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**THE REVIEW OF STANDARDIZATION AND
MEASUREMENT SERVICES AT THE
ECUADORIAN INSTITUTE FOR STANDARDIZATION**

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Felix von Ranke, Associacao Brasileira de Normas Tecnicas, Brazil

June 27 -29, 1974

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**THE REVIEW OF STANDARDIZATION AND MEASUREMENT
SERVICES AT THE ECUADORIAN INSTITUTE FOR STANDARDIZATION**

**By: Raul Estrada
Director General, Instituto Ecuatoriano de Normalizacion
and H. Steffen Peiser
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Introduction

At the invitation of one of the authors (Raul Estrada), a small international team of standards and measurements specialists visited Ecuador on June 27 - 29, 1974, to review the operations of the Ecuadorian Institute for Standardization, especially in the light of the recommendations made two years earlier by a Survey of Standardization and Measurement Services in Ecuador conducted by a team which was organized and sponsored by the U.S. National Bureau of Standards and the U.S. Agency for International Development [1]. The present team included:

William Andrus, National Bureau of Standards, U.S.A.
Yardley Beers, National Bureau of Standards, U.S.A.
Orlando Donoso T., Direccion General de Normas y Tecnologia,
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Brazil

The background document supplied by the principal host, Eng. Raul Estrada forms Parts I to III of this Report and the statement issued at the end of the Review is given in Part IV. Financial support of the Agency for International Development is gratefully acknowledged. It was arranged through a wider contract with NBS (PASA contract), following recommendations of a Seminar on Metrology and Standardization in Less-Developed Countries [2].

Figures in brackets indicate the literature references at the end of this report.

INEN

Revision to the NBS/AID Survey of April 1972

June 27, 1974

Part I. Historical Background

INEN was established by a Presidential Decree on August 28, 1970, and it began functioning in December 1970. According to the Decree, INEN was charged with the responsibility of:

- a. Preparation of technical standards for raw materials, intermediate, and finished products, as well as inspection procedures, methods of test, measurement classification and designation;
- b. Issuing of Certificates of Conformity to standards for products manufactured in the country;
- c. Representing the country in the meetings of international organizations concerned with standardization.

The Weights and Measures Law decreed by the President of Ecuador on January 9, 1974, conferred the following further responsibilities to INEN:

- a. Maintenance of the nation's Prototype Standard of Mass;
- b. Calibration of Secondary Standards of weight and measure;
- c. Inspection and testing of commercial devices and packaged goods, and granting of type approvals;
- d. Conversion to and implantation of the Metric System (SI) in the country within ten years.

INEN is an organization of the Ecuadorian Government under the Ministry of Industry, Commerce and Integration, and is fully financed by the Government. INEN is governed by a Council of Directors and the General Director is the administrative head. He is presently assisted by 14 scientific and technical personnel and 22 administrative, accounting, and other supporting staff.

During the first 18 months, INEN initiated a program of publicity to explain the advantages of standardization and to enlist the cooperation of the industry, universities, Government, and other

organizations in the country. INEN also formulated Rules of Procedures and Regulations for its activities. Some technical committees and sub-committees were also set up for preparation of standards. In addition, an internal coordinating committee was established to coordinate and review all the activities of INEN. During the latter part of 1971, steps were taken for establishing at INEN a National Metrology Laboratory. Also, a draft law was prepared for conversion to the SI system of measurement units and for adoption of unified weights and measures throughout the country. INEN also organized training courses within the country in the fields of standardization, quality control, metrology, and industrial safety.

Part II. NBS Survey and Subsequent Progress

During the last week of April 1972, a week-long standardization workshop was held at the laboratories of the National Bureau of Standards, Washington, D. C. This workshop was attended by representatives of Ecuador, Turkey, and Korea. At the conclusion, a team consisting of three NBS experts, two from Korea, and one expert from Turkey visited Ecuador to conduct a survey of standardization and weights and measures services needed to support industrial development. This team spent approximately ten days visiting a number of industrial units in different fields and also meeting representatives of important organizations, Government officials, and directors of technical educational institutions.

The recommendations of the NBS Survey Team are summarized below:

- a. The INEN standards program should be expanded to include:
 - 1) legislation that may be needed for carrying out a full program;
 - 2) voluntary quality marking scheme;
 - 3) metrological service;
 - 4) national center for technical information on standardization;
 - 5) public information on the scope, significance, and value of standardization;
 - 6) national plan for voluntary standardization and quality control training;
 - 7) system of accredited test laboratories;
 - 8) active participation in international, regional, and sub-regional standardization activities.
- b. INEN should be adequately financed to carry out its principal activities.

The NBS Team's survey and recommendations were valuable to INEN at a time when it was finalizing its goals and developmental plans. INEN has followed the NBS Survey recommendations in large part; consequently, there have been many significant developments within the country and the institution has made several strides. These are outlined in subsequent paragraphs.

Programs and Priorities. One of the first steps taken by INEN was to review the entire field of activity relating to standardization, formulate a program for its work, and identify priorities [3]. This program was circulated widely to the industry and Government departments and was well received.

Internal Reorganization. In order to effectively deal with all the activities envisaged, INEN's structure had to be reorganized, creating distinct departments to handle individual activities. Accordingly, INEN now has a Standards Department, a Quality Control Department, a Metrology Department, and departments relating to administration and finance.

The Standards Department has four divisions, namely Construction, Mechanical and Metallurgy, Electrical, and Food and Chemical. In time it is proposed to set up four more divisions to deal with textiles, petroleum and natural gas, minerals, and transport. The Quality Control Department is at present concerned with technical assistance to the industry, quality certification, and establishment of testing laboratories. The Metrology Department is concerned with primary standards, reference materials, calibration and testing services, and type approval. The Finance Department is concerned with all financial matters and the Administrative Department looks after staff matters and general services. Publicity, public relations, and general coordination are handled by a special officer designated as Director of Coordination. As provided in the Law, a Directorate of Weights and Measures will be established at INEN to administer the programs of package control, scale testing, flow meter testing, and type approval. The Weights and Measures Law also gives INEN responsibility for the development and monitoring of a National Plan for Conversion to the SI. A Department for SI Conversion will provide the secretariat for the principal Coordinating and Sector Committees made up of Government, industry, commerce, and scientific and technological experts.

Staff. The growth of the staff working at INEM since its inception is shown in Figure 1.

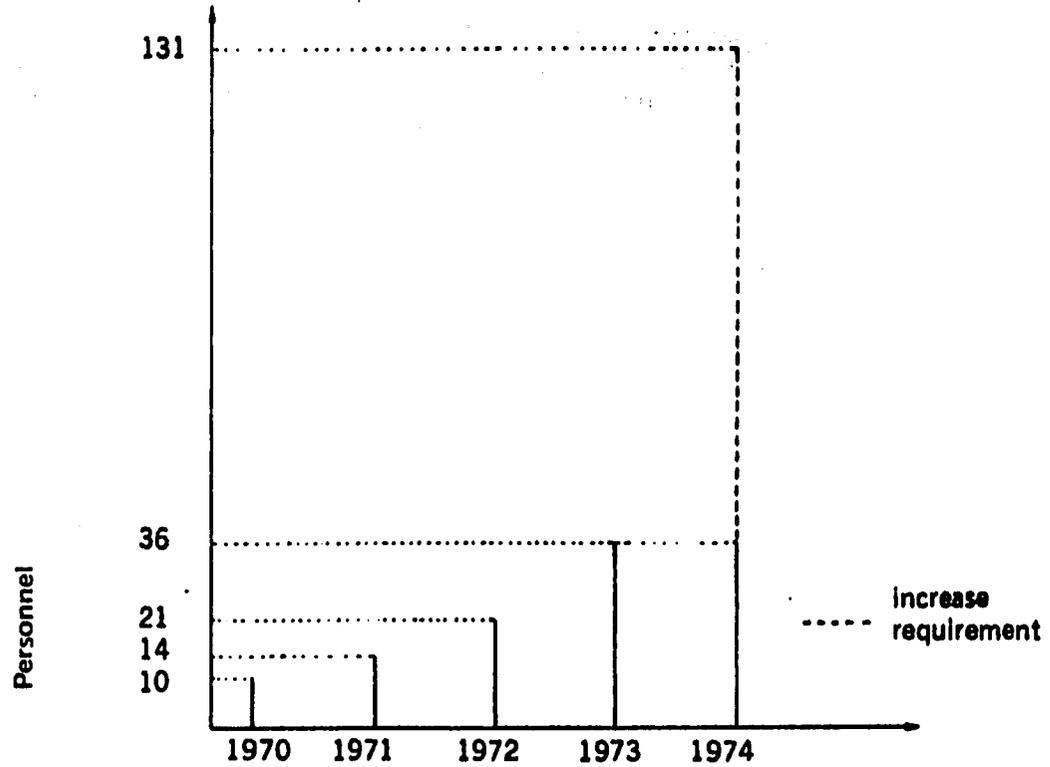


FIGURE 1

Finance. The finances provided INEM by the Government, beginning in December 1970, are given in Figure 2.

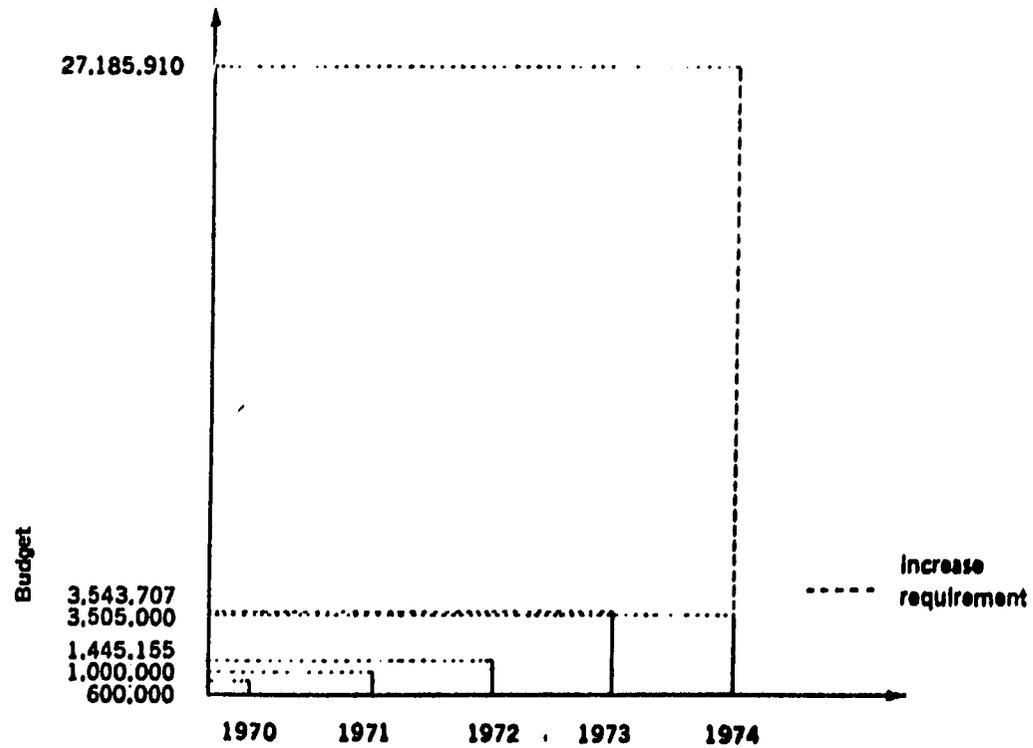


Figure 2

Printing and Reproduction. One of the major steps taken by INEN during 1972 and 1973 was the establishment of a modern printing and reproduction facility, partly with the assistance of USAID. The present equipment includes: 2 offset printing presses; 1 IBM-72 composer equipped with 2 magnetic recording units; and 1 computerized composer unit.

Library and Information. INEN is well on the way to building a highly useful Standards Reference Library and Information Center. Due to inadequate funding and lack of space, it has not been able to make the necessary rapid progress. In spite of these restrictions, INEN has acquired some important reference books and also many ISO and IEC standards, an extensive set of ASTM standards provided by NBS, besides a large number of national standards from all Latin American countries, the United Kingdom, South Africa, the United States, India, Germany, Israel, Italy, and France. Some microfilm equipment has also been acquired and additional equipment is still necessary in order to complete the facility. International assistance is required in the building of a standards information center, a vital need for INEN and the country.

Standardization. The achievements of INEN to date in the preparation of standards is given in Figure 3.

STANDARDS

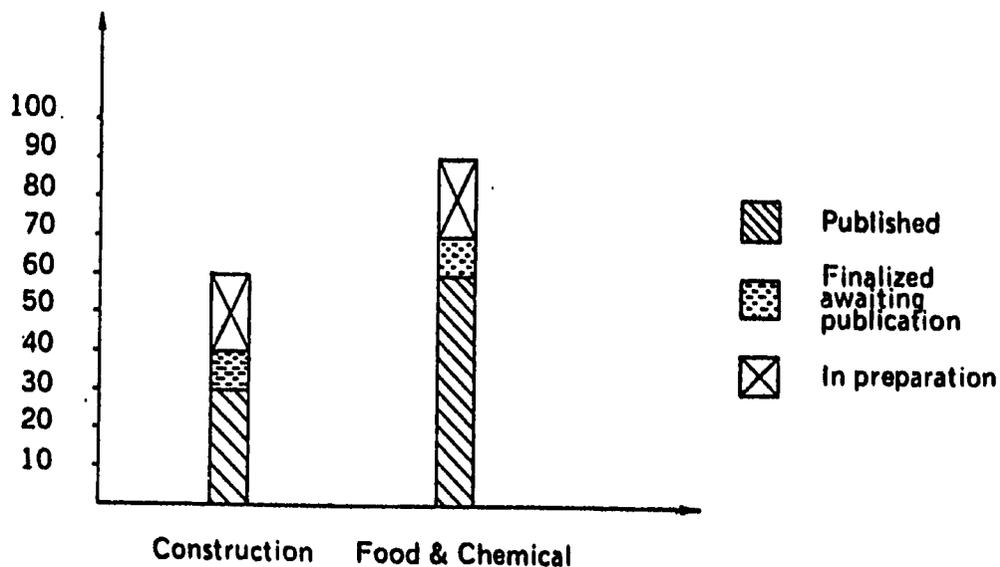


FIGURE 3.

Quality Control and Certification Marking. A scheme for lot inspection of materials and products has been finalized and put into use. A draft scheme for National Certification Marking is currently under study. Various monographs on Quality Control have been published for the benefit of industry and educational institutions. Some pilot projects are being selected for implementing the quality control systems and also for awarding of the National Certification Mark.

Metrology. The program for metrology includes the maintenance of standards and instruments housed in the INEN Metrology Laboratory, calibration of secondary standards, and testing of field standards used in the control of commercial weights and measures. The metrologists also provide calibration and testing for industries and universities and other professional services such as technical seminars, laboratory planning, and auditing.

Conversion to SI. The initial program plan for Conversion to SI has been completed. The National Advisory Committee has met and nominated the initial Coordinating and Sector Committees. The committees will, in turn, identify the priorities and time frame for conversion to SI for each economic sector over the designated ten-year period.

Weights and Measures. INEN has been given responsibility for implementation of the Weights and Measures Law which includes the inspection and test of weighing and measuring devices and packages throughout Ecuador. Also, the Directorate of Weights and Measures has authority for issuing type approvals for all domestically manufactured and imported weights and measures equipment. INEN specifications for weights and measures are adopted from international standards, including those of OIML, ISO, IEC, and ANSI. Packaging and labeling requirements closely follow the model regulations of the National Conference on Weights and Measures. The program of law enforcement will begin during 1974 and will employ sampling procedures with principal responsibility for legal compliance resting upon industry and commerce. The Directorate has authority to condemn equipment and commodities and to collect fines where violations occur.

International Cooperation. INEN is participating in the standardization activities of the Andean Group and also COPANT. However, the Institute is not able to send representatives to attend technical committee meetings in view of the lack of funds. It is hoped that the situation will improve in the years to come. INEN is at present developing a system by which the national industry takes active part in examining the documents emanating from the Andean Group and COPANT so that realistic national views could be communicated to the bodies concerned. INEN became a registered member of IEC during 1973. INEN hopes to become a member of ISO and OIML during the

current year. The Institute is already actively participating in the Codex Alimentarius.

Technical Assistance. During the three and a half years of its existence, INEN has received technical assistance from visiting experts representing many fields:

OAS	Three	-documentation library, standardization, and quality control;
USAID	Six	-standardization (food products, fertilizers), metrology, administration, organization;
UNIDO	Two	-standardization, quality control, certification marking.

Training. INEN has taken advantage of training courses in the fields of standardization, quality control and metrology in various parts of the world. So far, seven of their technical officers have received intensive training in these courses.

Other Activities. The General Director of INEN is actively participating in a number of national and international conferences. He has participated in the NBS workshops on standardization and quality control, NBS Surveys in Turkey and Korea, and meetings of the "Junta del Acuerdo de Cartagena" and Codex Alimentarius.

Part III. Future Program

The increased activity in the Andean Group and the discovery of petroleum in Ecuador have changed the outlook and plans of the Government relative to industry and the economy. In view of this, INEN also has had to redefine its objectives, programs, plans, policies, and priorities. Such a task has just been completed and a copy of the revised programs is attached.

At present, the details of these new program plans and their implementation are being worked out. In addition, the normal activities are being accelerated. One of the urgent tasks presently before INEN is the immediate establishment of pilot projects in selected industries. These shall consist of:

- a. Quality control procedures;
- b. National Certification Mark of Quality;
- c. Company standards departments;

- d. Verification of quality of products; and
- e. Calibration services.

Further, the program for Conversion to SI is just underway in accordance with the Weights and Measures Law. Also, the Rules and Regulations (specifications, tolerances, and other technical requirements for packaging and commercial equipment) for the supervision of weights and measures are being developed.

Conversion to SI and administration of the Directorate of Weights and Measures will constitute a principal activity of INEN during the years to come. INEN is also launching a crash program for the preparation of a large number of urgently needed National Standards and their implementation.

It is important that INEN should have its own headquarters building and also a well equipped laboratory facility for routine testing. These are essential for the projected expansion of INEN and to enable the Institute to carry out its obligations effectively. Provisions have been made in the 1974 budget for the acquisition of land upon which to construct the new laboratories and administrative offices. A detailed project has also been prepared for UNDP assistance which is currently under consideration by the Government.

Assistance Required. In the future, INEN will need considerable financial and technical assistance from other national and international organizations, particularly in the following fields:

- a. Visiting experts to assist in specific projects;
- b. Training of technical and administrative personnel;
- c. Equipment for testing and calibrations;
- d. Standard reference materials;
- e. Information services including public relations, reproduction and printing, and library;
- f. Financial assistance to permit attendance at meetings of ISO, IEC, OIML, COPANT, and Codex Alimentarius.

Conclusion. It is hoped that with continued Government support, cooperation by industry, consumer interest, and assistance from other national and international organizations, INEN will be able to achieve its objectives and play its key role in the National Plan for economic development of Ecuador.

**Part IV. International Review of Current Capabilities and Programs
in Standardization, Metrology, and Quality Control of the Ecuadorian
Institute of Standardization (INEN)**

Sponsored by the U.S. National Bureau of Standards and the U.S. Agency
for International Development by H. S. Peiser, Review Leader

One June 27 and 28, 1974, a group of experts in standardization, measurement technology, and quality control for manufacturing and processing industries, visited Quito for a review of the current capabilities and plans of the Ecuadorian Institute of Standardization (INEN). Under the directorship of its present General Director, Ing. Raul Estrada, an international team of experts carried out an extensive survey in 1972 of the available and needed technical services for the industrial development of Ecuador. The present review was conducted by the following team which visited Ecuador for that purpose after the termination of a seminar in La Paz, Bolivia on a Latin American System of Metrology.

Mr. William E. Andrus
Program Manager of Engineering and Information
Processing Standards
U.S. National Bureau of Standards (U.S.A.)

Dr. Yardley Beers
Senior Research Scientist
Quantum Electronics Division
U.S. National Bureau of Standards (U.S.A.)

Ing. Orlando Donoso T.
General Director of Standards and Technology
Ministry of Industry and Commerce (Bolivia)

Ing. Raul Estrada A.
Director General
Instituto Ecuatoriano de Normalizacion (Ecuador)

Mr. B. M. Gutterman
Assistant Director for Coordination
Office of Technology
Bureau of Foods
Food and Drug Administration (U.S.A.)

Mr. H. Steffen Peiser
Chief, Office of International Relations
U.S. National Bureau of Standards (U.S.A.)

Ing. Felix Von Ranke
General Director
Brazilian Association for Technical Standards (Brazil)

Taking advantage of the presence of two consultants at the Instituto Ecuatoriano de Normalizacion, Engineer Estrada suggested and they agreed to join the review team. They were:

B. S. Krishnamacher, Indian Standards Institution and United Nations Industrial Development Organization, India
T. M. Stabler, Instituto Ecuatoriano de Normalizacion, Ecuador formerly Chief, Office of Weights and Measures, National Bureau of Standards

This team was cordially welcomed at an introductory session by the Vice-Minister for Commerce, Dr. Eduardo Calderson, and the Vice-Minister for Industry, Colonel Richelieu Levoyer, who expressed the appreciation of Ecuador for what had turned out to be far-sighted recommendations of the original Survey, and who at the same time stressed the even more critical need for an effective program of action for INEN within the five-year National Program for Development of Ecuador.

The subsequent meetings were conducted under the chairmanship of the INEN Director General, Ing. Raul Estrada, supported by the foreign advisers presently working at INEN, Ing. B. S. Krishnamachar, Deputy Director of the Indian Standards Institution, and Mr. Thomas M. Stabler, former Chief of the Office of Weights and Measures of the U.S. National Bureau of Standards. All the technical staff of INEN participated in the discussions which were conducted in a spirit of mutual confidence and friendship.

The foreign experts were greatly impressed with the achievements to date of INEN and engaged in lively constructive debate on its future. Some papers were presented by INEN summarizing its present status and also the General Programs of Action which represent analysis of the objectives, strategies, fields of activity, flow diagrams, organization and personnel requirements, responsibilities, and scheduling.

The rapid expansion of industry and trade in Ecuador is bringing new and greatly expanded responsibilities to INEN. The recommendations of the 1972 Survey, which so far have served INEN, will now need extensive revisions.

In recognition of this, the new team issued views and recommendations:

1. The system of development of Ecuadorian Standards employed by INEN, in the greatest possible harmony with regional and international standards, should be regarded as a model for small industrializing nations. Only minor procedural changes were suggested for experimental use by INEN.

2. The small but now well equipped metrology laboratory was judged to be so outstanding that it should be used also by other Andean Group neighbor countries, especially as a training laboratory. The international team had high praise for the construction, management, and appropriateness of this facility for current Ecuadorian needs in industry and commerce [4].

3. Quality Control (or quality service), coupled with internationally recognized certification carried out by INEN accredited test laboratories, was regarded to be of cardinal importance to Ecuador, especially for Government purchasing and export programs. Industry needs innovative advice and standards information. The team saw a danger in complex regulatory responsibilities which would bring INEN services under some suspicion in the eyes of users.

4. The usefulness of standard reference materials for calibrating instruments and chemical analysis is considered to be of such importance to INEN programs in support of industrial needs, that INEN should take a leadership position for Ecuador or even for the Andean Group [5].

5. The laws under which INEN operates were reviewed and found exemplary. Some detailed suggestions for revisions were made, for example, the expansion of the membership of the Council of INEN Directors so that all Ecuadorean Ministries can have direct influence and access to INEN expertise, especially in the development and promulgation of standards.

6. The great rate of expansion of the responsibilities of INEN causes well recognized problems in staffing and office and laboratory space, as well as in budgeting. Any pressure to expand the fields of activities at a faster rate than can be achieved with excellence is a threat to the growing credibility and good image of INEN. The Management Council of INEN and the Director General are fully aware of the critical importance of achieving the right balance between new and older programs.

7. INEN is fortunate to have the opportunity of receiving continued USAID support. Two proposals for planning support of INEN were received from U.S. contractors. Neither USAID nor the Review Team favored accepting either proposal as INEN has done its own planning so very well. Further international assistance should bring

to INEN experts in specific fields such as fish products and inspection of electrical codes for domestic buildings.

8. The responsiveness of INEN programs to the needs and aims of Andean Integration and to international standards as reasonably feasible is welcome because it will bring the benefit of appreciable technology transfer to Ecuadorian industry.

9. The international review team was impressed by the excellence of the publication and printing programs as well as with the library facilities of INEN. The team pledged a further supply of needed standards literature, especially from the U.S.A. The new microfilm equipment at INEN will prove very useful to Ecuadorian industry. The Bolivian member of the review team has been invited to stay in Quito a little longer to study the progress made by INEN.

REFERENCES

- [1] Newman, S.B. and Peiser, H.S. (Editors), A Report on a Survey in Ecuador on Standardization and Measurement Services in Support of Industrialization Goals, May 1-12, 1972 (NBS Report 10881). [a Spanish version is also in existence]
- [2] Mason, H.L. and Peiser, H.S. (Editors), Metrology and Standardization in Less-Developed Countries: The Role of a National Capability for Industrializing Economies; Proceedings of a Seminar Held at Airlie House, Warrenton, Virginia, February 1-4, 1971 (NBS Special Publication 359), December 1971.
- [3] Instituto Ecuatoriano de Normalizacion, Programas Generales de Accion, 1974. [in Spanish]
- [4] Stabler, T.M., National Program of Metrology for Ecuador (NBS Report NBSIR 73-157), April 1973.
- [5] Cali, J.P., et al., The Role of Standard Reference Materials in Measurement Systems (NBS Monograph 148), January 1975.

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