvals, consumer protection, training of personnel; (2) participants should be of the same rank (presumably this means comparable responsibility and technical capability); (3) provide for more intra-group discussion; (4) include more practical tests and analyses.

The Contractor also suggests a greater variety of courses -- as proposed in the Project Paper. Metrology, standardization and quality control are all worthy of separate courses. Another alternative is to take specific technical sectors, or

sub-sectors, and discuss suggested minimum standards, minimal quality controls and laboratory needs at the level of the firm, suggested capabilities of the standards institute or other technical institute to service and monitor the industry effort. Consideration should be given to holding some, if not most, courses overseas -- perhaps in conjunction with one of the more technologically advanced LDCs and/or a regional organization. This could facilitate the provision of some technical assistance in conjunction with the course, and it could also help promote the local standards institute within local governmental and industrial circles.

d. NBS Reports

NBS prepared some subject matter reports and these apparently were given very wide distribution. It also prepared reports on each seminar, workshop, course, and survey; these generally were distributed to all of the participants in the particular activity. At this point in time, it seems worth re-thinking the system of reporting on these activities. The writing and editing of these reports took considerable time, including that of the project director. Probably even more time

was taken up in obtaining manuscripts of articles (e.g., from workshop participants who had returned to their countries) or obtaining clearance of edited materials. A number of workshop articles were very superficial, and it is difficult to see how they could be of much general interest. Comments on the survey reports were provided in 7 above. It seems appropriate to re-evaluate also the system of reporting on the other project activities.

In line with some of the suggestions above, it might be more useful to have participants come to a particular activity with one or two problems with which they would like help. By the end of the activity, it should be possible to put together a report setting forth the special types of problems that were cited and discussing the various suggestions given by participants or NBS experts for alleviating or resolving the problem. This then could be useful to both participants and nonparticipants, and wider distribution of the report would be justified.

As an alternative to the foregoing, or as a supplement thereto, special publications could be put out periodically synthesizing the result of

a number of project activities regarding a special subject. A special source of information would be reports of country surveys and technical assistance activities because those reports normally would be given limited distribution.

All of the above (a through d) might be summarized as follows: Less show and tell, and more problem specific orientation and more hands-on participation.

IV. POSSIBLE FOLLOW-ON ACTIVITY

In suggesting possible follow-on activity, it seems appropriate to look first at the apparent LDC needs and then at NBS suggestions for program activities. This is followed by the Contractor's recommendations for program priorities and project structure.

A. LDC Needs

The following information on LDC needs and the comments on the program suggestions in B below are based on:

(1) interviews at NBS and with Mr. Peiser, the now retired former manager of the NBS program;

(2) an analysis of the responses to the NBS questionnaire in which respondents commented on NBS programs they had attended and made suggestions for future NBS activites:

(3) observations and interviews by the evaluation team in Panama, Ecuador and Sudan, including seeking comments on the activities in an NBS proposal for an expanded program (discussed in B. below and presented in full in Annex F);

(4) a review of various NBS documents.

In looking at LDC needs, it seems useful to look at the likely needs of the categories of potential country participants in the program: (1) technologically advanced; (2) intermediates; and (c) beginners. It should be noted that a more technologically

advanced country may have institutions working in standardization and measurement that fit in more than one category. Also an institution in any country may fit in different categories depending upon the technical area. Nevertheless, the categorization appears useful for programming purposes.

1. Technologically Advanced

These countries generally have their basic infrastructure -- sometimes too much of it because of previous irrational development. Their needs are likely to be for;

(a) management assistance;

(b) access to technical publications and data systems;

(c) opportunities for scientific contact and information exchange;

(d) advanced specialized training, including on-the-job training similar to that available under the NBS guest worker program;

(e) access to specialized laboratories for a special program such as the research associate program at NBS.

2. Beginners

The beginners are at a very basic level and need help in convincing the planners and budgeteers of the need to begin building an effective measurement and standards institution. Chances are that it will take

at least two years of development before the new organization will begin to have any impact. The beginners need help with:

(a) drafting enabling legislation;

(b) preparing an initial plan of work;

(c) preparing funding plans;

(d) designing laboratories;

(e) ordering equipment;

(f) obtaining standard physical reference materials plus standards and measurement documentation;

(g) setting up and testing the equipment;

(h) laboratory management, including technical broadening for the director designate of the new standards institution; and

(i) training of other personnel in techniques of measurement, equipment and instrumentation maintenance, standards development, etc.

To meet the initial needs, a starting point could be a survey team of international experts, preferably with representation from at least two sources of funding for technical assistance and purchase of equipment. The duration of the survey would be 2-4 weeks, depending upon the country's geography, the size and complexity of the economy, availability of economic data, local logistic support, etc. The outputs of the survey would be: (a) draft legislation (if needed); (b) a draft

time-phased work plan; (c) draft financial plan, including recommendations for partial self-financing (i.e., extra-budgetary) and an external assistance plan (e.g., for laboratory design, laboratory procurement); and (d) a survey report outlining the needs for measurements and standards, pinpointing to the extent possible potential benefits from the investment and sketching out a development plan for the standard institution(s), indicating priority work activities and technical areas of concentration. The survey report would be designed for generalists. A separate short report could be prepared, if deemed necessary, for the standards institute, covering technical subjects and possibly a training plan.

It should be understood that follow-on technical assistance would be needed during the early development of the institution -- possibly through a permanent advisor who could also meet some of the training needs.

3. Intermediates

The intermediate country's institution generally has obtained acceptance and is seen as providing a useful service. It is likely to be suffering from growing pains as it tries to respond to the rapidly increasing workload that comes with acceptance. Thus, it may be

needing some of the services important to the beginner, but at a higher level of sophistication. At the same time, as it moves into more sophisticated programs or technical areas, it starts to have an interest in the activities of interest to the technologically advanced.

B. Suggested Program Activites

The first nine items in the tabulation in Table IV-1 below are from a paper prepared by NBS to provide suggestions for activities to be included in the program that was being developed by the stillborn Foundation for International Technological Cooperation/Institute for Scientific and Technological Cooperation. A complete description of the items is included in the paper which is attached as Annex F. Asterisked items in the table are activities which are especially appropriate for NBS participation or management.

Table IV-1

Annotated List of Program Suggestions

Suggested Program Activity	Contractor's Comment
* 1. NBS Workshops on U.S. Systems for Standardization & Measurement Services — usually 2 weeks, part at NBS, part at various parts of the U.S. plus attendance at the National Conference of Standards Laboratories.	This has been popular with beginner, intermediate and advanced countries. It could be more effective if: a) an additional week could be added for an individually tailored program; b) there was less traveling ; and c) more time was devoted to discussing possible solutions to the problems presented by LDC participants. (Also see III. F. 8 above.) Desirable to have participation by beginner, intermediate and advanced LDCs.
* 2. Course of Weights & Measures Control in Retail Markets -- has been 2-week course.	Also generally popular, but most slots should be reserved for beginner countries. Course should be a week or two longer and include some hands on experience in product testing and analysis and calibration and testing of scales and other frequently used measurement devices. Other course subjects are also needed. (See III. F. 8 above.)

Suggested Program Activity	Contractor's Comment
3. Management of Committees Developing Standards -- a new idea calling for 6 months with the American Society for Testing Materials.	There was interest in this in both Panama and Ecuador. However, 1 month was considered sufficient time. It would be especially useful for beginner countries.
4. Academic training in Engineering Metrology -- a proposed 1-year course to be developed.	Interest expressed in Panama. Might be of interest to beginner countries. Argentina is now giving such a course.
5. Technical Assistance in Ordering and Maintenance of Laboratory Instruments — NBS proposed to contract for this.	This need was expressed by a number of beginner countries, but would probably be of interest to intermediate and advanced countries too.
* 6. Laboratory Audit Program -- taking an NBS U.S. program to the LDCs. It would involve a visit to each participating laboratory by an NBS expert plus a 2-week training course in-country.	Interest has been expressed by Ecuador, Jamaica and Panama. Especially useful for beginner and intermediate countries.
7. Surveys of Standardization and Measurement Services Needed for Development -- usually involved a 2-3 week survey by a 10-person team to identify needs and stimulate awareness of the benefits of S & M services.	Strongly supported by all countries that have had one, and by UNIDO and other experts who have participated or viewed results. It is particularly appropriate for beginner countries. Suggest better pre-planning, longer time in-country, different reporting arrangements, follow-up visits to provide technical assistance, participation of other donors (e.g., UNIDO, OAS) -- see also III. F. 7 above
8. Regional Seminars on Standardization and Measurement -- 4 were held between 1974 and 1978.	Past ones were well received. Suggest at least one week in length, allowing time for participants and experts to deal with a number of specific problems presented by participants and develop some possible solutions. Subjects would depend upon regional interests, but suggestions from questionnaire respondents include: management; laboratory administration; standardization; technology administration; technology information and technology transfer;

Suggested Program Activity	Contractor's Comment
	quality control; technology forecasting. It also might be feasible to present the latest research in specific technical areas that would affect laboratory instrumentation or standards development or modification.
* 9. Development and Use of Certified Standards Reference Materials (SRMs) — SRMs are substances whose composition and properties have been accurately measured and certified by NBS to be within certain ranges. They can be used by laboratories to calibrate their own measures with NBS, thereby offering user laboratories a relatively cheap way of increasing the accuracy of their measurements. NBS suggested a contract to disseminate information on the usefulness and potential benefits of SRMs.	A number of respondents indicated interest in using SRMs. All 3 countries visited had previously requested SRMs, but NBS had not filled their requests. This apparently happened because AID decided in 1976 not to include the provision of SRMs by NBS in the follow-on project. A separate contract to increase demand may not be necessary.
* 10. Guest Workers -- scientists who work in NBS on mutually agreed projects. Generally no funding support is provided by NBS.	Of 73 guest workers at NBS during the last 3 years, 44 were from industrialized countries and 29 from LDCs, virtually all advanced LDCs.
11. Food and Drug Administration (FDA) training courses and special seminars -- FDA is offering over forty 2 to 4-week courses (over 40 subjects) in FY 81 sponsored by the Executive Director for Regional Operations and over thirty 2 to 5-day courses for training in the milk and food products sanitation area under the State Training Branch. FDA also gives special seminars about FDA standards which result in large numbers of detentions of LDC exports. FDA could place a participant in an FDA district office for on-the-job training.	This seems especially appropriate for beginner and intermediate countries. Beginner, intermediate and advanced countries might be interested in seminars related to quality control of their exports to the U.S. Ecuador and Sudan would like to participate if funding could be arranged. FDA says training is free, but transport to the U.S. and per diem would need to be funded.

Suggested Program Activity	Contractor's Comment
12. Short Term Technical Assistance in Standardization, Quality Control and the Establishment of National Standardization and Measurement Systems -- suggestions from respondents.	The need for 3 to 4-month technical assistance in quality control in specific industries was raised in Ecuador. IESC might be a source of expertise if host countries were able and willing to pay the costs -- AID does not permit direct AID funding of IESC personnel because AID provides IESC with a grant.

* Activities where NBS participation or management is particularly desirable.

C. Recommended Program Components and Project Structure

The Contractor's scope of work asks for a discussion of "the possible future role of NBS in the Agency's programs." However, it seemed to the Contractor that one should first answer the question: "Should there be a continuing AID role in standardization, and if so, what form should it take and how might it be structured?" Then it is appropriate to ask: "How would NBS fit it into such a structure?"

Based on a review of U.S. interests (II. C above), it is clear that the USG should be involved in standardization and measurement in the LDCs. If the USG is involved, it is logical that such involvement should be managed and funded by AID. After all, Congress rejected the establishment of the ISTC, the most logical alternative to AID. If AID is to be involved, how should its involvement be structured? A starting place would seem to be to look again at the U.S. interests to be served by an AID standardization and measurement program.

From the political interest point of view, it is important that the USG, as a minimum, have a funded activity with which it can provide, if requested, the types of assistance called for in the MTN Agreement on Barriers to Trade (standards code). Furthermore, it is important that the more technogically advanced countries participate. To be responsive to the foregoing, one could establish a project whose goal was: "To improve LDC technological infrastructure needed to import, adapt and utilize

foreign technology in the area of metrology, standardization and quality control." Such a goal would be in line with LDC aspirations. Such a goal would further not only U.S. political interests, but also U.S. economic and scientific interests and U.S. international development strategy.

Under that goal, a minimal activity would be to establish a project whose purpose would be to: "Respond to requests for technical assistance under the MTN Agreement on Barriers to Trade." However, the focus of the MTN Agreement is fairly narrow, and it is possible that little technical assistance would be requested under the agreement. Furthermore, there clearly is a strong demand for assistance in strengthening standards institutions and for increasing the utility and importance of accurate measurement, standardization and quality control. It seems, therefore, that a larger and more comprehensive effort is called for. Otherwise, there is a danger that the USG political interests of improved relations with the LDCs on technology transfer issues will not be achieved. Such a limited project would also likely have minimal impact on development objectives.

If AID goes to a larger and more comprehensive effort, should it not be responsive to AID's mandate of improving the lot of the poor? It should be, it could be (see III. F. 3 above) and it will be if the Contractor's recommendations are accepted -- and if the mandate is reasonably defined. However, a more

comprehensive standardization and measurement activity should be only partly centrally funded and managed. U.S. interests will not be fully served unless USAIDs also include measurement services components in their agriculture, health, nutrition, education, rural development, regional development, small/rural industry development, private enterprise development and urban development projects. The amount of funds utilized for such a project component would generally be quite small in relation to total project costs, but it could be very significant to the affected standards institution(s) and/or ministry of local government inspection services and to the achievement of project objectives. There may also be some additional science and technology projects, and it would be appropriate and desirable for the standards institute to benefit from such projects.

To facilitate a greater USAID effort, there is need for an informational/support type activity that would:

(1) develop (through surveys and possibly small research grants) and disseminate, both to USAIDs and LDC governments, information showing how standardization and measurement services serve economic and social development, with cost/benefits calculations where feasible, and suggesting means of integrating standardization and measurement into development projects;

(2) review up-coming projects at both the PID and PP stages to suggest when standardization and measurement components would strengthen projects; and

(3) provide assistance to USAIDs in designing the standardization and measurement component for a project and in providing or arranging for technical backstopping of standardization and measurement activites.

One matter raised in this evaluation that needs to be addressed is the question of the degree of country concentration. On the one hand, achievement of political objectives suggests no country concentration -- or concentration on the more technologically advanced. Development objectives, on the other hand, are better served when there is a concentration of effort. Also, AID is supposed to concentrate on the poorer countries, which are frequently the less developed technologically. To formulate a project structure that reconciles these two apparently conflicting objectives, one should recognize that a centrally funded project generally is not supposed to concentrate activities in a country in the same way as a bilateral project unless it is strictly for demonstration purposes. However, this project is beyond the demonstration stage. Therefore, the project should be meeting a broad objective or facilitating bilateral assistance

objectives. With the addition of the information/support type activity described in the previous paragraph, the proposed project should be able to do both.

There would still be the need to establish priorities because there will not be sufficient resources to do all of the things needed. Priorities might be established by types of activities rather than by countries, or perhaps one should say that country concentration would be determined by the nature of the requests received. To do this, it is proposed that a new centrally-funded project be established entitled Equity in the Marketplace. Keeping in mind the array of U.S. interests, the project's purpose would be to: "Improve the quality, safety, reliability and accuracy of measurement of (a) the principal marketed products of concern to the poor and (b) the principal products in LDC-US trade." This would provide a basis for focusing on particular commodities or sectors and on ensuring greater focus in such project activities as workshops and country surveys. Given the number of questionnaire respondents who asked for greater specificity and less generality in NBS activities, increased focus in those activities is not likely to reduce the positive political impact of the project.

Within the foregoing framework, some additional thoughts on priorities are offered. During the first year of a follow-on project, items 1) and 2) of the informational/support activity discussed above (i.e., the information or orientation element)

should receive high priority; in subsequent years, item 3) -- USAID backstopping -- would be of higher priority. Such backstopping would be facilitating country concentration -- put another way, country concentration in the project would be a function of USAID initiatives. Responses to requests under the MTN Agreement would have a high priority, but if all requests could not be accommodated, highest priority would go to those countries where there was or was expected to be, a related bilateral effort. Next highest priority would go to those countries whose requests most directly conformed to the project purpose suggested above. Higher priority than heretofore should be given to supporting and working with regional organizations or otherwise supporting regional cooperation.

These suggestions for priorities have some implications for the type of activities that are likely to be the most prominent in the centrally funded project. Response to MTN Agreement requests would likely require short term technical assistance -- at least initially. This could lead to requests for bilateral projects. Also, if a pattern developed in the nature of the MTN requests, a regional or stateside seminar or workshop might be developed.

The informational or orientation element would probably require contracting for some survey and/or research work. The USAID support element would in the first instance be related to project development; this would probably require

country surveys and follow-up short term technical assistance. It might involve setting up a seminar in-country for ministers, planners, etc. on the role of standardization and measurement services in export development, small industry development, consumer protection, protection of the environment, etc.

The regional cooperation aspect would likely involve seminars and possibly short term technical assistance and courses. FDA seminars might fit in the informational element or in regional cooperation.

Support for approved bilateral AID projects presumably would not be funded from the centrally funded project, but could entail support from the same agencies and/or firms responsible for implementation of the centrally funded project. The bilateral project support could entail long and short term technical assistance, courses, seminars, laboratory audit program, guest workers at NBS, training with FDA, FDA seminars, etc. The provision of Standard Reference Materials (SRMs) is likely to be needed in both the centrally funded project and in many of the bilateral projects.

Project Implementation

How might this suggested centrally funded Equity in the Marketplace Project be implemented? What would be an appropriate NBS role? First of all, what is being suggested involves a broader spectrum of activities than did the Standardization in LDCs project, although many of the activities would be carried out only if there were requests for the services, e.g., under the MTN Agreement procedure or by USAIDs wishing help in project implementation. The proponents of the Standardization in LDCs project assumed (or at least hoped) that the project would promote additional standardization and measurement services activities that would be funded by USAIDs or other donors. This was largely wishful thinking as far as USAIDs were concerned, but it may have been somewhat more successful as far as facilitating project funding by OAS, the United Nations Industrial Development Organization (UNIDO) and one or two other bilateral donors. The proposed Equity in the Marketplace project includes a specific element designed to increase USAID activity in the standards area -- as well as facilitate even more than previously the participation by other international organizations such as UNIDO and OAS. Furthermore, the level of activity in the centrally funded project, at least in part, will be a function of USAID interest in the standards field.

There will be a need for a much larger role by FDA than in the previous project. There will be a need for additional

contracting, e.g., to carry out the informational/orientation role and possibly some of the support activity. It is also likely that requests for NBS services, from both the centrally funded and bilateral activities, would be greater than these combined requests were during the period of the previous project. NBS, like other government agencies, is facing a reduction in force and the International Affairs Office will not be exempt. NBS is most suited for working with the more technologically advanced countries, but increased activity would be likely under the proposed new project in intermediate and beginner countries. Therefore, given the foregoing factors, and the delays and shortfalls in some of the activities under the Standardization in LDCs project, the Contractor has some reservations about giving total implementation management responsibility to NBS.

The most logical implementation mode would call for:

(1) a RSSA or PASA arrangement with FDA for training courses, seminars, the supplying of experts for short term technical assistance and leading or participating in country survey missions upon request;

(2) a RSSA or PASA arrangement with NBS to provide workshops, seminars and courses in the U.S. similar to those previously provided, but taking into account suggestions in this report; provision of experts for short term technical assistance; leading or participating in country

survey missions; providing SRMs upon request; extending the Laboratory Audit Program to LDCs upon request; sponsoring and organizing some overseas seminars and courses; and facilitating and supporting some increase in the number of guest workers from LDC standards institutions (probably the more technologically advanced);

(3) a contract with one or more private U.S. firms to organize requested seminars or courses, particularly overseas, in those cases in which it would not be appropriate or feasible for NBS or FDA to do so; develop and distribute materials to LDCs and USAIDs on the role and relevance of measurement services (broadly defined) in economic and social development; review project proposals to determine when a measurement services component is needed; provide short term technical assistance; and lead or participate in country survey missions.

It will be noted that there is some overlap between the three implementing units, e.g., in supplying experts for technical assistance, in running seminars and courses and in leading or participating in country surveys. This is intentional for two reasons: 1) there are different types of objectives to be met within each of these activities, and an increased capability

for greater specialization or greater breadth is needed; and 2) the Contractor anticipates that there will be times when one of the agencies will not be able to meet a short term need, so the contractor(s) would be for the purpose of back-up.

The principal disadvantage of the recommended implementation mode is that it assumes a much larger management/coordination role being played by the AID Project Officer. Previously, the project was to be monitored/supervised only, utilizing 10 percent of the project officer's time. Since AID is planning to cut AID/Washington staffing further, it is not clear whether this mode is feasible. Another disadvantage is the possibility for development of friction among the three implementing units. This probably could be overcome, or at least minimized, by having the Project Directors from each unit serving on an advisory committee to the AID/Washington Project Officer -- regional bureau officers serving on such a committee should also be useful. The representatives of the three implementing units should collectively work with the Project Officer in establishing annual work plans.

The next preferable arrangement would be to have a RSSA/PASA arrangement with NBS under which NBS would be the project manager/coordinator and would do all the contracting and the arranging with FDA. This minimizes requirements for supervision for AID. It also increases the chances of benefiting from the experience NBS has gained from the two previous projects it

implemented. It also takes greater advantage of the good working relationships that NBS has with standards organizations, industry associations, weights and measures units, and the more technology-oriented industries throughout the U.S. NBS also has contacts in many international or regional standards organizations. For this option to work, it would be necessary to have an efficient and mutually satisfactory working agreement between NBS and FDA. Also, NBS would have to do considerably more contracting out than it did under previous projects. Since the proposed project is supposed to incite and support additional USAID activity in the measurement services area, NBS would need to receive more field oriented AID input into project implementation planning. This suggests that the NBS Project Director would need to meet periodically with an advisory committee which included regional bureau representation.

Regardless of the implementation mode, it is suggested that plans be made to provide briefings to USAID Directors, perhaps at regional Directors' meetings, and give seminars in selected countries after some of the studies have been completed, on the value of measurement services components in development projects. It is also recommended that the current PASA arrangement with the National Technical Information Service (NTIS) be expanded to provide for the dissemination through the NTIS system overseas of ASTM, ANSI and other U.S. standards documentation that may be requested by LDC standards bodies.

Annex A

SCOPE OF WORK

The Contractor will prepare a report discussing the role of the National Bureau of Standards (NBS) in increasing the effectiveness of specific LDC standards institutions, including their effectiveness in providing standardization and measurement services which benefit small farmers and urban workers. The report will discuss the role of the NBS in the performance of the work called for in AID's Project 931-0243 as specified under RSSA/COM/NBS 1-75. The report shall include an evaluation of all pertinent aspects of this performance and a basis for the design of a possible future role for NBS in support of the Agency's programs. The report will be based on materials provided to the contractor by NBS, AID, and other persons and institutions involved in the project. The contractor will gather first hand information from interviews and records in two LDC tentatively identified as Ecuador and Panama. It shall also be based on interviews and the Contractors personal experience and knowledge of AID, development and NBS programs.

In support of the Contractor's efforts, NBS shall furnish the services of an expert to gather first hand information on the results of the NBS/AID program in three LDC tentatively identified as Turkey, Sudan and Ecuador. This expert will provide AID, NBS and the contractor with a report of his findings in these countries. The expert shall also assist in the analysis of the workshops and training courses. NBS and AID shall also provide for the contractor's review a list of questions and issues pertaining to the program which is to be used by the evaluation team as a guide for the in-country effort.

The NBS project includes 1) workshops on various themes, 2) LDC standardization surveys by international teams to assess the state of the national systems, to project future requirements as related to the national development plan and to recommend specific actions, 3) follow-up and problem solving advisory services including equipment procurement assistance, and 4) standards and metrology training courses involving U.S. private sector service users, private institutions, state and local institutions, and professional groups. All pertinent materials of record concerning these efforts will be furnished the contractor by NBS, AID, and others.

The Contractor's report will consider the efforts under the project in the context of each country's development plans and AID mission programs wherever possible. It will deal with

such concerns as 1) the increased LDC government commitment to standardization and measurement responsibilities, 2) the qualitative and quantitative improvements in standards preparations including better industry cooperation and participation, 3) the training services available for staff and clients on standardization, quality control and measurement, 4) the role of the course and workshop participants from LDCs in their countries development efforts.

The report will specifically discuss the effectiveness and efficiency of the NBS and AID management of the project, comparative effectiveness of various alternative resource allocations among the various project elements, and the possible future role of NBS in the Agency's programs.

Annex B

JAMES L. ROUSH

3800 North Fairfax Drive, #1214
Arlington, Virginia 22203

Telephone: (703) 528-4553

HIGHLIGHTS OF EXPERIENCE

Program Management

- Supervised AID programs in Cameroon, Chile and Central America (Regional)
- Managed major overhaul of AID's planning, budgeting, accounting and reporting systems
- Managed planning, budgeting, obligating and review of $200 to $300 million annual project program in Vietnam
- Represented USG or AID in international conferences

Research, Analysis and Evaluation

- Evaluation of AID project with National Bureau of Standards: Standardization in LDCs (1981)
- Assessment of the technical assistance program of the U.S. AID Mission in Mali (1980)
- Preparation of a five-year assistance strategy for AID for the Indian Ocean islands of Madagascar, Mauritius, Comoros and the Seychelles (1980)
- Appraised the U.S. aid program in Sri Lanka and analyzed Sri Lanks's development experience (1978)
- Prepared a proposal for a Technology Exchange and Cooperation program with middle-income LDCs (1978)
- Appraised AID's Reimbursable Development Program (1978)
- Evaluated an AID Section 211(d) grant to the Land Tenure Center, University of Wisconsin (1978)
- Helped design Development Studies Program, a training program for AID program design and implementation officers (1975)
- Designed an integrated system for the planning, budgeting, designing, implementing, accounting and evaluation of AID's project program (1974)
- Report on how to reduce the trafficking of narcotics in the Southern Cone of South America (1972)
- Paper describing how "peace initiatives" policies were made in the U.S. Government (1966)
- Comparative analysis of the economic development of Chile and Argentina (1966)
- Paper outlining a proposal for a political solution in Vietnam (1966)
- Master's thesis on the evaluation of U.S. aid program (1966)

OTHER ACTIVITIES

Executive Director, Foundation for a Peaceful Environment among Communities Everywhere, Arlington, Virginia

Member of the Board of Directors, Capital Area Division, United Nations Association of the USA

Community Coordinator for Virginia Suburbs of the Great Decisions Program of the Foreign Policy Association

Member of the Editorial Board of the Foreign Service Journal, Publication of the American Foreign Service Association

Associate, Political Economy Working Group, The Churches Center for Theology and Public Policy, Wesley Seminary, Washington, D.C.

Member of the Public Affairs Committee and Editor of In-House Newsletter, Tower Villas Condominium

Member: American Economics Association, Society for International Development, World Affairs Council of Washington, D.C.

AWARDS FROM AGENCY FOR INTERNATIONAL DEVELOPMENT

Distinguished Career Service Award (1978)

Distinguished Honor Award (1976)

Superior Honor Award (1969)

Meritorious Honor Award (1954)

CONSULTING/CONTRACTUAL SERVICES

Contracted by the Office of Science and Technology of AID/Washington to evaluate the project Standardization in LDCs, a project implemented by the National Bureau of Standards. (February - June 1981)

Prepared for the U.S. AID Mission in Mali (through Experience, Inc. indefinite quantity contract) an assessment of the mission's technical assistance program and recommended actions for improving its efficiency and effectiveness in the future. (November - December 1980)

Contracted by the U.S. Department of Agriculture under its RSSA arrangement with the Office of Nutrition in AID to visit four countries in Latin America and the Caribbean (Paraguay, Bolivia, Jamaica and Costa Rica) to prepare scopes of work for policy impact studies to be carried out in those countries. Policy impact in this context refers to the impact of agricultural policies on food consumption. Also prepared a draft Request for Proposal for studies in Latin America and Africa. (February - June 1980)

Three-week consultancy with Experience, Inc. to serve as the leader of a two-person group to prepare a Small Program Statement (five-year assistance strategy) for the Indian Ocean islands for the Office of East Africa in AID. (January - February 1980)

Member of the 1979 Foreign Service Performance Evaluation Panels for AID. (October - November 1979)

Five-day consultancy with Experience, Inc. to complete a Project Paper for an agricultural research project in Sao Tome and Principe. This involved editing a draft paper, reviewing and supplementing the economic analysis and preparing the Logical Framework, the Initial Environmental Examination and the Statutory Check Lists. (October 1979)

Member of a Selection Panel for International Development Interns being recruited by AID. (May - August 1979)

Annex C

FEB 6 1981

During the years 1970-1979, the National Bureau of Standards carried out a program to help develop the technological infrastructure for standards and metrology in a number of smaller and more rapidly developing countries of the world. This program was conducted in cooperation with the U.S. Agency for International Development (AID), which also provided partial funding for the activity. Now NBS and AID are seeking to determine how effective the program was, and we ask for your assistance in this effort.

The NBS/AID program included the following elements:

(a) Orientation workshops in the United States - Officials of metrology and standardization organizations throughout the world came to the United States for orientation on the U.S. system. Usually one week was spent at NBS followed by one week of visits to private sector organizations.

(b) Country surveys - Teams of NBS specialists plus third country participants visited selected countries (at their invitation) to survey the needs of local industry for metrological and standardization services and the ability of local institutions to provide these services.

(c) Regional topical seminars - Seminars on topics of broad interest to a particular geographical region were organized, with invitations to participate sent to all the countries of the region.

(d) Supply of Standard Reference Materials - Selected reference materials, needed by various laboratories around the world to calibrate local measurement methods, were supplied free of charge.

(e) Written standards - Product and engineering standards prepared by the American National Standards Institute, the American Society for Testing and Materials, and other standards-writing bodies were supplied to national standards organizations around the world.

(f) Special courses - Courses were organized on instrument procurement, weights and measures administration, and an NBS-developed set of computer programs for data management and statistical analysis.

AID and NBS are now jointly carrying out an evaluation of the program to determine how effective it was in assisting the participants to improve their institutional infrastructure and to determine whether the individual participants have found that it contributed to their own personal abilities to carry out their responsibilities. According to our records, you or your institution participated in one or more of the activities of this program, and we now seek your assessment of its usefulness.

We would appreciate receiving your own personal informal comments; for our purposes official governmental responses are not required and indeed, they may be less revealing than we would like.

We would greatly appreciate your responses to the following questions. Please give as much detail as you wish, answering those questions which you consider relevant to the activities in which you and your institution participated.

1. Did increased familiarity with NBS and the U.S. system of metrology and standardization help you to plan or operate your own institutional services in a more effective manner? If so, please explain in what ways.

2. Did your institution initiate new services or improve existing ones as a result of participating in the NBS program? If so, please provide details and indicate which NBS activities were most helpful.

3. Did you personally gain knowledge or skills as a result of participating in the NBS program that have been useful in your subsequent career? If so, which elements of the NBS program turned out to be most useful to you?

4. Did your institution gain increased resources of funding or manpower from its parent ministry or other sources as a result of participating in the program? In what way did the NBS program help?

5. Do you consider that the NBS program has helped your institution support industry in your country? The health and safety of your people? Fairness to both buyer and seller in trade? Please provide examples and tell us how the NBS programs helped.

6. Were you satisfied with the activities in which you participated? Was the available time used effectively? Were the technical presentations at the appropriate level of detail and degree of sophistication? Was the subject matter covered the most useful for your purposes? What did you like - and what did you dislike - about these activities?

7. Should NBS undertake a similar program in the future? Or in related activities, but covering more technical or more managerial types of subjects? If so, what advice would you give on how to improve the program?

Your responses to these questions will be very helpful to AID and NBS; first, to help determine whether a continuing program of this nature would be a high priority matter for us, and second, if it is high priority, to help us adapt the program to be most effective. We would greatly appreciate receiving your response by March 15, 1981, if this is possible.

Thank you very much for your cooperation.

Sincerely,

Edward L. Brady

Edward L. Brady
Associate Director for
International Affairs

Annex D

DANIEL De SIMONE
2743 N. Wakefield Street
Arlington, Virginia 22207

PERSONAL

Born: May 4, 1930, Chicago, Illinois
Married: 1955 to Virginia Carey of Morris, Illinois
Children: Jane Ellen, 24; James Michael 21; Daniel Carey, 9

EDUCATION

University of Illinois: B.S. Electrical Engineering, with highest honors, 1956; was elected President of the Senior Class.

New York University, School of Law: J.D. (LL.B.), 1960; was appointed an editor of the *Law Review*.

EMPLOYMENT *Aug. 1980*

1973-Present: Deputy Director, Congressional Office of Technology Assessment. Have had major responsibility for the planning, organization and development of OTA from its inception in 1973 as the "look ahead" technical advisory agency of the U.S. Congress (OTA's sister agencies are the General Accounting Office, the Library of Congress, and the Congressional Budget Office). During this period of development, Congressional demand for OTA's assistance in legislative activities has grown over five-fold to a level of $11 million per year. Have been involved in over 100 assessments of issues and policy choices spanning a wide range of concern to society: energy, transportation, telecommunications, computers, innovation and productivity, national R&D policies and priorities, international trade, space, genetics, health, national security, strategic materials, food and renewable resources. Have worked closely with key Senators, Congressmen, and Congressional staff directors and have testified extensively before Congressional committees.

1971-1973: White House Science Policy Assistant. Was responsible to the Science Adviser to the President for review of multi-billion dollar civilian R&D plans and programs, the formulation of incentives for stimulating technological innovation, and the drafting of Presidential statements on science and technology. Also served as Executive Director of the Federal Council for Science and Technology, the policy coordinating body for the U.S. Government.

1972-1971: Chairman, White House Panel on International Technology Transfer. The panel was charged with developing policy options for governing technology transfer abroad and included senior representatives of the National Security Council, the Domestic Council, the Office of Management and Budget, the Council on International Economic Policy, the National Aeronautics and Space Council, and the Office of Science and Technology.

1969-1971: Director, U.S. Metric Study, Department of Commerce. A massive, $3 million assessment for Congress, under Public Law 90-472, of the social, economic and national security implications of the world wide change to the metric system and the consequences of alternative courses of action open to the U.S. The study involved all agencies of government and every sector of society. Chaired extensive public hearings to which over 700 representative national groups (labor, industry, education, consumers, etc.) were invited to testify. Submitted 13-volume report to Congress with recommendations that led to enactment of the Metric Conversion Act of 1975, the first in U.S. history.

1964-1969: Director, Office of Invention and Innovation, National Bureau of Standards. Directed studies of the innovation process and the effects of tax, antitrust and other Federal regulatory policies on technological innovation in American industry. Provided assistance to inventors submitting inventions to the U.S. Government. Was responsible for reviewing R&D plans, programs and budgets (over $300 million in 1969) of the numerous technical agencies of the U.S. Department of Commerce and, in this capacity, reported directly to the Under Secretary of Commerce.

1962-1964: Consultant to the Assistant Secretary of Commerce for Science and Technology. Was responsible for drafting legislation to stimulate civilian industry technology, amend the patent laws, and establish cooperative research programs between government and industry. Helped to plan, organize and establish the President's Commission on the Patent System.

1956-1962: Member of the technical and patent staffs, Bell Telephone Laboratories, Inc., Murray Hill, New Jersey. Worked on advanced computer and communications technologies.

1954-1956: Teaching Fellow, Department of Engineering, University of Illinois. While attending the University, assisted the faculty in teaching courses in electronics, network and analysis and electric power systems.

1948-1952: U.S. Air Force, Strategic Air Command (Electronic countermeasures).

ADDITIONAL EXPERIENCE

- Executive Director, National Inventors Council, U.S. Department of Commerce (1963-1969)
- U.S. Escort for Soviet Delegation on two-month tour of U.S. industrial centers, the first such visit from the USSR in the thawing of the Cold War (1963).
- Executive Secretary, Panel on Invention and Innovation, U.S. Department of Commerce (1965-1967).
- Member, Panel on Venture Capital for New Technologically based Enterprises, U. S. Department of Commerce (1968-1970).
- Chairman, U.S. Interagency Committee on Regional Technical Programs (1965).
- Member, Foreign Patent Policy Committee, Federal Council for Science and Technology (1964-1965).
- Member and Rapporteur, Interagency Committee on East-West Trade (1963).
- Member, U. S. Delegation to the East-West Conference on Invention Protection and Technology Transfer, Geneva, Switzerland (1964).
- Chairman, National Conference on Creative Engineering Education, Woods Hole, Mass., September 1965.
- Consultant to the National Commission on Technology, Automation and Economic Progress (1966); President's Commission on the Patent System (1966); President's Commission on Marine Science, Resources and Engineering (1967-1968); Arms Control and Disarmament Agency (1966-1969).

- o Adviser to the Department of Scientific Affairs, Organization of American States (1968-1970).

- o U.S. Member of OAS Working Group on Strategies for Technological Development of Latin America, Chile (1969).

- o U.S. Member, Conference on Energy Alternatives, Organization of American States, Trinidad and Tobago (1976).

- o Commissioner, National Commission on Electronic Funds Transfer (1977).

- o Member, U.S. Study Group on Automated Manufacturing in Japan, Japan Productivity Center, Tokyo, July 1978.

AWARDS and HONORS

- o National Civil Service League Award, 1972: One of the 10 individuals selected annually for "outstanding achievement in government service."
- o U.S. Department of Commerce Gold Medal Award, 1967, for "distinguished achievement in the field of Invention and Innovation Policy."
- o Ford Foundation Fellowship Award for a study of technology policies of the European Economic Community, 1964 (this grant was later declined to accept the directorship of the Office of Invention and Innovation).
- o Institute of Electrical and Electronics Engineers: "Outstanding Senior Student of the Year," 1956.
- o Elected to Tau Beta Pi (National engineering honorary society) in 1955 and Eta Kappa Nu (National electrical engineering honorary society) in 1954.

PROFESSIONAL ACTIVITIES

- o Member, Institute of Electrical and Electronics Engineers: Chairman, University of Illinois Branch (1955-1956).
- o Member, Committee on Curriculum Reform, American Society for Engineering Education (1964-1966).
- o Member, New York University Creative Science Program (1967-1970).
- o Member, American Bar Association Section on Science and Technology; Chairman, Committee on International Patent Legislation (1967-1968).

PUBLICATIONS

Major Works

Improving the National Climate for Invention and Innovation, Washington, 1964.
Technological Innovation: Its Environment and Management, U. S. Department of Commerce Panel on Invention and Innovation, Washington, 1967.
Education for Innovation, with J.H.Hollomon, et al, Pergamon Press, 1968.
A Metric America, the summary volume of the 13-volume report to Congress on the U.S. Metric Study, 1971.

Articles

Essays and papers published in the *New York Times*, the *Harvard Business Review*, the *World Book Encyclopedia*, *Engineer*, *IEEE Spectrum*, and other scientific and technical books and periodicals.

Annex E

STANDARDIZATION IN LDC'S PROJECT

Summary Report
on
Interviews Held

Submitted to the Office of International Relations,
National Bureau of Standards, in fulfillment of
Purchase Order No. NB81AA-G7399, dated February 2, 1981

by

Daniel V. De Simone
The Innovation Group, Inc.

TABLE OF CONTENTS

AN ASSESSMENT OF THE NBS/AID PROGRAM OF TECHNICAL ASSISTANCE TO DEVELOPING COUNTRIES

by Daniel V. De Simone

I. BACKGROUND

This assessment is part of the evaluation of the NBS/AID project, Standardization in the LDCs, which was undertaken over the three-year period, July 1976 to September 1979. The evaluation team consisted of James L. Roush, the team leader, under contract with the Agency for International Development (AID); and Daniel De Simone of the Innovation Group, Inc., under contract with NBS. The overall purpose of this evaluation is to provide a basis for the design of a possible follow-on project and to explore the possible future role of NBS in support of AID's programs.

This assessment is the NBS portion of the evaluation and responds to the contractural terms of reference. In particular: "The contractor will visit a number of less developed countries that took part in the program and will interview appropriate government officials and industrial managers in order to determine the following:

a. Whether NBS technical assistance helped to strengthen the LDC institutional infrastructure in metrology and standardization.

b. Whether the technical competences and managerial skills of the individuals who participated in the programs were enhanced by their participation.

c. Whether the indigenous institutions became better able to provide services to ensure quality of products, protect the national health and safety, or ensure equity in the market.

d. Whether the indigenous institutions were aided to provide services to promote the international marketability of manufactured products.

e. If the NBS program is judged to have had a significant impact, can local factors be identified that contributed to the impact? Conversely, if the impact is judged to have been small or negligible, can local factors be identified that might have counteracted any NBS stimulus?"

In the course of our evaluation, we interviewed key individuals in Panama, Ecuador, Sudan (De Simone only), and Washington, DC, who were either involved in the program, knowledgeable about it, or affected by it. We also reviewed the results of a questionnaire survey that had been addressed to a much wider foreign audience than the persons we were able to interview. Finally, we reviewed all of the extensive, pertinent background literature that had been provided to us by NBS, AID, the host countries, and the AID missions.

PERSONS INTERVIEWED

Panama (Panama City)

Mr. Jay Speicher, Executive Officer, USAID, Panama
Mr. J. Padillo, Deputy Program Officer, USAID, Panama
Ing. Aristides Falcón, Director, COMPANIT
Sra. Carlota Marisín Bieberach, Deputy Director, COMPANIT
Ing. Esmeralda Hernandez, Chief, Metrology Laboratory, COMPANIT
Lic. Eduardo Camacho, Metrology Laboratory, COMPANIT
Ing. Cecilio Lipsit, Metrology Laboratory, COMPANIT
Ing. Humberto Cardales, Metrology Laboratory, COMPANIT
Lic. Idritza Pérez, Metrology Laboratory, COMPANIT
Lic. Ivonne Rivera, Metrology Laboratory, COMPANIT
Ing. Carola J. Bartley, Metrology Laboratory, COMPANIT
Lic. Carmelo Bayard, Director, Centro de Investigación y Tecnología del Cuero
Ing. Maricela Ferrer de Chan, Technical Director, Hojalatería Ferrer, S.A.
Ing. Ivonne Ruiz de Suarez, Deputy Director, Dirección General de Comercio Exterior, Ministerio de Comercio y Industria de Panamá

Ecuador (Quito)

Ing. Luis Felipe Urresta, Director, INEN
Ing. Hernán Sotomayor, Deputy Director, INEN
Dra. Leonor Orozco, Chief, Chemical Division, INEN
Mr. Patricio Maldonado, USAID, Ecuador
Ing. Hugo Jara, Director, Quality Control, INEN
Ing. Jaime Redin, Director, Sistemas Andinos, S.A.
Dra. Teresa Baus, Ministry of Health
Ing. Rafael Aguirre, former Chief, Metrology Division, INEN
Econ. Nelson Diaz, Director for Industry, Ministry of Industry and Commerce, and Chairman of the INEN Council
Ing. Juan Kohn, Director General, Ideal, S.A.
Ing. Faisal Misle, Technical Director, INGESA, S.A.
Econ. Angel Matovelle, Executive Director, Consejo Nacional de Ciencia y Tecnología
Ing. Jaime Velasquez, Director, Instituto de Investigaciones Tecnológicas (IIT), Escuela Politécnica Nacional
Prof. Hector Izurieta, Director, Textiles Laboratory, IIT
Ing. Wilson Mantilla, Director, Laboratorio de Metalografía, IIT
Mr. Leo Garza, USAID, Ecuador
Mr. Carlos Luzuriaga, USAID, Ecuador

Sudan (Khartoum)

Mr. James Holtaway, Acting Director, USAID, Sudan
Dr. Awatif A. Faraq, Development Specialist, USAID, Sudan
Mr. Robert Friedline, Project Officer, USAID, Sudan
Mr. Babiker Abu El Hassan, Acting Director, Weights and Measures Administration (WMA), Ministry of Cooperation, Commerce and Supply (MCCS)

Mr. Mohamed Mustafa Kovina, Director, Khartoum Division, WMA, MCCS
Mr. Adam Mohamed Hamid, Controller, WMA, MCCS
Mr. Almoneim El Awam, Standards Laboratory, WMA, MCCS
Dr. Sayed Zacria Abdel Nabi, Director of the Standards, Testing and Quality Control Department, Industrial Research and Consultancy Institute
Mr. Mohamed Yagoub Abdalla, Assistant Undersecretary, Ministry of Cooperation, Commerce and Supply
Mr. Sayed El Amin El Awad, Acting Director, Department of Standardization and Quality Control, Ministry of Cooperation, Commerce and Supply

Washington, DC

Dr. Edward L. Brady, Associate Director for International Affairs, NBS
Dr. Kurt F.J. Heinrich, Chief, Office of International Relations, NBS
Dr. John K. Taylor, Coordinator, Quality Assurance and Voluntary Standardization, NBS
Dr. H. Steffen Peiser, Consultant, NBS
Mr. Roger Moeller, Industry Specialist, Bureau for Development Support AID
Mr. Benjamin M. Gutterman, former Assistant Director for Coordination/ Technology, Bureau of Foods, Federal Drug Administration
Ing. Romulo Ferreira, Department of Scientific Affairs, Organization of American States (OAS)
Mr. Rigoberto Amas, Technological Development Unit, Department of Scientific Affairs, OAS

II. GENERAL OBSERVATIONS AND CONCLUSIONS

A broader range of countries would have provided a more solid basis for generalization. However, the countries selected were satisfactory for our purposes. They are at different stages of development; their economic and social environments provide interesting contrasts; and the forms, timing, and intensity of NBS/AID assistance within these variegated contexts differed markedly as well.

One lesson to be drawn from our evaluation is that this is as it should be. That is, any future NBS/AID assistance activities should correspond in diversity to the economic and social factors to be encountered in the developing countries. The activities should be adapted innovatively to the peculiar needs of each country--recognizing, of course, the practical limits of such an approach and the challenges to effective implementation that these different problem sets pose. In the three countries that we visited, we found that the acceptance, sophistication, and diffusion of measurement and standards capabilities differed markedly.

Another conclusion emerges forcefully from our visit: the developing countries thirst for the kinds of NBS/AID assistance we evaluated and discussed. Their priorities with respect to the forms of assistance varied, depending upon their level of sophistication, but there was no question that they would be grateful for any salutary ties to NBS/AID. For all of their differences, this was one thing they had in common.

Thirdly, the conclusion is inescapable that these modest, person-to-person efforts to boost the measurement and standards capabilities of developing countries are cost-effective. Beyond our own observations, the Japanese and West Germans attest to this through their increasing attention to similar kinds of aid projects. My estimate of the level of resources that Japan applies to this one area of technical assistance is that it is at least an order of magnitude greater than that applied by the United States. It is clearly a low-cost investment in good will. And in the longer term, as the Japanese illustrate so well, such investments will undoubtedly lead to the commercial advantage of the donor as well. It should come as no surprise that Japan leads the world in exports of manufactured products to the LDCs.

There is, moreover, a philosophy underlying the Japanese approach to aid to the developing countries which should appeal to the United States as well. It is this: technology, such as the know-how involved in measurement and standards work, helps a broad segment of the population of the developing countries to which it is transferred. In contrast, grants of money and equivalent gifts often serve to benefit only elite groups. In any case, whether the higher level of Japanese technical assistance to the LDCs is motivated by practical or altruistic considerations (or both, for in this case they are consistent), the results are mutually beneficial to both donee and donor. In terms of good will and export markets, the rate of return on investment is very high indeed.

With one important qualification, there is no question that NBS/AID technical assistance has helped to strengthen the institutional infrastructure of the developing countries we visited. The capabilities and skills of the

104

individuals who participated in the programs were enhanced. They were better able to address problems of equity in the marketplace and quality control for health and safety and international marketability. The important qualification --and this is especially true of Sudan--lies in the countervailing political and economic factors that in general affect the climate for technological progress and economic growth. In Sudan, these factors have more than overpowered, at least to date, any progress that could have been derived from the relatively insignificant boost from the NBS/AID survey of 1978. The disparity between these opposing forces is just too overwhelming. Because it differed so vividly from the other countries, Sudan thus offered some important insights.

In any future NBS/AID program of assistance, the number and kinds of countries to be aided should be commensurate with the NBS/AID resources that will be available. In the last go-around (1976-79), the resources provided in the NBS/AID plan were too meager and were targeted at too many countries, with the result that they may have been below critical mass in most of them. This would suggest the desirability of limiting any future program to fewer countries and selecting them only after a careful appraisal of resources (funds, people, availability, commitment), matching these with the requirements of the countries and the desired results.

Another important lesson emerges from our evaluation: follow-up, such as the provision of standard reference materials, would have made a great difference, but there were no resources for that to be done effectively. Here, again, we see that adequate resources are key. When they are insufficient for a sustained effort, critical mass cannot be achieved.

III. PANAMA

We began our interviews in Panama by visiting Mr. Jay Speicher, Executive Officer of the AID Mission, to discuss the purpose of our evaluation and to obtain his general impressions of the state of the economy and current developments. Later in the week we met with Mr. Padillo, the Deputy Program Officer of the Mission, who gave us some interesting examples of economic development projects that had failed because of the lack of standards. One such project involved the making of dresses by a group of Chiriqui Indians. The dresses were made with enthusiasm and much good work all around. But there was insufficient attention to standards for sizes and quality control, and the project collapsed.

Our first meeting with our Panamanian hosts was at the headquarters of COMPANIT (Comisión Panameña de Normas Industriales y Técnicas), the national measurement and standards body. We met with the Director of COMPANIT, Ing. Aristides Falcón, and the Deputy Director, Sra. Carlota Marisín Bieberach.

COMPANIT had benefited, they said, from the NBS/AID workshops, seminars, and courses attended in the United States by their former colleagues at COMPANIT. "Former colleagues" was to become a recurrent expression in our discussions, for all of the Panamanians who had participated in the NBS/AID program had left COMPANIT. Ing. Falcón and Sra. Marisín had not themselves been involved in any of the NBS/AID projects. Their opinions of the program were therefore hearsay, except to the extent that they may have been affected indirectly by the knowledge acquired by their predecessors.

They alleged that a combination of low salaries, lack of opportunity, and frustration with what they felt to be COMPANIT's inferior status in the ministerial bureaucracy encouraged the exodus of the senior people trained by NBS. Their departure has left the agency seriously bereft of top talent. The salary differential between COMPANIT and industry, as well as other government agencies, widens with time. Starting salaries are comparable for the three categories, but from that point on the differentials grow, and as COMPANIT personnel develop experience and demonstrate skills of value to industry, they are naturally enticed away by the higher levels of remuneration and greater opportunities available elsewhere.

Ing. Falcón directs a staff of 15, which serves as the secretariat for the Commission (COMPANIT); develops and promulgates standards; provides weights and measures services; serves as a technical resource regarding applications for patents; consults with other government agencies that have technical problems, especially with respect to contracts; and covers quality control activities. It was clear from Ing. Falcón's remarks that COMPANIT was not able to handle all of these responsibilities. He lamented the lack of understanding and appreciation for the importance of these responsibilities at the upper levels of his ministry and throughout government. He noted that whereas the value of standards and measurement services could be taken on faith in the United States, this could not be assumed in Panama. He described, in effect, a "Catch 22" situation: to demonstrate their worth at the ministerial level, they must have adequate resources; to be given resources, they must demonstrate their worth.

COMPANIT must also have an adequate legal basis, he noted, if it is to perform its standards functions. At present, they have as a charter an executive order that was issued in 1970 and which does not, he said, give COMPANIT sufficient authority to carry out its responsibilities regarding industrial and technical standards. The effort to provide COMPANIT with an effective statutory basis began in 1974. Since then, Ing. Falcón observed, studies have been commissioned and advisory panels appointed to review the matter, with no result. He believed that a survey of the kind performed by NBS/AID in other countries might help to change the attitudes of industry and government towards standards and quality control and encourage the passage of an effective law in this field.

We found the morale problems of the COMPANIT headquarters reflected as well at the Metrology Laboratory, which is located at the University of Panama. Its director, Ing. Esmeralda Hernandez, expressed gratitude for the help that NBS had given in setting up the laboratory, and especially, the sympathetic attention that had been afforded them by Dr. Steffen Peiser. She said that they would welcome further help from NBS/AID, not so much in terms of training in the United States, but the kinds of assistance NBS/AID could provide locally or regionally. We reviewed with her the kinds of possible forms of assistance outlined in an NBS document entitled "Tentative Ideas About Programs Under FITC on Standardization for Intermediate Income and Less Developed Countries." This document, which is also reproduced as an appendix to Mr. Roush's report along with mine, was used. The document will be referred to hereafter as the "Discussion Points Paper."

Ing. Hernandez ranked the possible forms of assistance in three levels of priority. In the first category (highest priority), she placed:

- o Surveys.
- o Laboratory audits.
- o Courses in metrology.
- o Ordering and maintenance of laboratory equipment.
- o Standard Reference Materials.

In the second category, she listed:

- o Courses on weights and measures control in retail markets.
- o Regional seminars.

And in the third category, she placed:

- o Management of technical standards committees.
- o Workshops in the United States.

Our visit to the Metrology Laboratory was followed by less formal and more revealing conversations with COMPANIT's Deputy Director, Sra. Marisin, and two officials of COMPANIT, Ing. Maricela Ferrer de Chan, the highly respected former Director of COMPANIT, and Ing. Ivonne Ruiz de Suarez, the former head of the Metrology Laboratory. The latter two had moved on to more rewarding occupations--de Chan to industry and de Suarez to a higher directorate in the Ministry of Commerce and Industry. Both continued to believe that the development of Panama's measurement and standards capabilities was important to social and economic progress. And both remained fervently loyal and supportive of COMPANIT. However, they were deeply concerned about its future.

117

Ing. de Chan, who is said to have been the most important contributor to COMPANIT's development since its founding in 1970, deplored its current status. She noted that COMPANIT had no access to the Minister and there were two layers of unsympathetic bureacracy in between. Still, she felt that these adversities could be turned around.

We discussed the possible forms of assistance in the Discussion Points Paper. Her immediate reaction was that an NBS survey could do more to persuade the government and industry of the importance of standards and quality control than anything she or other Panamanians could do internally, solely by themselves. Had an NBS/AID survey been conducted in Panama, she said, it could have made a difference for COMPANIT, especially in giving measurement and standards a respectful status in the eyes of the Ministry.

This is how she ranked the items in the Discussion Points Paper:

- o Highest priority: The survey of needs.
- o No. 1 priority: Courses on weights and measures; instrument ordering and maintenance; regional seminars.
- o No. 2 priority: Laboratory audits; standards committee management.
- o No. 3 priority: Courses in engineering metrology; SRMs (Standard Reference Materials).
- o Lowest priority: Workshops in the United States on U.S. systems.

She explained that her ranking of SRMs in the third tier was because her experience had been one of futility in trying to obtain follow-up assistance. She said that COMPANIT had received a set of SRMs in 1972 and that they had been used at the University to analyze cement and other materials. Their appetite for SRMs had been whetted, but no more were ever received. The reason, of course, is that such follow-up was not provided for in AID for NBS assistance to the LDCs.

Ing. de Suarez, who had attended the 1978 NBS Course on Weights and Measures Services, endorsed Ing. de Chan's top ranking of the survey form of assistance. Ing. de Suarez is now the Deputy Director of the Foreign Trade Directorate (Dirección General de Comercio Exterior), Ministry of Commerce and Industry. She is thus at a level above COMPANIT in the Ministry. She sees standards and quality control as indispensable to improvements in Panama's economy, consumer interests, and the country's trade interests. However, she was persuaded that it was hopeless to get that message across from within the government and expressed the hope that an NBS/AID survey might be undertaken in Panama. She was confident, she said, that it would have a beneficial impact.

Regarding the NBS/AID course that she had attended in 1978, Ing. de Suarez thought that it had been of great benefit to her subsequent work at COMPANIT. For her part, Ing. de Chan said that she had learned much from the NBS/AID seminar in which she had participated and recommended them highly, as noted earlier. She would have rated the workshop she attended higher, she said, if future ones could be better tailored to the needs and level of experience of the

tra'nees from developing countries. In her opinion, the workshop she attended tried to do too much and was too sophisticated. She had found the seminar more rewarding.

IV. ECUADOR

Despite all of the problems that were revealed to us in the numerous discussions we had with officials in government and industry, Ecuador's measurement and standards resources and capabilities are an order of magnitude better than those of Panama and vastly superior to those of Sudan. The Instituto Ecuatoriano de Normalizacion (INEN) is flourishing by comparison. However, among the alleged problems are: salaries inferior to those for similar positions in industry, excessive turnover of personnel, inadequate laboratory facilities, insufficient instrumentation and equipment, unnecessary work on some standards, and obsession with procedures, too much attention to "not invented here," and an unsympathetic industrial community (although the industrialists we interviewed were very supportive of INEN). Notwithstanding these alleged problems, in contrast to the measurement and standards institutions of Panama and Sudan, INEN is a paradise.

With only one exception, everyone we talked to in industry and at the AID Mission spoke favorably of INEN's work and its current administration. With no exceptions, all of the people we talked to gave high marks to the NBS/AID program for the assistance it had given to INEN over the years. One of them observed that the NBS/AID help was "a critical factor in keeping INEN alive as an institution" during its formative period. The current Director of INEN, Ing. Luis Felipe Urresta, said that the NBS/AID survey of 1972 gave credibility to INEN and was a major factor in gaining support for its programs. "The survey was a turning point," he said. From our discussions, it can be said that the NBS/AID program of assistance:

a. Helped to strengthen INEN institutionally.

b. Enhanced the technical competences and (to a lesser extent) the managerial skills of the INEN staff who participated in the NBS/AID activities.

c. Bolstered the capabilities of INEN to help assure equity in the market and in the areas of quality control within which it is authorized to provide services affecting national health and safety.

d. Aided in INEN's development of capabilities to help promote the international marketability of manufactured products.

e. Constituted an important element in INEN's progress, though clearly not the only one.

Many suggestions were made by the people we interviewed on how to improve any future NBS/AID courses, workshops, or seminars. First, they felt that participants should be grouped in accordance with their levels of experience and skill. They felt that the participants in past workshops were too heterogeneous in terms of experience. One of them observed that "the fellow from Korea was shopping for SRMs, while I was learning about them for the first time."

They felt that travel could be cut to provide more time for learning practical skills. Perhaps this criticism was too much weighted with hindsight. Nevertheless, it was commonly held. One of them noted that one state weights and

measures program would have been enough to study--and could, therefore, have been done in greater depth.

They all felt a need for more basic training in quality control. One former INEN official urged NBS to set up a training project on quality control. The project could draw upon such other agencies as the Food and Drug Administration, the Environmental Protection Agency, and the U.S. Department of Agriculture, as well as institutions in the private sector.

V. SUDAN

By all accounts, the 1978 NBS/AID survey of standardization and measurement services in Sudan had a salutary effect on the people it touched, both in government and industry. However, the physical conditions and resources of the various institutions, as they were perceived to be at the time of the survey, either remain the same as they were or have changed for the worse.

The survey itself had an immediate beneficial impact; but it is too early to tell whether, at the ministerial levels of the Sudanese government, it will engender policy and budget directives to rationalize and promote Sudan's measurement and standardization capabilities. The reason is that these upper echelons have not yet seen the report on the survey. Moreover, even at the bureau and departmental levels of the ministries, the report has had a limited distribution.

The measurement and standardization officials I interviewed told me that the report had been made available to them only a few weeks before my arrival and, furthermore, that only four copies had been received. They needed more copies, they said, so that the findings and recommendations of the report could be conveyed to key people in government and industry. Apparently, they do not have a facility available to them for reproducing the report. It was clear, in any case, that the report and its recommendations have yet to make their mark.

The survey itself, however, was highly acclaimed by all of the officials with whom I spoke as a "marvelous undertaking," a "splendid achievement," a "most rewarding experience," and other similar expressions of approval.

There were three criticisms, however, although none of them detracts from the highly favorable consensus regarding the survey itself. They concern post-survey developments or the lack thereof. One has already been mentioned, namely, the delay in receiving the report on the survey. Secondly, it was said, with some feeling, that the survey report did not adequately reflect the benefits that the Sudanese had derived from the survey. Indeed, one of my hosts said that he thought the report was "excessively modest and self-effacing." The third criticism was that they (the Sudanese participants) had not had a chance to comment on a draft of the report before it was printed. Had they the chance, they said, they would have suggested more assertive statements of what had been accomplished. As can be seen, these "criticisms" are forms of praise.

One of the benefits of the survey is quite remarkable. Dr. Sayed Zacria Abdel Nabi, Director of the Standards, Testing and Quality Control Department of the Industrial Research and Consultancy Institute, Ministry of Industry, told me that prior to the survey, the Sudanese participants had never before met as a group to discuss common problems and issues pertaining to measurement, standardization, and quality control. "In fact," he exclaimed, "we had never before met as a group for any purpose at all. We have this extraordinary phenomenon of Dr. Peiser and his colleagues coming from abroad to meet us and perhaps not knowing that they were bringing us face to face to discuss our own realities for the first time."

The conditions of Dr. Nabi's laboratory, incidentally, are deplorable. The survey report (see page 20) noted the inadequacy of the space and the imminence then (in 1978) of its replacement with new facilities. However, they are still located where they were and the conditions are worse. The roof has caved in at several places and the support walls are disintegrating.

None of the facilities I visited had air conditioning. One of them had an overhead fan, but it was not working. I learned why later: unfailingly, the electric power was interrupted in Khartoum for several hours every day that I was there. You could count on it.

There are other countervailing factors of a policy nature that definitely pose obstacles to progress on the measurement and standards front, no matter how wisely and efficiently efforts to assist the Sudanese are undertaken. Sudan has enormous economic problems that are largely self-imposed, as I sensed from my discussions at the AID Mission and from my own personal observations. Sudan has been called the potential breadbasket of Africa and the Middle East. Even the NBS survey report alluded to this. The fact is that Sudan cannot sustain itself, let alone feed anyone else, and must import food. Its fiscal, monetary, and trade policies and intrusions into the market stifle entrepreneurial initiative. Phoney exchange rates further discourage foreign investment.

Sudan is kept afloat only because of aid from abroad--mostly from Saudi Arabia and, increasingly, the United States. While I was in Khartoum, President Nimeiri announced a US$100 million aid package for Sudan. That same week Chevron discovered oil in the Southwest of Sudan; there was also an attempted coup to oust Nimeiri. One hopes that the oil will help, but the economic and political systems that have failed to parlay the bountiful sweet waters of the Nile and other natural resources may squander the petroleum revenues as well.

At the AID Mission, Mr. James Holtaway, Deputy Director of the Mission (Acting Director while I was there), reported that the Mission was totally absorbed in the massive economic problems of Sudan. He said that he appreciated the importance of building up the country's technical infrastructure via measurement, standardization, and quality control projects, but that the Mission had all it could do to cope with Sudan's current macro-economic problems, such as alleviating its balance-of-payments difficulties. Moreover, the country was being inundated by refugees from Chad and Eritrea. The streets were teeming with these unfortunate people, uprooted by Libyans to the west and Ethiopians to the east. In sum, the AID Mission in Sudan has all that it can do to handle the large-scale problems it is addressing and has no resources or experienced people to keep up with the longer-term, small-scale technical projects of the kind involved in the NBS/AID survey.

Because of the counterproductive government policies noted above, Sudan has a "brain drain" problem that would seriously undermine the development of its measurement and standards capabilities even if other factors were favorable. Talented scientific and technical people have emigrated in droves to Saudi Arabia and the other Gulf countries. They can get four to five times the salary there, in real terms, plus other amenities, including housing and recreational facilities. As another example of misguided policy, I was told

that the government had just imposed an embargo on the further emigration of such skilled Sudanese.

These are the countervailing realities of Sudan and they answer in inescapable terms the final question in the list of tasks for this evaluation: "If...the impact of the NBS survey is judged to have been small or negligible, can local factors be identified that might have conteracted any NBS stimulus?" Clearly, yes.

Some additional observations:

The Sudanese had received the NBS questionnaire, but declined to discuss it until they had given it full consideration. They are planning a meeting to review it and will then prepare a collective response.

Mr. Mohomed Yaoub Abdalla, Assistant Undersecretary of the Ministry of Cooperation, Commerce and Supply, noted that the Japanese are systematically training key commerce and measurement and standards officials in Japan. They are given "scholarships" for six months that provide a stipend and fully cover subsistence costs. The trainees are introduced to a wide variety of Japanese manufacturing and technical activities during the program. Mr. Abdalla himself had already participated in the program and attested to its excellence and the care with which the Japanese executed it. Clearly, the Japanese see these scholarships, which are extremely generous by U.S. standards, as a low-cost investment, with the prospect of significant long-term trade advantages. The Sudanese who are trained in the program and given this unique experience will surely have acquired a bias, if not a preference, for Japanese products and services. Good will figures large, too.

Mr. Babiker Abu El Hassan, the Acting Director of the Weights and Standards Administration of the Ministry of Cooperation, Commerce and Supply, said that their urgent needs are:

- o A legal Metrology Laboratory, as recommended by the survey team (see NBSIR 80-2020, page 4).
- o Better training of their weights and measures personnel.

He submitted written comments to this effect, which are reproduced here.

COMMENTS ON STANDARDIZATION AND
MEASUREMENT SERVICE IN THE SUDAN

> In fact it (the NBS survey report) is a true picture of our position now and it is a clear look to what we need in the future.
>
> All these points were discussed with the international team members during their visit to Sudan and agreed upon.
>
> We hope that all the recommendations outlined in the report will be implemented in the near future in order to improve

and promote the Weights and Measures Service all over the Sudan.

Our urgent needs are as follows:

(1) Implementation of the Legal Metrology Laboratory recommended by the team.

(2) (a) Training of our weights and measures officials and technicians abroad.

(b) We see that it is very essential to establish our Training Center to initiate training programs. Contribution of NBS and U.S. Agency for International Development in the form of technical consultation and financial aid is highly appreciated.

A long-range program may be developed to implement other recommendations.

BABIKER ABU EL HASSAN
Acting Director
Weights and Measures Administration
Ministry of Cooperatives, Commerce
and Supply
March 17, 1981

The weights and measures stations in the capital area--the tri-cities of Khartoum, Omdurman, and Khartoum North--are probably more sophisticated than those in the other 18 provinces, each of which has only one weights and measures station. In a country of over 17 million people and close to 2.5 million square kilometers, it would seem impossible to maintain weights and measures integrity in the markets spread over so vast a region. Mr. Hassan hopes that the government will authorize the establishment of 10 additional stations to help close the massive gaps in the network. He also expressed the hope that it will be possible to secure training through NBS/AID for the technicians involved.

The temperature of the facility where Mr. Hassan and his colleagues are headquartered varies from hot to torrid, depending upon the time of day, and is therefore unsuitable for temperature-sensitive measuring activities. This underlies the top priority given by Mr. Hassan to the construction of a new metrology laboratory.

In my discussions with the principal measurement, standardization, and quality control officials, there was a clear consensus that additional training programs would be high on their list of desired forms of assistance from abroad. They are, as I have already noted, much impressed with the Japanese program. They expressed the hope that U.S. training programs could also be provided both in the United States and Sudan, as well as regionally.

Dr. Nabi of the Research and Consultancy Institute said that his laboratory would be most grateful if standard reference materials (SRMs) and

training in their application could be provided. He said that the Institute had requested such help previously, but without success. The SRMs were badly needed, he noted, for their work in quality control of products. Next in order of importance to his institution would be NBS's laboratory audit program and, beyond that, assistance in the selection, acquisition, and maintenance of laboratory equipment. In summing up his views, he urged that any follow-up assistance concentrate on implementing the NBS survey report and avoid restudying the issues and problems with which NBS and an earlier UNESCO report had been concerned. He also made an interesting observation on the "brain drain" problem noted earlier. He firmly believed, he said, that if he could provide more research opportunities for his staff--that is to say, more job satisfaction--he could overcome the higher salaries offered his people by the Saudis and others. As it is, he lamented, he trains his laboratory people only to see them depart for the Gulf states, where they not only earn much more, but are also given excellent research opportunities.

Mr. Sayed El Amin El Awad, Acting Director of the Department of Standardization and Quality Control of the Ministry of Cooperation, Commerce and Supply, stated that the training of personnel would be his highest priority in any NBS/AID follow-up assistance. The basic problems confronting his institute, however, as he sees them, are the lack of any legal basis for enforcing quality control and the inability to test products and commoditites within his own department. For years they have had a bill pending before the People's Assembly that would give his department a legal basis for establishing effective quality control. However, he felt that the prospects for its passage are as bleak now as they were at the time of the survey. Mr. Awad is hopeful, nevertheless, that when the survey report is made available to the responsible authorities, it will engender support for the proposed law.

There was considerable discussion of the earlier UNESCO report on standardization, the so-called "Winser report," which had precluded the NBS survey--in particular, its recommendation that Sudan establish a single, autonomous National Standards Organization, with a solid statutory basis. The balkanization of standards and quality control responsibilities observed by the NBS survey team in 1978 persists today. None of the persons I interviewed was in favor of consolidating their fractionated standards and quality control activities into a single national body, even though some of them lamented the lack of effective interaction among their respective institutions.

It is clear that the fractionation of standards and quality control responsibilities will be a major obstacle in any future effort to assist the Sudanese in these areas.

In our discussions of quality control, Mr. Awad said that his Department of Standardization and Quality Control would welcome the kinds of training assistance that the U.S. Food and Drug Administration offers to personnel from the developing countries. The basis for our discussion was the letter of November 24, 1980, to Sr. Felipe Urresta of the Instituto Ecuatoriano de Normalizacion from Mr. Max Castillo, Jr., of FDA's Office of Health Affairs. However, Mr. Awad said that his budget was insufficient to cover the travel costs that would be required for Sudanese trainees.

Time and again, he emphasized the need for training assistance. There was he said, a profound ignorance of quality control and standards in Sudan industry--hence, the low quality of Sudanese products. Moreover, import restrictions guaranteed the market for shoddy goods.

Mr. Awad pointed out that quality control is not a systematic endeavor in Sudan. They are receptive to sporadic complaints from the public, but can do little about them. His department has neither the trained personnel nor the necessary legal underpinning to establish and maintain an effective quality control program. The proposed law, noted earlier, that would provide such a basis has been pending for so long that industry, he said, considers it to be a charade. He hoped, however, that the dissemination of the NBS survey report would improve prospects for passage of such a law.

VI. ORGANIZATION OF AMERICAN STATES

Back in Washington, Mr. Roush and I visited the Department of Scientific Affairs of the Organization of American States to discuss their activities regarding the development of measurement, standards, and quality control capabilities in Latin America and, especially, their perceptions and observations relative to the various NBS/AID projects undertaken in the region.

Ing. Romulo Ferreira reviewed the history of SIM, the Interamerican System for Metrology, which had been conceived following the NBS/AID regional seminar held in La Paz, Bolivia, in June 1974. The impetus for SIM had come from the OAS which, he noted, wanted to establish a regional network of mutually reinforcing activities and capabilities in metrology. There had been some skepticism at the outset (notably, on the part of U.S. participants in the La Paz seminar) about the viability of such an institution, but Ing. Ferreira said that it has turned out well, "even if not perfect," with 13 Latin American countries now participating. Its usefulness was recently confirmed, he noted, by the United Nations Industrial Development Organization (UNIDO) at an international meeting held in Sao Paulo, Brazil.

Regarding COPANT, Comisión Panamericana de Normas y Técnicas, he expressed regret that the United States, through the American National Standards Institute, showed so little interest in its activities and rationalization. Whereas ASTM, the American Society for Testing and Materials, had been an enthusiastic contributor from the time COPANT was launched in 1953 until ANSI took over the U.S. representation in the 1960s, ANSI has been, he said, "a skeptical, disinterested, and noncontributory member."

On the other hand, he observed, the NBS/AID projects had definitely been helpful in Latin America, especially the survey projects. He pointed to the marked differences in the measurement and standards capabilites of Ecuador and Panama and attributed major credit to the survey and follow-up activities that the NBS/AID program had stimulated in Ecuador. Ecuador's INEN is doing well, he said; but COMPANIT is in bad shape. He recommended that in any future NBS/AID assistance efforts, surveys be considered for Panama and other countries that have not had this kind of assistance.

Ing. Ferreira is no longer directly involved in this area. He is preoccupied now with quality control projects in three areas: (1) food (Argentina, Uruguay, Haiti); (2) leather (Panama, Paraguay, Costa Rica); and (3) textiles (Guatemala, Argentina, Uruguay, Brazil). He expressed the hope, however, that there could be greater cooperation between the measurement and standards programs of NBS/AID and the OAS. He singled out as especially useful the NBS Laboratory Audit Program, standard reference materials, and training assistance in measurement, standards, and quality control.

He emphasized, however, that his preference was that the assistance be on a regional basis and not through bilateral arrangements. It should be noted in contrast that the general consensus of the measurement and standards officials whom we interviewed in the countries visited was that

bilateral arrangements were preferred. This was especially emphasized by Ing. Luis Felipe Urresta, the Director of Ecuador's INEN.

Mr. Rigoberto Amas, who has taken over responsibility of the measurement and standards activities of the Department, noted that West Germany has a very substantial program of assistance in the measurement and standards field, particularly in the training of officials. As an example, he said Colombia alone had 12 trainees in Germany. He praised the Germans for their systematic approach and for their follow-up assistance.

Clearly the Germans, like the Japanese (as noted above regarding Sudan), see a reciprocal long-term benefit to themselves as well. The recipient countries will benefit from the enhancement of their skills and capabilities in measurement, standards, and quality control--and the trainees will no doubt develop some appreciation and preference for German products and services that will eventually have some influence in their respective countries regarding trade and relations with West Germany.

Annex F

E.S. Peiser
National Bureau of Standards

Tentative Ideas about Program Under FITC on Standardization for Intermediate Income and Less Developed Countries

Background

Standardization includes two distinct topics: (1) the definitions, artifacts, and methods needed to ensure accurate, compatible worldwide measurements, and (2) the written specifications and definitions needed to describe the properties and behavior of products and processes. Both are necessary for industrial, agricultural, and social development, but until recently they have not been widely recognized as necessary for progress, at least not to the same extent as the economic, financial, managerial, educational, and other infrastructure requirements.

Physical and chemical standards of measurement enable any measurable attribute to be quantified in terms of internationally accepted unit magnitudes. Even the most ancient records of marketplaces show that society very early recognized the need that has grown and become the motivating force for the development of metrology -- the science of measurement.

Written standards for products, safety, test methods, information processing, and building codes enable manufacturers and traders to specify and select their raw materials and convey information to users of their products. Such standards provide the technical details for virtually all commercial transactions as well as for every step in a manufacturing process.

Standardization is thus a supporting technology, pervasive throughout science, industry, commerce, and trade. It is a basic infrastructure element through which, by assisting the development of a technically competent standards organization, one can provide support to engineering, to mining, to food and nutrition, to communication, and medical services. The developing world is apparently convinced now that standardization is a key to entry into world markets and to progress in many other fields. Thus, it would seem to be an important aspect of an FITC program to assist developing countries to improve their infrastructure support for all types of applied science and technology.

In the following, NBS describes briefly some possible program elements, including a general outline of the mechanisms of implementation. Some of the governmental and private sector organizations that would be partners of NBS in these activities have indicated their readiness to participate, but not all have been contacted.

1. Workshops on U.S. Systems for Standardization and Measurement Services

The objective of a Workshop on U.S. Systems for Standardization and Measurement Services would be to give the participants an understanding of the services provided by the public and private sectors in the U.S. and how the various organizations relate to each other. We would not advocate that any other country follow the U.S. pattern; experience has shown that no two countries organize themselves identically to provide the needed services. Workshops could be held annually for about 12 to 24 invited technical leaders selected from other countries. For two weeks, typical governmental agencies, private sector standards developing organizations, universities, industrial companies, test laboratories, and R and D institutes would be visited. Each organization would describe its functions and how it fits into the wider U.S. picture. The program would include evening discourses by distinguished speakers. Each workshop would be led by a person familiar with many aspects of the subjects, preferably experienced in government and industry; these individuals would organize the program and coordinate the presentations. Arrangements for accommodations, travel, and scheduling could be under a separate contract. Consideration might be given to having the participants' direct cost of about $2,500 each borne by the sending countries; alternatively FITC funds might cover these expenses also, as well as the cost of coordination and subsequent evaluation (about three man months per year). The contractor cost for management of a workshop would be about $5,000.

2. Course of Instruction on Weights and Measures Control in Retail Markets

All countries accept a governmental responsibility to assure equity in the marketplace. The 50 states of the Union perform this function well and are happy to show to specialists from abroad the way they operate their weights and measures services. Many state weights and measures officials would be glad to participate in a two-week program of instruction for selected officials from abroad with similar responsibilities, preferably scheduled so that it could be directly followed by a week's attendance at the U.S. National Conference on Weights and Measures. This organization, comprised of state weights and measures officials, meets once a year to enable the participants to interact with each other, with the instrument industry, and with scientists developing relevant new techniques. An FITC program could be under the coordination of the NBS Office of Weights and Measures, which would select one state weights and

measures office per year to cooperate under a subcontract arrangement. The direct cost of the participants would average $2,500 each and could be borne by the sending country or by FITC. NBS costs, including the state subcontract, would be of the order of $25,000 per year.

3. Management of Technical Standards Developing Committees

Engineering and product standards are usually developed by technical committees in which manufacturers, users, and general interest groups all participate. Participation in the committees is like attending a technology school in which opposing viewpoints are openly presented and the technical merits of differing approaches are extensively debated.

The American Society for Testing and Materials is the largest standards developing organization in the world. Despite its name, it is open to participants from abroad. Many of its standards enjoy worldwide recognition and its committee management and publication records are outstanding. This Society and other private sector standards writing organizations are prepared to receive standards committee management trainees, who would learn how to bring together ultimately in their own country manufacturers and users to hammer out compromise standards. The trainees would learn not only about committee management but also about the current state of technology in the field of the standard.

Training assignments should last at least six months, at the end of which the trainee, joined by a small group of experts from the U.S. standards training organization, should hold a seminar in the trainee's home country on "Standards Committee Management and Benefits to Manufacturers and Users." Neighboring countries in the region might well be invited to participate. The total cost of the program, for which the U.S. standards organization would be reimbursed, would be about $25,000 to $50,000 per seminar abroad and trainee, depending upon how much of the total expense would be shared by the home country.

4. Course in Engineering Metrology

In many manufacturing processes, and in the final quality assessment of products, reliable measurements have to be made at or near the maximum attainable accuracy. Training of graduate scientists and engineers for this purpose could be carried out by a university; a postgraduate course of engineering metrology provided by a university near the Washington or Boulder

laboratories of NBS would be well attended. NBS staff would participate in the training and NBS laboratories could provide access to some types of special facilities. A one-year course for 25 students would cost approximately $100,000 a year in addition to travel and maintenance costs for the students. A useful element of the training program would be a one-month work assignment within an American manufacturing company. A prerequisite for the course would be a good technical background and knowledge of statistics.

5. Ordering and Maintenance of Laboratory Instruments

One of the difficulties in sustaining a technical program in a developing country is that the complex instrumentation obtained from the more developed countries frequently either does not perform as intended or soon fails in service. The causes of failure are diverse; the end effect is that instruments hardly ever perform as well or as long as anticipated. Supplier and user are both hurt. Experiments by Hughes Aircraft, NBS, DRI, and others have indicated that the probability of success in the use of instruments in less developed countries can be greatly increased. To this end, FITC might request NBS to issue an RFP to trade associations like the Scientific Apparatus Maker's Association and U.S. companies for the purpose of assisting less developed countries to improve their procurement and maintenance of sophisticated laboratory instrumentaion.

Proposals submitted under this RFP should include plans for:

a. adapting instruments for use in LDC's;
b. Specifying user requirements by clearly analyzing the need;
c. ensuring proper transportation, installation, calibration, and environment;
d. preparing manuals, including information on power supply and needed ancillary equipment; and
e. instructing users on maintenance and probable repairs, spares.

The costs for programs of this type would vary widely depending upon the range of instrumentation included and the initial state of preparedness of the specific country in which the program would be established.

6. Laboratory Audit Program

This suggestion is for the NBS/Laboratory Audit Program (LAP) to be extended to non-U.S. users. The aim is to provide traceability to internationally recognized units. LAP provides credibility and confidence in member laboratories, which are taught to use uniform calibration, testing, and reporting procedures, mostly in the weights and measures areas.

NBS proposes that in the first year LAP be extended experimentally to perhaps three countries in one region. Ecuador, Jamaica, and Panama are suitable and known to be interested. A two-week training course would be needed plus a visit to each laboratory by an NBS specialist. The first year cost would be $20,000.

7. Surveys of Standardization and Measurement Services Needed for Development

A survey of standardization and measurement services consists of sending an international team of up to ten specialists in fields selected by the host country to identify the needs of industry and government for measurement and standardization services and to stimulate awareness of the benefits of standards and measurement services provided by nationally managed capabilities and facilities. A report is written at the end of each survey describing the conditions found in governmental and industrial organizations and recommending methods of establishing self-reliant programs in standardization in order to benefit development. The cost of each survey is about $30,000.

8. Regional Seminars on Standardization and Measurement

Neighboring countries often have similar non-competitive problems which they are glad to discuss together under guidance of a U.S. expert. Experienced guidance is generally necessary to avoid undue repetition of previously described problems and to ensure energetic searches for constructive solutions. The types of problems that might be discussed on a regional basis are illustrated by the titles of the following regional seminars managed in the past several years by NBS.

"Metrology in Industry and Government: How to Find Out Who Needs What Services," September 27-28, 1978, Daeduk, Korea

"Regional Seminar on OMNITAB II," May 12-25, 1976, La Paz, Bolivia

"Testing and Certification for Export Products in Industrializing Countries," May 19-20, 1975, Singapore

"Regional Seminar on a System of Standardization and Metrology for Latin America," June 24-25, 1974, La Paz, Bolivia

The cost of such a seminar is about $20,000. NBS or any of several universities and not-for-profit laboratories are potential contractors.

9. Development and Use of Certified Standard Reference Materials (SRM's)

Standard Reference Materials are substances whose composition and properties have been accurately measured and certified to be within certain ranges by NBS. They enable scientists in a laboratory anywhere in the world to calibrate his own measurements against those made by NBS. They thus make it possible for laboratories in less developed countries to make reliable physical and chemical measurements for selection of raw materials, control of production, and characterization of products at a cost far less than if the laboratory carried out its own absolute calibrations. Thus, SRM's make possible reliable production in technologically developed and undeveloped regions alike.

NBS proposes that a contract be let to disseminate understanding of the usefulness and potential benefits of SRM's. The contract might include the preparation (and translation) of appropriate textbooks, the study of illustrative case histories, and analysis of current and potential usage of SRM's in selected target countries.

This could develop into a large effort and NBS recommends that it be started from modest beginnings with careful evaluation at regular intervals. Appreciable benefits from a $50,000 investment in a first year should be expected.

Program Coordination

Needs for staff at NBS to coordinate these activities would have to be determined after the size of the program to be supported by FITC is decided. Some of the coordination function might well be shared with FITC staff or with organizations in the private sector.