

# NBS Staff Participation in Outside Standards Activities

## 1979 HIGHLIGHTS

NBS Special Publication 573

## NATIONAL BUREAU OF STANDARDS

The National Bureau of Standards<sup>1</sup> was established by an act of Congress on March 3, 1901. The Bureau's overall goal is to strengthen and advance the Nation's science and technology and facilitate their effective application for public benefit. To this end, the Bureau conducts research and provides: (1) a basis for the Nation's physical measurement system, (2) scientific and technological services for industry and government, (3) a technical basis for equity in trade, and (4) technical services to promote public safety. The Bureau's technical work is performed by the National Measurement Laboratory, the National Engineering Laboratory, and the Institute for Computer Sciences and Technology.

**THE NATIONAL MEASUREMENT LABORATORY** provides the national system of physical and chemical and materials measurement; coordinates the system with measurement systems of other nations and furnishes essential services leading to accurate and uniform physical and chemical measurement throughout the Nation's scientific community, industry, and commerce; conducts materials research leading to improved methods of measurement, standards, and data on the properties of materials needed by industry, commerce, educational institutions, and Government; provides advisory and research services to other Government agencies; develops, produces, and distributes Standard Reference Materials; and provides calibration services. The Laboratory consists of the following centers:

Absolute Physical Quantities<sup>2</sup> — Radiation Research — Thermodynamics and Molecular Science — Analytical Chemistry — Materials Science.

**THE NATIONAL ENGINEERING LABORATORY** provides technology and technical services to the public and private sectors to address national needs and to solve national problems; conducts research in engineering and applied science in support of these efforts; builds and maintains competence in the necessary disciplines required to carry out this research and technical service; develops engineering data and measurement capabilities; provides engineering measurement traceability services; develops test methods and proposes engineering standards and code changes; develops and proposes new engineering practices; and develops and improves mechanisms to transfer results of its research to the ultimate user. The Laboratory consists of the following centers:

Applied Mathematics — Electronics and Electrical Engineering<sup>2</sup> — Mechanical Engineering and Process Technology<sup>2</sup> — Building Technology — Fire Research — Consumer Product Technology — Field Methods.

**THE INSTITUTE FOR COMPUTER SCIENCES AND TECHNOLOGY** conducts research and provides scientific and technical services to aid Federal agencies in the selection, acquisition, application, and use of computer technology to improve effectiveness and economy in Government operations in accordance with Public Law 89-306 (40 U.S.C. 759), relevant Executive Orders, and other directives; carries out this mission by managing the Federal Information Processing Standards Program, developing Federal ADP standards guidelines, and managing Federal participation in ADP voluntary standardization activities; provides scientific and technological advisory services and assistance to Federal agencies; and provides the technical foundation for computer-related policies of the Federal Government. The Institute consists of the following centers:

Programming Science and Technology — Computer Systems Engineering.

<sup>1</sup>Headquarters and Laboratories at Gaithersburg, MD, unless otherwise noted; mailing address Washington, DC 20234.

<sup>2</sup>Some divisions within the center are located at Boulder, CO 80303.

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# NBS Staff Participation in Outside Standards Activities, 1979 Highlights

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and Development  
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<sup>†</sup> *Special publication.*

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Jordan J. Baruch, Assistant Secretary for Productivity, Technology, and Innovation

1.5. NATIONAL BUREAU OF STANDARDS, Ernest Ambler, Director

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## Foreword

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This report is part of an ongoing effort to identify and appropriately recognize NBS staff contributions to the development of private sector and other government agency standards. This effort was intensified in 1975 after an in-house study of NBS' impact on U.S. standardization activities found that information on NBS staff standards activities was not well documented. As a result, a Standards Assistance and Management Information project was initiated to improve the flow of information from the standards committee participants to those with an interest in their activities.

Both NBS staff and outside groups will, I believe, be struck by the scope and extent of NBS' participation in and commitment to the successful functioning of the U.S. standards system. The NBS Organic Act and subsequent legislative and executive mandates have defined a role for the National Bureau of Standards in the U.S. standards system that can be broadly divided into two categories:

1. As the Nation's Central Measurement Reference Laboratory, NBS interacts with the system primarily as a provider of scientific and technical information and measurement knowhow; and
2. As a Major Federal Laboratory Applying its Technical Competence to the Solution of National Problems, NBS commonly expands its role as information provider and measurement technology advisor to take on standards initiator, coordinator, and promoter roles.

It is expected that NBS staff will find this report a source of useful information on the various NBS organizational elements concerned with monitoring committee participation and providing standards-related information. By improving NBS staff awareness of what their NBS colleagues are doing in the standards area, we intend to encourage more productive interactions and to discourage unnecessary duplication of effort.

In addition, we expect that this report will be of use to outside groups seeking NBS advice or assistance with regard to standards activities. The references to standards information activities and standards impact research may also be of interest.

In the future, we expect to continue strong support of the national standards system, and we look forward to the new roles NBS will assume as a result of two recent standards-related governmental actions. The first is the passage of the Trade Agreements Act of 1979 which implements the Multilateral Trade Negotiation (MTN) Agreements, including the Agreement on Technical Barriers to Trade. This legislation assigns new

responsibilities to the Standards Information Service which will become the national standards and certification information center called for in the MTN agreements.

The second action is the issuance of the Office of Management and Budget Circular on Federal Participation in the Development and Use of Voluntary Standards. NBS staff participated in the development of the original policy principles that formed the basis of the Circular and will continue to play an important role in its implementation and administration.

In many ways participation in standards activities is a difficult task. It is to the credit of NBS participants that they not only get things done within the system, as I think this report shows, but they accomplish them in a manner that earns the respect and praise of their peers. I am sure that NBS staff will continue to do an excellent job and make valuable contributions to the development of worthwhile and innovative standards.

Lawrence D. Eicher  
Director  
Office of Engineering Standards



## Acknowledgments

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Special thanks to Joan Koenig, Charlette Prather, and Paul Majewski of the Office of Standards Information, Analysis and Development, for their support and assistance in preparing this report. Thanks also to those individuals throughout NBS who provided information on their units' standards activities.





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## Abstract

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NBS uses a decentralized system for managing the participation of NBS representatives in outside standards committees activities. This type of management is governed by NBS policy; coordinated through standards offices in each NBS Major Organizational Unit; and monitored and supported by the Office of Standards Information, Analysis and Development (OSIAD).

This report summarizes NBS standards activities during calendar year 1979. It contains information on NBS staff participation on standards committees, highlights of significant technical and individual contributions made by NBS staff, a description of NBS standards management activities, and a directory of staff participating on committees.

For further information on NBS standards activities, contact OSIAD, National Bureau of Standards, Technology, B-166, Washington, D.C. 20234, (301) 921-2092.

Key words: Annual report; standards activities; standards information; standards participation.

## Introduction

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An important element of the National Bureau of Standards (NBS) mission is to assist in the development of standards for products, processes, and materials in cooperation with other government agencies and private organizations. The relationship which has developed over the years between NBS and the standards community has been mutually beneficial and rewarding. NBS, as the Nation's central reference laboratory for measurements in the physical sciences and engineering, contributes its technical expertise and leadership to standards activities. These activities, in turn, provide NBS with feedback on the Nation's measurement needs and serve as a valuable mechanism for disseminating the results of NBS research in such areas of national concern as energy conservation, environmental protection, health and safety, and consumer protection. There were 496 NBS staff members involved in outside standards activities in 1979, which represents 29 percent of NBS' professional, scientific, and technical staff.

This report summarizes NBS staff participation in outside standards activities during calendar year 1979. It contains statistics on NBS staff participation on standards committees, highlights of significant technical and individual standards contributions made by NBS staff, a description of NBS standards management activities and a directory of staff participating on committees.

## NBS Standards Management and Information Activities

NBS uses a decentralized system for managing the participation of NBS representatives in outside standards committees activities. This type of management is governed by NBS policy (Chapter 3.02, NBS Administrative Manual); coordinated through standards offices in each NBS Major Organizational Unit (MOU); and monitored and supported by the Office of Standards Information, Analysis and Development. Questions relating to NBS policy interpretation or development and standards activities coordination are reviewed by the NBS Standardization Advisory and Coordination Committee (SACC).

On April 18, 1978, SACC was established as a standing committee of the Bureau. The purpose of this committee is to ensure that:

- Bureauwide standards policies and practices are coordinated among the major organizational units;
- NBS standards participation is effective and efficient;
- Department of Commerce directives related to standards are appropriately incorporated into NBS guidelines; and
- Appropriate consideration is given to developments outside NBS that have implications for NBS management action and for staff participation in standardization activities.

Members of the SACC committee are selected by the NBS Director. The committee currently consists of four NBS voting members: Dr. Edward Brady, Chairman, Associate Director for International Affairs, Office of the Director; Dr. Arthur McCoubrey, Associate Director for Measurement Services, National Measurement Laboratory; Dr. Lawrence Eicher, Director of the Office of Engineering Standards, National Engineering Laboratory; and Mr. M. Zane Thornton, Deputy Director of the Institute for Computer Sciences and Technology. Mr. James E. French, Chief of NEL's Office of Standards Information, Analysis and Development, serves as Executive Secretary in a non-voting capacity. Mr. David Edgerly, Chief of NML's Office of Domestic and International Measurement Standards, serves as alternate Secretary.

## Information Activities

NBS technical work is carried out in three Major Organizational Units. Each of these units has a standards coordination office which monitors their respective standards activities: National Measurement Laboratory - Office of Domestic and International Measurement Standards; Institute of Computer Sciences and Technology - Standards Administration Office; and National Engineering Laboratory - Office of Standards Information, Analysis and Development (OSIAD).

NEL's OSIAD has the responsibility for collecting and disseminating information on all NBS staff participation in outside standards-writing activities. The Standards Assistance and Management Information (SAMI) project of OSIAD collects and disseminates needed information through a computerized data system to promote efficient participation by NBS staff members in standardization activities and to assist Bureau managers in making decisions about the allocation of NBS resources for these activities. SAMI services include:

- a directory of NBS memberships on U.S. and international engineering and measurement standards committees;
- presentation of seminars on topics of particular interest to standards committee participants; and
- development of routine and special reports for NBS committee participants, their managers, and others on the nature and extent of NBS participation in U.S. and international standards activities.

The Standards Impact Analysis (SIA) project of OSIAD stimulates and conducts research into the workings of the national and international standards system and the economic, social, legal, and other impacts of standardization. This program:

- identifies research needs in standardization and makes them known to the academic, economic, and standards communities;



- conducts or contracts for standards impact assessment and related research of specific interest to NBS programs and disseminates the findings to the NBS staff and others; and
- maintains close liaison with other NBS and outside groups involved in studies of standards systems worldwide and the impacts of standards. A reference collection of studies in this area is maintained.

Other NBS units involved in assessing impacts of standards include:

- the Applied Economics Group, Center for Building Technology (CBT). This group uses techniques such as benefit-cost analysis, life-cycle costing, and econometric analysis to evaluate building codes and standards. Research in this area includes economic analysis of standards and guidelines for making life-cycle cost evaluations of buildings. CBT economists interact with SIA staff and other NBS units in developing and publishing various research reports in these areas;
- NBS' Planning Office, Office of the Associate Director for Programs, Budget, and Finance, sponsors research and analysis to identify the need for domestic and international standardization and to assess the broad economic impacts of standardization. The Planning Office staff works closely with NBS staff and outside individuals to provide information which can be used to assist in determining the allocation of funds among competing programs within the Bureau; and
- the Institute for Computer Sciences and Technology (ICST) is responsible for developing Federal automatic data processing (ADP) standards for Federal agency use. A long-range plan adopted by ICST establishes priorities for the development of needed ADP standards and guidelines, and provides for studies of standards' impact and for forecasts of computer technology trends. ICST's Program Development Office works with Federal agency ADP and computer industry officials to identify the need for standards, set priorities based on needs, collect and evaluate data on standards usage by Federal agencies, and study the impact of standards on agencies and the computer industry. The information developed is used to develop timely and technically sound future standards and to assess existing standards for their continued usefulness.

The Standards Information Service (SIS) of OSIAD provides up-to-date information on published standards and standardization activities to NBS staff and the public. By means of a computer produced Key-Word-In-Context Index, SIS can answer questions dealing with existing U.S. standards. SIS maintains a reference collection of engineering and related standards, which includes over 240,000 standards, specifications,

test methods, codes and recommended practices issued by U.S. technical societies, professional organizations, and trade associations; State purchasing offices; U.S. Government agencies; and foreign national and international standardizing bodies. The collection also contains over 300 reference books; articles, pamphlets, reports and handbooks on standardization; 150 periodicals and newsletters; and the Visual Search Microfilm Files on selected national and international standards.

## Standards Committees Participation and Travel

Memberships in standards-writing activities totaled 1,664 (1,487 U.S. and 177 international) during 1979. NBS staff participate in such organizations as the American National Standards Institute, the American Society for Testing and Materials (ASTM), the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, and the International Organization for Standardization. The most memberships are held in ASTM. Committee members traveled a combined total of approximately 3,861 days in 1979 to attend committee meetings and/or conferences. Specific details on participation and travel are discussed later in this report.

The major interest areas of committee participation in 1979 corresponded with NBS research in solar and other energy, fire, materials, radiation, electronics, computers, nondestructive testing, erosion, temperature measurements, ultrasonic testing, economics, acoustics, and law enforcement.

## NBS Organizational Units Referenced in This Report

The following abbreviations of NBS organizational units are used throughout this report:

OD	Office of the Director
OADPBF	Office of the Associate Director for Programs, Budget, and Finance
DAIS	Office of the Director of Administrative and Information Systems
NML	National Measurement Laboratory
ONDE	Office of Nondestructive Evaluation
OSRM	Office of Standard Reference Materials
OSRD	Office of Standard Reference Data
DMS	Directorate of Measurement Services
OWS	Office of Weights and Measures
CAPQ	Center for Absolute Physical Quantities
CRR	Center for Radiation Research
CTMS	Center for Thermodynamics and Molecular Science
CAC	Center for Analytical Chemistry
CMS	Center for Materials Science
ICST	Institute for Computer Sciences and Technology

CPST	Center for Programming Science and Technology
CCSE	Center for Computer Systems Engineering
NEL	National Engineering Laboratory
CAM	Center for Applied Mathematics
CEEE	Center for Electronics and Electrical Engineering
CMEPT	Center for Mechanical Engineering and Process Technology
CBT	Center for Building Technology
CFR	Center for Fire Research
CCPT	Center for Consumer Product Technology
OES	Office of Engineering Standards





## Individual Highlights

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In 1979, NBS staff received various awards for significant contributions to standards development. Many staff members were appointed to chair committees and to serve as delegates to international standards organizations. Individuals are listed alphabetically by MOU.

### Office of the Director

Dr. Ernest Ambler, NBS Director, served as a member of the Board of Directors of the American National Standards Institute (ANSI). ANSI is the nationally recognized coordinator of voluntary standards development, the clearinghouse for verification of national consensus and represents the standards position of the United States in the international non-treaty standards organizations, ISO and IEC. Dr. Ambler served as the U.S. delegate to the 16th General Conference on Weights and Measures (CGPM). The CGPM, established by the Treaty of the Meter, is held every four years to review activities of the International Bureau of Weights and Measures (BIPM) and the International Committee for Weights and Measures (CIPM). Dr. Ambler also chaired the Consultative Committee for Measurement Standards of Ionizing Radiation at the International Bureau of Weights and Measures. Under Dr. Ambler's leadership many intercomparisons of radiation standards have been carried out. These intercomparisons have played a major role in assuring the accuracy and uniformity of worldwide measurement of ionizing radiations.

### National Measurement Laboratory

John Barnes, CMS, was asked to serve as chair of ASTM F2.30.01, under Subcommittee F2.30, Test Methods, Flexible Barriers Materials.

Brian Belanger, DMS, was appointed chair of ASTM E46.91 Subcommittee, Interface. This responsibility includes channeling requests for assistance from other ASTM committees to the proper subcommittees in ASTM Committee E46, Quality Systems.

Harold Berger, ONDE, was selected chair of ASTM Subcommittee E7.91, U.S. Technical Advisory Group for ISO/TC 135, Non-Destructive Testing.

Dr. Randall Caswell, CRR, was elected secretary of the International Commission on Radiation Units and Measurements.

Dr. Ronald Eby, CMS, was selected as chair of ASTM Committee D20 on Plastics. This committee concentrates on the development of standards for plastics, their raw materials, components, compounding ingredients, and finished products made from plastics.

Dr. William Gerhold, CMS, was appointed chair of ASTM Committee A5 on Metallic-Coated Iron and Steel. This committee focuses on standards for iron and steel products protected against corrosion by use of metallic coatings.

Dr. Lewis Gevantman, OSRD, was selected as secretary of the International Union of Pure and Applied Chemistry C.05.8 Committee on Solubility.

William Harris, CMS, received the 1978 Arnold H. Scott Award from ASTM Committee D9 on Electrical Insulating Materials. Harris was cited for his outstanding achievement in the field of electrical insulation technology.

Dr. John Herron, CTMS, was asked to serve as chair of the task group on Atmospheric Transport and Transformation under ASTM Subcommittee work group E35.21.02, Environmental Chemistry-Fate Modeling.

Dr. Harry Hertz, CAC, was selected as a member of the Board of Directors for the National Committee for Clinical Laboratory Standards (NCCLS). The 12-member Board oversees the operations of the Committee, a non-profit educational organization devoted to establishing laboratory standards for the improvement of clinical medicine.

Dr. John Mandel, NML Headquarters, received the Award of Merit by ASTM for "outstanding performance and dedication, at the highest level of excellence and integrity, to the development and advancement of the voluntary standardization of statistical methodology useful in evaluating measurement processes and interpreting experimental test results."

Dr. Leonard Mordfin, ONDE, was appointed chair of ASTM Subcommittee E28.13 on Residual Stress Measurement.

Dr. John Taylor, CAC, was re-elected to a second three-year term as chair of ISO Technical Committee 147, Water Quality. He also serves as the U.S. representative on Subcommittee 3, Ambient Measurements, of ISO Technical Committee 146, Air Quality.

Dr. Charles Tilford, CTMS, was appointed chair of the American Vacuum Society Subcommittee on Gages.

Otto Warnlof, OWM, was appointed secretary of the U.S. National Working Group on Electronics Associated with Weighing Systems, of OIML Pilot Secretariat 7/Reporting Secretariat 2, dealing with general questions relating to the measurement of mass.

## EDWARD BENNETT ROSA AWARD

The Rosa Award recognizes outstanding achievements in the development of meaningful and significant standards of practice in the measurement field. The award is named after Dr. Edward B. Rosa, a physicist, who set the pace for the high level of achievement in the early years of the Bureau.

In 1979, the award was presented to Louis Costrell, Center for Radiation Research, National Measurement Laboratory. The superior achievements of Costrell in the development of standards for electronic instrumentation have had a significant national and international impact on the design of modular instruments now used in nuclear physics, high energy physics and related areas.

## **Institute for Computer Sciences and Technology**

John Berg, CPST, was selected as chair of the ANSI X3/SPARC (Standards Planning and Requirements Committee) Data Base Systems Study Group. The Group is chartered to develop an overall plan for data base standards within ANSI, to provide liaison between the related projects in X3 subcommittees, and to develop and provide U.S. representation in the International Organization for Standardization data base working group of Technical Committee 97, Computers and Information Processing.

William Burr, CCSE, was appointed chair of an ad hoc working group within ANSI X3.T9, I/O Interface, to develop a plan of work for the development of future interface standards. He is now an active participant in this effort, which is expected to lead to a new generation of computer interface standards, hopefully developed for adoption as an American National Standard as well as a Federal Information Processing Standards Publication.

Michael Hogan, CCSE, was asked to serve as Chief Delegate for the U.S. in the ISO TC97 Subcommittee 11, Flexible Magnetic Media for Digital Data Interchange.

## **National Engineering Laboratory**

Dr. Merritt Birky, CFR, was appointed chair of a Task Group of ASTM Committee E5.21 on Smoke/Toxicology, to develop a combustion toxicity test method.

Dan Chwirut, CMEPT, was appointed chair of ASTM Work Group E7.06.06 on Ultrasonic Immersion Testing and serves as secretary for ASTM Work Group E7.06.01 on Ultrasonics Glossary. Both of these groups fall under ASTM Committee E7, Nondestructive Testing, Subcommittee .06, Ultrasonic Testing Procedure.

Myron Crawford, CEEE, received a Certification of Achievement from the Institute of Electrical and Electronics Engineers' Electromagnetic Compatibility Society for his "outstanding contribution" in the development of the transverse electromagnetic (TEM) cell as an electromagnetic compatibility test device. As a result of Crawford's work, use of the TEM cell is now growing to widespread use by Government and industry as a means of testing electronic products and components for susceptibility to electromagnetic interference.

William Cullen, OES, was appointed by the ASTM Committee on Standards (COS) as chair of an ad hoc committee to consider basic policy and accompanying guidelines for the use of specific precautionary statements in standards. COS is a standing committee of the ASTM Board of Directors. Cullen was also elected as chair of the RILEM Technical Activities Committee .

Robert Dikkers, CBT, received the Department of Commerce Silver Medal for "significant contributions for the development of national performance criteria and standards for solar energy systems."

Dr. Larry Eicher, OES, was elected a member of the International ISONET Management Board for a three-year term, 1979-81. ISONET is the information network for the International Organization for Standardization.

Daniel Flynn, CMEPT, was asked to serve as chair of ANSI Committee S1, Acoustics. The scope of this committee is "standards, specifications, methods of measurement and test, and terminology in the fields of physical acoustics, including noise, architectural acoustics, electroacoustics, sonics and ultrasonics, and underwater sound, but excluding those aspects which pertain to safety, tolerance and comfort."

Dr. Jeffrey Fong, CAM, served as editor of the widely acclaimed ASTM Special Publication 675, Fatigue Mechanisms, published in 1979. The document contains material from a three-day symposium sponsored by ASTM, NBS and the National Science Foundation. Topics such as physical characteristics of fatigue damage, striations, voids, and microcracks, and time-dependent damage are discussed. Fong also accepted a three-year term appointment as chair of the Materials and Fabrication Operating Committee of the Pressure Vessel and Piping Division of the American Society of Mechanical Engineers.

James French, OES, was appointed by the Instrument Society of America to serve on its Standards and Practices Board which oversees the management and direction of ISA standards-writing activities.



Dr. Clayton Huggett, CFR, was appointed to the National Fire Protection Association Standards Council, which is responsible for the administration of NFPA standards development activities.

Sam Kramer, NEL Headquarters, was selected as NBS representative on ANSI's Acoustical Standards Management Board.

Esher Kweller, CCPT, was selected as chair of ASHRAE Technical Committee TC6.4 on In Space Convective Heating.

Dr. Harold Marshall, CBT, was selected as chair of a new ASTM Subcommittee E6.81 on Building Economics, under ASTM Committee E6 on Performance of Building Construction.

Dr. Victor Nedzel'nitsky, CMEPT, was selected as chair of ANSI Work Group S1.54, Standard Microphones and Their Calibration. Nedzel'nitsky is directing the development of a standard method, based in large part upon his research at NBS, for pressure calibration of 1/2 inch laboratory condenser microphones, coordinating the revision of the existing standard reciprocity calibration of microphones, and coordinating liaison between ANSI S1.54 and the parallel work being done internationally under IES TC29, Electroacoustics.

Dr. David Pallett, CMEPT, was appointed as chair of the new ANSI Work Group S1.76, Reference Sound Sources, under ANSI Committee S1, Acoustics. This group is charged with preparing an ANSI standard for characterization and calibration of reference sound sources, providing liaison with the ISO Technical Committee 43, Acoustics, which is also working on a similar standard, and exploring possible causes for the systematic differences that have been observed between sound power level determination in a reverberation chamber and those in a free field.

Dr. Julius Persensky, CCPT, was appointed chair of ANSI Subcommittee Z535.04, Product Alerting, under ANSI Committee Z535, Safety Signs and Colors.

Dr. Edward Pfrang, CBT, was appointed as chair of the American Concrete Institute's Technical Activities Committee. This committee is responsible for the management of all technical activities of the Institute. It coordinates the technical content of all Institute standards and publications as well as convention programs.

Clinton Phillips, CMEPT, was elected Vice President of ASHRAE. As part of this role, Phillips coordinated the society's standards committees and research and technical committees.

Brian Pierman, CBT, was appointed secretary of the newly formed ANSI Committee Z535, Safety Signs and Colors. This new committee is a reorganization of two existing ANSI committees on safety colors and signs and added functions to standardize symbols and product alerting. It effectively combines various aspects of safety alerting and ensures consistency among previously separate ANSI standards.

Tom Proctor, CMEPT, was asked to serve as chair of ASTM Work Group E28.13.05 on Measurement of Residual Stress by Ultrasonic Methods, under ASTM Committee E28, Mechanical Testing, Subcommittee .13, Residual Stress Measurement.

Robert Scace, CEEE, was appointed vice chair of ASTM Committee F1, Electronics. Scace also provides liaison between F1 and the Semiconductor Equipment and Materials Institute (SEMI). In this capacity, Scace has made substantial contributions to the Book of SEMI Standard which, through his efforts, now incorporates the ASTM Committee F1 published standards. Scace has also made major contributions to the development of SEMI standard terminology. Scace also serves as liaison between F1 and the West German Standards organization, Deutsches Institut für Normung (DIN), Committee NMP221 (Normenausschuss Materialprüfung) on Testing of Materials for Semiconductor Technology. Concerns of NMP 221 of interest to ASTM F1 include particulate contamination in process chemicals used in semiconductor industry and definitions relating to semiconductor process technology.

William Slattery, OES, was named 1979 Outstanding Section Member of the Washington Section of the Standards Engineers Society. Slattery also received the ANSI Meritorious Service Award in recognition of his work in building and managing the NBS Standards Library and Standards Information Service.

Dr. Harold Van Cott and Walter Leight, CCPT, were selected as chair and vice chair, respectively, of the Human Factors Subcommittee of the Systems Safety Society. Van Cott and Leight are assisting in the cooperative effort of the System Safety Society and the Human Factors Society to specify engineering and human factors "good practice guidelines" for safety standards.

Dr. James Wright, NEL Headquarters, was elected as Vice President of the International Union of Testing and Research Laboratories for Materials and Structures (RILEM). Although RILEM is not a standardization body, the technical information developed in the technical committees is becoming increasingly more important as input to international standards. The input is generally through a "RILEM RECOMMENDATION" which is one of the final products of a technical committee. These Recommendations are submitted to the appropriate committee of the International Organization for Standardization



(ISO). Wright also served on the ASTM Board of Directors. He participated in the work of the Board's Committee on Society Development (CSD) and Technical Committee Activities. He was named chair of a task group reporting to the CSD subcommittee on long-range planning and played a leadership role in the development of a systematic approach to ASTM's long-range planning process.

Dr. Felix Yokel, CBT, was selected as chair of American Society of Civil Engineers' Committee on Foundation and Excavation Standards. This committee is preparing standards on pile and pier foundations, shallow foundations, excavation and site exploration.



## Technical Highlights

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These significant highlights were selected by the Major Organizational Units as representative of their various research areas and do not reflect all of NBS' standards activities.

### OFFICE OF THE DIRECTOR

Dr. Ernest Ambler, NBS Director, served as a member of the Board of Directors of the American National Standards Institute (ANSI). During the past year, the ANSI Board has dealt with a number of significant issues facing the U.S. Voluntary Standards System including the endorsement and approval of the National Policy on Standards for the United States prepared by the National Standards Policy Advisory Committee (NSPAC), and the ANSI International Standards Policy. In addition, the ANSI Board has approved the establishment of a new ANSI service fee system which is expected to improve ANSI's ability to meet growing demands for standards coordination on both the national and international levels.

### Associate Director for International Affairs

On May 8, 1979, Assistant Secretary of Commerce Jordan Baruch and Chinese State Bureau of Metrology Director Li Cheng Ting signed an agreement for cooperation in the fields of metrology and standards. The agreement calls for Chinese scientists to be stationed for periods of six months to two years in the NBS laboratories and for exchange visits of appropriate officials of the two institutions.

An NBS group consisting of Dr. Edward Brady, Associate Director for International Affairs; Dr. Harry Ku, Chief, Statistical Engineering Division, Center for Applied Mathematics; Mr. Raymond Kammer, Associate Director for Programs, Budget and Finance; and Mr. Ted Schell, Department of Commerce, visited China on April 23-May 9, 1979 to meet with Chinese officials. Cooperation in metrology and standards will contribute considerably toward harmonizing standards for international trade between China and the U.S., as well as the quantitative measurements on which such trade depends.

### OFFICE OF THE DIRECTOR OF ADMINISTRATIVE AND INFORMATION SYSTEMS

#### Library Division

In February 1978, the Council of National Library Associations, which furnishes the Secretariat for ANSI Committee Z39, Library Work Documentation and Related Publishing Practices, asked NBS to provide working space for the Executive Director of the Committee. Patricia M. Berger, Chief of the NBS Library Division, arranged for a permanent office in the NBS library in February 1979.

ANSI Committee Z39 works on standardization relevant to information systems, products, and services as they relate to library operations, information dissemination, and information and data handling systems. Internationally, Z39 participates in the work of International Organization for Standardization (ISO) Technical Committee 46, Documentation, to develop standards for librarianship, documentation and related information handling, including information systems and interchange networks as applied to documentation.

#### Instrument Shops Division

The NBS Instrument Shops Division performed measurements of sample continuous business forms in connection with a proposed draft standard for ANSI Committee X4, Office Machines and Supplies, Subcommittee A7. The scope of the standard covers continuous form sizes used in processing paperwork documentation over keyboard driven and/or automatic business machines, and also specifies the sprocket feed holes and margins to encourage uniformity in practice. The data results will eventually be released to the U.S. forms industry through publications distributed by the International Business Forms Industries. The data will be used for the preparation of tolerance profiles on critical dimensions on a business form for development of a draft U.S. Continuous Form Standard by ANSI Subcommittee X4.A7.

### NATIONAL MEASUREMENT LABORATORY

#### Associate Director for Programs/Directorate for Measurement Services

Based on the initiative of the Office of Weights and Measures, and with support of U.S. industry, the U.S. successfully established a new committee in the International Organization of Legal Metrology (OIML) concerned with requirements for electronics associated with weighing systems. This new committee, chaired by the U.S., will propose an international standard addressing the means for evaluating the performance of weighing systems equipped with electronic components.

In carrying out NBS' assigned task of managing U.S. participation in OIML, the Office of Domestic and International Measurement Standards (ODIMS) plans and directs a variety of activities intended to maintain an effective U.S. presence in OIML. During 1979, NBS participated in the review of 36 proposed OIML International Recommendations covering a wide variety of measuring instruments and including several very basic metrological subjects such as physical standards, calibration of instruments and measurement uncertainty. With the cooperation of other government agencies (Federal and State) and private industry, NBS identified significant differences between current U.S. measurement practices and those proposed in the OIML Recommendations. These differences are considered significant impediments and warrant continued

U.S. efforts to ensure that the final Recommendations will be acceptable to the U.S. The following subject areas were reviewed by NBS: fluid meters, pressure gages, barometers, gas calorimeters, load cells, materials testing machines, and strain gages.

The Office of Measurement Services worked with ASTM headquarters staff preparing an expanded NBS/ASTM collaboration plan including four joint areas of interest:

- 1) NBS participation in ASTM committees;
- 2) Accelerated development of the Measurement Assurance Program (MAP) services working with ASTM Subcommittee E20.03, Resistance Thermometers, to explore MAP approaches to industrial grade platinum resistance thermometry;
- 3) Legal Metrology - through the formation of new ASTM committees, ASTM might facilitate the preparation of U.S. positions to be incorporated into the OIML standards writing process; and
- 4) Alternatives to NBS calibration services - the possibility of generating ASTM standard test methods incorporating calibration methods used by NBS will be explored, so that other laboratories would be able to perform calibrations with a quality comparable to those performed by NBS.

#### Center for Absolute Physical Quantities

In response to the increased demand for industrial platinum resistance thermometers (PRT), the Resistance Thermometry Subcommittee of the ASTM E20, Temperature Measurement, has issued a standard for testing these thermometers. In cooperation with ASTM, NBS' Center for Absolute Physical Quantities initiated a round robin involving more than 20 industrial testing laboratories in order to obtain repeatability and reproducibility data for the new standard. The first data showed considerable scatter in the accuracy levels of the participating laboratories, indicating the need for a Measurement Assurance Program (MAP) in industrial PRT measurement. The Center is registering participants for this new MAP which will provide a significantly improved measurement base for the new thermometers. Dr. George Furukawa serves as secretary for the subcommittee.

In cooperation with ASTM Subcommittee E20.08, Medical Thermometry, the Center developed three proposed standards. Two of the standards, Precise Temperature Measurement in the Clinical Laboratory and Electronic Fever Thermometers, were based on NBS research. The third, Liquid in Glass Clinical Thermometers, is a revision of an earlier standard written by NBS staff.



### Center for Radiation Research

The Center for Radiation Research (CRR) played a key role in the development by ASTM Committee E7, Nondestructive Testing, of a new image quality indicator (IQI) for assessing industrial radiographic film capability. This device, sometimes referred to as the "Splettstosser plaque," is a multihole plaque-type "penetrameter" which also offers promise for quantitative evaluations of other parts of the x-ray image-forming system. The Center also helped in developing an ASTM radiographic standard for measuring image quality response of industrial x-ray film.

The Office of Radiation Measurement published a revised standard for the design and operation of particle accelerators as Handbook 107, American National Standard N43.1: Radiological Safety in the Design and Operation of Particle Accelerators. The Office serves as Secretariat to ANSI Committee N43, Equipment for Non-Medical Radiation Applications, with Elmer Eisenhower serving as committee chair. Dr. Wilfrid Mann chaired the National Council on Radiation Protection and Measurements committee which prepared and published NCRP Report No. 58, A Handbook of Radioactivity Measurements Procedures. Ten CRR scientists contributed to this report.

### Center for Analytical Chemistry

During 1979, the Center for Analytical Chemistry (CAC) drafted two standards for ASTM: Standard Practice for Collaborative Testing Methods for the Chemical Analysis of Sediments and Standard Practice for Treatment of Sediment Samples Prior to Chemical Analysis. Extensive laboratory work is being carried out to develop methods for the analysis of leachates from solid waste.

### Center for Thermodynamics and Molecular Science

The Center for Thermodynamics and Molecular Science participated in a round-robin testing program on Refuse Derived Fuels (RDF)-3, in support of ASTM Committee E38, Resource Recovery. Three series of round-robin tests on RDF-3 were carried out for various areas such as total chlorine, air-dry moisture, residual moisture, and soluble chloride oxygen difference. The round robin data revealed that calorific values (on a moisture-ash-free basis) yield a lower standard deviation by a factor of two to three when based upon the ash residue found in the bomb after calorimetric measurements than when based upon the separate ash content determination carried out on a "twin" sample. As a result of these findings, an alternative test procedure for the determination of ash content of RDF-3 was developed based upon the ash residue found in the bomb after a combustion experiment. This test procedure was submitted to ASTM Subcommittee E38.01, Energy, for consideration.

## Center for Materials Science

Two standards were prepared by the Center for Materials Science (CMS) for the ASTM Committee E38, Resource Recovery: Standard Methods of Test for Municipal Ferrous Scrap and Standard Specifications for Municipal Ferrous Scrap. The data base for the first standard methods was developed in a technical paper prepared by James Early.

The Center continues to assist ASTM Committee D20, Plastics, and F2, Flexible Barrier Materials, in developing improved standards for characterizing the barrier properties of plastic materials. A new standard method for the coulometric determination of oxygen gas transmission rates references NBS Standard Reference Material 1470, polyester plastic film for oxygen gas transmission, as its primary calibration standard. NBS is leading a task group formed to revise ASTM Standard D1434, Test for Gas Transmission Rate of Plastic Film and Sheeting, which is the classical method for the manometric and volumetric determination of gas transmission properties.

In the area of electromagnetic nondestructive evaluation, a new theoretical model needed by ASTM Subcommittee E7.03, Magnetic Particle and Penetrant Testing, was developed by CMS to describe magnetic leakage fields and their relation to the formation of particle indications on the much used ASTM magnetic particle test ring. The model points the way to providing a quantitative standard practice for transferring observations on the ASTM test ring to results on actual parts.

Wear and solid particle erosion work is underway by CMS on two test methods in support of ASTM Committee G2, Erosion and Wear. The first test method is concerned with the abrasive wear of materials. The ASTM dry sand/rubber wheel (DS/RW) abrasion test addresses a form of wear that is probably one of the most costly and prevalent. The Center contributed to writing the test method, as well as providing round robin testing and test procedure improvements. The second method concerns solid particle erosion testing of materials. A draft standard was developed and two cycles of round robin measurements were completed. A standard reference material (1020 steel) is being developed in this project for use with the method for the first time. These efforts should lead to a greatly improved measurement capability for wear and erosion and encourage the development of improved wear-resistant metals.

In the area of glass reclamation, the Center is cooperating with ASTM Committee E38, Resource Recovery, the glass industry, and reclamation facilities to write test procedures that assess the usefulness of recovered glass principally for reuse in container manufacture. A test that yields acceptable precision levels for refractory analysis in measured glass was developed for and accepted by Committee E38.



## INSTITUTE FOR COMPUTER SCIENCES AND TECHNOLOGY

The NBS Federal Information Processing Standards Publication (FIPS PUB) series is the official publication relating to standards adopted and promulgated under the provisions of legislative and executive mandates. These mandates have given the Secretary of Commerce important responsibilities for improving the utilization and management of computers and automatic data processing systems in the Federal government. To carry out the Secretary's responsibilities, NBS, through the Institute for Computer Sciences and Technology (ICST), provides leadership, technical guidance, and coordination of government efforts in the development of technical guidelines and standards in these areas. In 1979, several FIPS PUBs were published in support of this activity.

### Center for Computer Systems Engineering

Three Federal computer standards that will help the U.S. Government cut the costs of new computer peripheral equipment were approved by the Secretary of Commerce. The standards apply to the input/output channel level interfaces of all medium and large scale computer systems procured by the government. The standards were published in February 1979 as: FIPS PUB 60, I/O Channel Level Interface, which defines the mechanical, electrical, and basic functional specifications of the channel level interface; FIPS PUB 61, Channel Level Power Control Interface, which defines the channel interface for power sequencing of peripheral equipment; and FIPS PUB 62, Operational Specifications for Magnetic Tape Subsystems, which defines the use of the channel level interface for connection of magnetic tape peripheral equipment. The new standards will enable Federal agencies to procure magnetic tape peripheral equipment in a fully competitive manner. The Government expects to save \$61 million over the next five years through use of these standards.

The Computer Performance Evaluation Users Group (CPEUG), an organization sponsored by NBS to promote the development of standards and guidelines in the area of automatic data processing resource acquisition and control, held its annual meeting on October 15-19, 1979. The Conference theme was "The Expanding Role of Computer Performance Evaluation." The conference concentrated on the use of performance evaluation in such areas as installation management, computer system acquisition, and improved performance tools and techniques.

In 1979, the Magnetic Media Group continued to support the national and international activity concerned with standards for flexible magnetic media for digital data interchange by acting as the sole, worldwide source for signal amplitude response computer tape, Standard Reference Material (SRM) 3200. Similarly, NBS is

the sole, worldwide source for SRM 3216, which supports an ANSI standard for digital cartridge and SRM 1600, supporting an ANSI standard for digital cassette. A new high-density reference computer tape, SRM 6250, is under development. NBS has sent a sample tape to both ISO and ANSI X3, Computers and Information Processing, Subcommittee B1, participants for use in round robin testing to allow both ANSI and ISO to agree on signal amplitude interchange levels for common, worldwide data interchange for this type of data.

#### Center for Programming Science and Technology

The Federal Data Encryption Standard developed and published as FIPS PUB 46, was adopted in 1979 by the American National Standards Institute as an industry standard. FIPS 46 describes a cryptographic algorithm which can be used in many applications for the protection of digital data. The algorithm, created by IBM Corporation, was submitted to NBS during the standard's development process. Nine different devices implementing the algorithm have been validated by NBS as complying with the standard. The devices are presently being used to protect information in computer networks, on satellite data channels, in telephone circuits, and in facsimile applications.

#### NATIONAL ENGINEERING LABORATORY

#### Center for Electronics and Electrical Engineering

In 1979, the Center for Electronics and Electrical Engineering (CEEE) continued to provide the liaison officer between the West German standards organization, Deutsches Institut für Normung (DIN), Committee NMP 221 (Normenausschuss Materialprüfung) on Testing of Materials for Semiconductor Technology and ASTM Committee F1 on Electronics. Concerns of NMP 221 of interest to ASTM F1 include particulate contamination in process chemicals used in semiconductor industry and definitions relating to semiconductor process technology. Robert Scace serves as liaison between ASTM F1 and DIN and also between ASTM F1 and the Semiconductor Equipment and Materials Institute (SEMI). The liaison function with SEMI is valuable as it provides a mechanism through which test methods of importance to the semiconductor industry can be identified to the committee, thus enhancing the effectiveness of the committee by providing a measure of assurance that committee output is needed and will be used. The liaison function with DIN provides a mechanism for assuring that standards concerned with the same or very similar test methods have the same technical base.

In cooperation with ASTM F1, Electronics, CEEE conducted round robin evaluations of the following test methods: Methods of Measurement of Common-Emitter D-C Current Gain of Junction Transistors; Standard Test Methods for Transistor Collector-Emitter Saturation Voltage; Standard Method for Measuring MOSFET Linear Threshold Voltage; and Standard Method for Measuring MOSFET Saturated Threshold Voltage.

The Center participated in the following activities in connection with the Electronic Industries Association, Solid State Products Division, Joint Electron Device Engineering Council Committees:

- under JC-13.1 on Government Liaison for Discrete Semiconductor Devices, CEEE staff prepared drafts of the following documents- Proposed MIL-STD-750, Test Method 4081.2, Thermal Resistance of Lead-Mounted Diodes and MIL-STD-750, Test Method XXXX (undesignated), Thermal Response Measurements for Die Attachment Evaluation;
- under JC-13.2 on Government Liaison for Microelectronic Devices, a draft was prepared of MIL-STD-883, Proposed Revision of Method 1012, Thermal Characteristics;
- under JC-22 on Rectifier Diodes and Thyristor, CEEE is conducting round-robin evaluation of the Turn-Off Time Measurements of High-Power Thyristors test method and organizing the round-robin evaluation of the Reverse Recovery Time of Rectifier Diodes test method;
- under JC-25 on Low Frequency Power Transistors, CEEE is conducting round-robin evaluations of Transistor Gain-Bandwidth Product, Temperature Measurement of Power MOSFETS, and Thermal Resistance of Darlington Power Transistors test methods.

#### Center for Mechanical Engineering and Process Technology

A significant part of the Center for Mechanical Engineering and Process Technology's (CMEPT) research results are used in writing and updating documentary standards. This is particularly true of Standard Recommended Practice of ASTM in the area of ultrasonic and acoustic emission nondestructive testing. ASTM Document E127.5 on aluminum ultrasonic reference blocks is being revised, based in substantial part on technical data from research conducted by NBS. In addition, CMEPT participated in three round robins on aspects of this document.

ASTM Document E664 on ultrasonic measurement of apparent attenuation benefited from technical data supplied by NBS and was partly authored by NBS staff. The document received final ASTM approval in 1979. In addition to coauthoring the ASTM document on ultrasonic attenuation, Dan Chwirut authored the ASTM Proposal Document, "Recommended Practice for the Detection and Evaluation of Discontinuities by the Immersed Pulse-Echo Ultrasonic Method Using Longitudinal Waves." The Center is participating in four ASTM round robins dealing with ultrasonic testing and is the pilot lab in an international intercomparison of ultrasonic power measurements, an effort organized through International Electrotechnical Commission meetings.



On December 6-7, 1979, CMEPT hosted the 1979 Meeting of ANSI Committee B46, Surface Texture, where NBS presented a proposal for restructuring the B46 standard so that it couples more naturally with the corresponding international standard.

On September 17-21, 1979, CMEPT hosted the 53rd meeting of ANSI Subcommittee X3J7, a group that is involved with the standardization of the APT (Automatically Programmed Tools) computer language used for the numerical control of machine tools. The committee has begun identifying new APT language that will be required for the use of APT with two new technologies: design graphics systems and industrial robot manipulators. Recent new work in Subcommittee X3J7 involves language extensions for sensory based control of automation equipment where exact data values are not known until the time of manufacturing. The September meeting made clear the similarities of interest of the machine tool and robot communities in APT language to handle what can be called "realtime" data.

Joseph Richmond coauthored NASA Technical Memorandum 79682, Spectral Distribution of Solar Energy at Ground Level, which includes tables of terrestrial solar spectral irradiance for seven air mass values and four levels of atmospheric contamination. This will contribute to the development of a Standard Terrestrial Solar Spectral Irradiance, which is badly needed for use in computing values of solar properties of materials used as absorbers, concentrating mirrors and cover plates in solar energy systems. Three groups are now working on the development of such a standard: ASTM Committee E44, Solar Energy Conversion, a group at the Solar Energy Research Institute sponsored by the Department of Energy, and a committee of the International Commission on Illumination. Richmond is actively participating in the work of each of these groups and is providing liaison between them.

#### Center for Building Technology

The Center for Building Technology (CBT) holds the Secretariat of the ANSI Committee A58, Building Code Requirements for Minimum Design Loads in Building and Other Structures. Dr. Bruce Ellingwood serves as secretary for this committee. Activities of the committee involve revising the current version of the A58 standard to incorporate new information on building technology and loads research. Some of the revisions are based on live and wind loads research conducted at or funded by NBS. The A58 Committee is working to develop general loading criteria suitable for use with different construction technologies using the concept of probabilistic limit states design. A group of experts met at NBS for two months in the summer of 1979 as part of an NBS project to prepare draft load criteria. The criteria are currently under review by A58 personnel, and, if adopted, will do much to harmonize the design process in the U.S.

On April 26, 1979, CBT hosted the 4th meeting of Subcommittee 2 of the Interagency Committee on Seismic Safety in Construction. The subcommittee is charged with developing seismic design standards for Federal building construction and is responsible for preparing the draft standard for consideration by the committee. The subcommittee will also be developing a procedure for periodically reviewing the standard for the purpose of improvement.

In support of ASTM Subcommittee E6.23, Durability Performance of Honeycomb Sandwich Panels for Tactical Shelters, CBT is conducting research to evaluate a new brittleness tester for honeycomb panels. Dr. Geoffrey Frohnsdorff chairs this committee and several Center staff members provided input into four draft standards currently under review.

Douglas Burch serves on ASHRAE Standards Committee SPC 101P, which wrote a draft standard entitled "Application of Infrared Sensing Devices to the Assessment of Building Heat Loss Characteristics." Burch developed much of the technical rationale used to develop the requirements and guidelines included in the standard. The purpose of this standard is to provide instrument requirements and guidelines for carrying out infrared measurements which will insure the detection of thermal defects in the envelopes of buildings. The standard includes four types of survey: interior and exterior imaging; aerial line scanning; spot radiometers; and interior line scanning.

ASTM Subcommittee E6.41, Infiltration Performances, completed its first recommended practice on air infiltration measurement using the tracer-gas method in response to a need raised by development of building energy performance standards. Since early in the inception of the SF<sub>6</sub> tracer-gas method for measuring building air leakage rates, Dr. C. Max Hunt has pioneered in the development of application techniques. Dr. Hunt also prepared the second draft of the ASTM standard.

The Center has been instrumental in organizing new ASTM Subcommittee E6.81, Building Economics, established in April 1979, as part of ASTM Committee E6, Performance of Building Constructions. The subcommittee is developing standards that will serve as guidelines for making building-related decisions based on economic analysis. It is developing standard definitions of economic evaluation techniques and terms, recommending techniques for economic evaluation, and providing standard approaches for those techniques. Three CBT economists, Dr. Harold Marshall (subcommittee chair), Rosalie Ruegg, and Stephen Petersen, are playing leading roles in advising the various task groups of the subcommittee on technical issues. These CBT staff members are drafting a report describing how to measure life-cycle costs of buildings for the subcommittee's use in developing the first building economics standard.

The Center is involved in the activities of both ANSI Committees S1, Acoustics, and S3, Bioacoustics. Contributions to these groups include preparation, in cooperation with CMEPT, of a proposed standard for measuring and rating steady-state noise in rooms. This standard will be considered for adoption as a national standard by both committees. The document is the first of its kind in spite of an attempt by ANSI to stimulate the preparation of such a standard for roughly 20-25 years.

Active participation in the planning of a major round-robin on sound absorption measurements in reverberation chambers under the auspices of ASTM E33, Environmental Acoustics, is currently underway. This round robin is designed to identify and account for major sources of error that result in significant inter-laboratory discrepancies in reported sound absorption coefficients of acoustical materials. The planning is almost completed and CBT staff will be involved in the implementation of the program.

In 1979, CBT was instrumental in organizing a new ANSI committee in the area of visual communications for safety. Committee Z535, Safety Signs and Colors, represents an expansion of ANSI activity in the field of visual alerting and establishes as subcommittees previous committees dealing with safety colors (Z53) and safety signs (Z35). New functions have been added to Z535 to deal with the proliferation of safety symbols and to improve the quality of product alerting. Brian Pierman serves as secretary of this main committee.

NBS furnishes the Secretariat for ANSI Committee Z53, Safety Color Code for Marking Physical Hazards. CBT's Ken Kelly provided the technical leadership for the Secretariat in the revision of ANSI Safety Color Code Marking Physical Hazards (ANSI Z53.1-1979). One of the principal aims of the revised standard includes improving safety by providing for increases in the color codes used to mark physical hazards. The 1979 edition combined the Safety Color Codes used in previous editions with those used by the Federal Highway Administration.

On April 4-5, 1979, John Stroik chaired the first Symposium on Building Security held at NBS. The Symposium, co-sponsored by ASTM Committee F12, Security Systems and Equipment, consisted of four paper sessions and a special panel on environmental design for urban industrial security. Topics of the conference included building security, planning and design; crime prevention analysis, security in codes and standards; and security equipment and services. Participants included representatives from law enforcement and Federal agencies, research centers and universities, State and local governments, manufacturers and individual consultants. The proceedings are to be published by ASTM.



CBT was very active in 1979 carrying out activities relating to the development of standards and performance criteria for solar heating and cooling applications. Many of NBS solar projects result in proposed standards which are submitted to standards-writing organizations such as ASTM and ASHRAE for consideration and processing into national consensus standards. As part of CBT's solar energy program, research to develop draft standards for materials used in solar energy systems is being performed. Standards have been drafted and submitted to ASTM Committee E44, Solar Energy Conversion, which address cover plates, absorptive coatings, insulation, metallic containment materials and non-metallic containment materials. CBT is also coordinating a round robin of a test method for determining the effects of outgassing on solar cover plate transmittance. The test method and draft standard for outgassing were developed by NBS, based on CBT's solar materials research projects. In addition, draft standards for seals/gaskets and rubber hoses have been developed based on NBS research and submitted to ASTM Committee D11, Rubberlike Materials. The benefits of these standards are that they provide measurement procedures to assess the performance of materials used in solar energy systems and that they will aid the Department of Energy and the solar industry.

Three ASTM Standards, originally drafted by NBS staff, are being considered by ASTM Committee E44, Cover Plate Task Group. The first, Standard Practice for the Evaluation of Cover Materials for Flat Plate Solar Collectors, based on NBS research, addresses the testing and durability of cover plate materials. The second standard, Standard Practice for Exposure of Cover Materials for Solar Collectors to Natural Weathering Under Conditions Simulating Operational Mode, describes an exposure box and procedure for exposing cover materials to outdoor weathering while keeping the temperature elevated as it would be in a solar collector. This standard was also based on work initiated by NBS. The third standard, Standard Practice for Determining Resistance of Solar Collector Covers to Impact by Hail, describes a method for performing a hail impact test. These standards will benefit the solar industry by providing test methods and procedures which uniformly compare materials.

Two ASTM standards were approved in 1979 based on CBT drafts: ASTM D 3771-79, Specification for Rubber Seals Used in Concentrating Solar Collectors and ASTM D 3832-79, Specification for Rubber Seals Contacting Liquids in Solar Energy Systems. Robert Stiehler participated in the development of these standards.

CBT supported the development of ASHRAE Standards 95P, Method of Testing to Determine Thermal Performance of Packaged Residential Solar Water Heaters, and 96, Method of Testing to Determine Thermal Performance of Unglazed Flat Plate Liquid Type Solar Collectors, and the refinement of ASHRAE Standard 93-77, Methods of Testing to Determine the Thermal Performance of Solar Collectors. Dr. James Hill



participated on the ASHRAE working project committees responsible for the standards. Experimental work sponsored by the Department of Energy, was completed at the NBS Nike site aimed at experimental validation of the standards.

During 1979, a major study was completed showing that a different testing technique for flat plate water heating collectors, recently adopted in several European countries, gave results comparable to those given by the existing Standard 93-77. The technique requires a combination of outdoor testing to determine the optical-heat-loss characteristics. This information will be used for revising the standard in 1980/81. ASHRAE Standard 96 was completed in 1979 and adopted for the testing features that enable the unique characteristics of unglazed collectors to be determined, such as testing under extremely low wind speeds and at operating temperatures less than ambient air temperature. A test loop was designed and built at the Nike site in accordance with this standard and validation experiments were initiated. In support of ASHRAE Standard 95 for solar domestic hot water systems, CBT constructed a test loop in accordance with the standard and completed validation experiments for a single-tank system with a two collector panel array.

At the request of the Department of Energy, three CBT staff members, Dr. James Hill, Elmer Streed, and William May, provided technical support to the ANSI ad hoc committee on Thermal Performance Rating of Solar Collectors. These researchers analyzed current proposed rating methods and assessed their suitability for different types of solar collectors and solar applications (hot water, heating, cooling) in various climates. The objective of the ad hoc committee is to bring together concerned parties so as to gain voluntary acceptance of a uniform method for establishing and reporting voluntary consensus standards for thermal performance rating of solar collectors.

The development of interim and definitive performance criteria for solar heating and cooling systems was mandated in the Solar Heating and Cooling Demonstration Act of 1974. The various performance criteria and intermediate standards developed by CBT for the Departments of Energy and of Housing and Urban Development have been used as a technical base for evaluating systems in the residential and commercial demonstration programs. Definitive performance criteria documents for residential and commercial solar systems were completed in 1979.

#### Center for Fire Research

The Center for Fire Research (CFR) contributed to national and international standards for detectors and sprinkler systems: NFPA 13D, Sprinklers for Dwellings - CFR assisted in preparing a draft standard and an extensive full-scale verification program; NFPA 72E, Detectors - requirements for detector spacing were revised based on CFR-sponsored research; NFPA 74, Household Fire Warning Equipment - draft revisions

dealing with detector location and response based on CFR research; and ISO TC 21, Fire Fighting - CFR testing supported a draft protocol for full-scale testing of detectors. CFR also drafted test methods and product standards for elastomeric seals used in sprinkler alarm check valves and dry pipe valves.

In 1979, the Flooring Radiant Panel Test, developed by CFR and adopted as Federal Test Method Standard 372, NFPA 253 and ASTM E648-78, was incorporated into the Standard Building Code and Basic Building Code (pending) and is now being used by the Departments of Health, Education and Welfare and Department of Housing and Urban Development in setting flammability requirements for carpeting in corridors and exitways. It has also been referenced in the German Standard, DIN 4102.

The Attic Flooring Radiant Panel Test and the Cigarette Smoldering Combustion Test, previously included in Federal Specification HH-I-515D, were adopted in the Consumer Product Safety Commission Interim Safety Standard for cellulose loose fill insulation. CFR conducted round robin testing in support of these tests.

The Smoke Density Chamber Test developed by CFR and previously adopted as NFPA 285, was adopted by ASTM as E662-79, under the title Specific Optical Density of Smoke Generated by Solid Materials. The test is under consideration by ISO Technical Committee 92, Fire Tests, as draft proposal DP 5659.

The Fire Safety Evaluation System for Health Care Facilities, previously developed by CFR and described in a CFR report, was proposed for use by HEW. This system provides a means for establishing equivalency with the requirements of Chapter 10 of the NFPA Life Safety Code (NFPA 101), and has been proposed for official adoption and incorporation into NFPA 101.

Several CFR-developed test methods have been prepared in draft form and proposed for adoption by ASTM Committee E5, Fire Standards. These methods are: 1) Room Fire Test of Wall and Ceiling Interior Finish (under Subcommittee E5.13, Large Scale Tests); 2) Assessing the Resistance of Upholstered Furniture to Continuing Combustion After Exposure to a Smoldering Cigarette (under Subcommittee E5.15, Building Content); and 3) Time of Ignition of Interior Finish Materials by Flame Impingement (under Subcommittee E5.23, Combustion).

#### Center for Consumer Product Technology

Center for Consumer Product Technology (CCPT) staff participated in a joint committee of the System Safety Society and the Human Factors Society to develop guidelines and ultimately standards for human factors performance criteria for commercial non-military products and equipment. Dr. Harold Van Cott and Walter Leight were selected chair and vice chair,

respectively, of this joint committee. The scope of the committee will be non-Department of Defense specifications and standards for products and systems not already covered by an existing human factors standard, guideline or development guidelines.

The Department of Energy published a standard procedure for measuring "First Hour Rating of Water Heaters" based on CCPT research recommendations. The Center is working on energy test procedure modifications for DoE for room air conditioners, water heaters, TVs, refrigerators, freezers, home heating equipment (other than furnaces), humidifiers and ranges and ovens.

The Center's Law Enforcement Standards Laboratory (LESL) completed the development of a draft performance standard for speed measuring radar units. The final standard will be promulgated by the National Highway Traffic Safety Administration (NHTSA) in the Federal Register. The standard will be used to evaluate commercial speed measuring radar units to establish a qualified products list. Federally funded State and local law enforcement agencies' projects will be authorized to purchase only those radar units included on the qualified products list. LESL also completed the development of a performance standard for breath sample collection/storage devices. This standard will be promulgated by the NHTSA in the Federal Register for use in the establishment of a qualified list for such devices. These devices are widely used by State and local police in rural locations to collect breath samples from suspected drunken drivers for the later analysis of breath alcohol content in a central laboratory. In addition, some States now require that a sample of breath from an individual accused of drunken driving must be retained for use by defense counsel.

#### Office of Engineering Standards

On October 11-12, 1979, ANSI and the Office of Engineering Standards (OES) sponsored a symposium on International Standards and the International Standards Information Network (ISONET) at NBS. Representatives of the U.S. Trade Representative Office and the Department of Defense addressed the Multilateral Trade Negotiations and the Trade Agreements Act of 1979 and the NATO Objectives for Standards Harmonization, respectively. A session on Information Services for Exporters covered both private and government sources. The development of ISONET was discussed by representatives of the International Organization for Standardization: Poland, Federal Republic of Germany, United Kingdom, Canada, France and Norway.

In 1979, ISO approved the establishment of an international network of standards information centers called ISONET. NBS and ANSI participated jointly in the planning and development phases of this work and the NBS Standards Information Service was named



U.S. Member. Dr. Lawrence Eicher, Director of OES, served as U.S. delegate to the ISO Committee on Scientific and Technical Information relating to Standardization (INFCO) meetings, which was responsible for developing ISONET. Charles Phucas, Group Leader for the NBS Standards Information Service, also participated in this work as a member of the ANSI Advisory Group for INFCO and ISONET and as an U.S. delegate to the 1979 planning session of INFCO.

ISONET provides for the efficient exchange of information about standards and regulations between countries in order to promote closer cooperation among ISO members to aid the transfer of technology for development, to reduce technical barriers to international trade, and to encourage worldwide cooperation on standardization and implementation. ISONET currently consists of approximately 25 member countries who exchange selected information on a regular basis. Operational policies of ISONET are established by the ISONET Management Board of which Dr. Eicher is a member.

The Cement and Concrete Reference Laboratory, an NBS Research Associate Program in OES' Office of Testing Laboratory Evaluation Technology, sponsored by ASTM Committee C1 on Cement and C9 on Concrete and Concrete Aggregates, celebrated its 50th anniversary in 1979. A luncheon was held in Philadelphia during the June 1979 ASTM Committee Week. NBS was presented with a commemorative plaque which reads, "This cooperative project between NBS and ASTM C1 on Cement and C9 on Concrete and Concrete Aggregates has provided outstanding contributions to the promotion of uniformity and improvement in testing of cement and concrete."

In 1979, NBS and the Technical Association of the Pulp and Paper Industry (TAPPI) celebrated ten years of a collaborative reference program (CRP) to help testing laboratories evaluate and improve the accuracy and precision of their procedures. In addition to paper, the program covers container-board, rubber, forensic materials and, most recently, thermal insulation. Laboratories voluntarily subscribe to the program and select the tests in which they wish to participate. NBS' Office of Testing Laboratory Evaluation Technology (OTLET) periodically prepares two different samples of paper for each test and sends them to participating laboratories where the samples are tested in accordance with TAPPI methods and instruction provided by NBS. A laboratory's values are then forwarded to OTLET for statistical evaluation and the results are returned to the laboratory so that the staff can determine the level and uniformity of its test values in comparison with those of other participants. The TAPPI program has grown from approximately 100 to 260 participants and from nine to 25 test methods. Subscribers include both domestic and foreign paper mill and research laboratories as well as consumer, government, and commercial testing laboratories.

## Statistics on Standards Committees Memberships

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In 1979, 496 (or 29 percent) of NBS' 1720 professional, scientific and technical staff participated on 1232 outside standards committees (1069 national, 163 international). Memberships on these committees totaled 1664 (1487 national, 177 international). The most memberships, 823, were held in the American Society for Testing and Materials (ASTM). NBS staff participated in the activities of 121 standards organizations (96 national, 25 international).

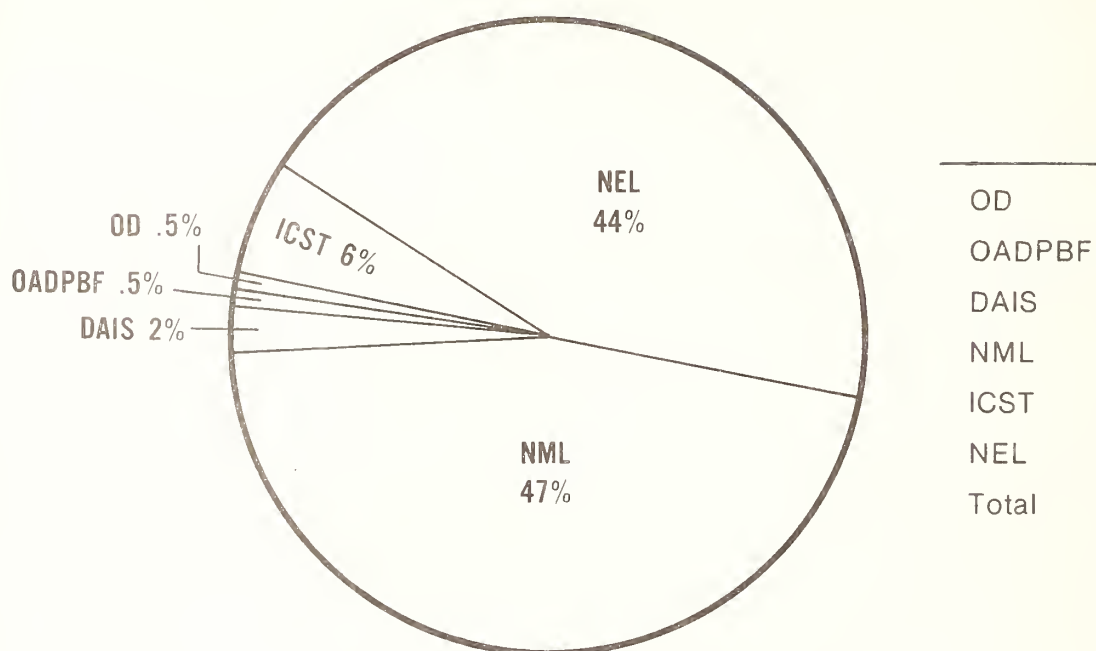
The statistics presented here were gathered from responses given on NBS Form 83, Record of Committee Assignment. Each NBS staff member is required to fill out this form in order to maintain a complete computer record of NBS participation.

The following tables are broken down by NBS' Major Organizational Units (MOU):

OD	Office of the Director
OADPBF	Office of the Associate Director for Programs, Budget and Finance
DAIS	Office of the Director of Administrative and Information Systems
NML	National Measurement Laboratory
ICST	Institute for Computer Sciences and Technology
NEL	National Engineering Laboratory



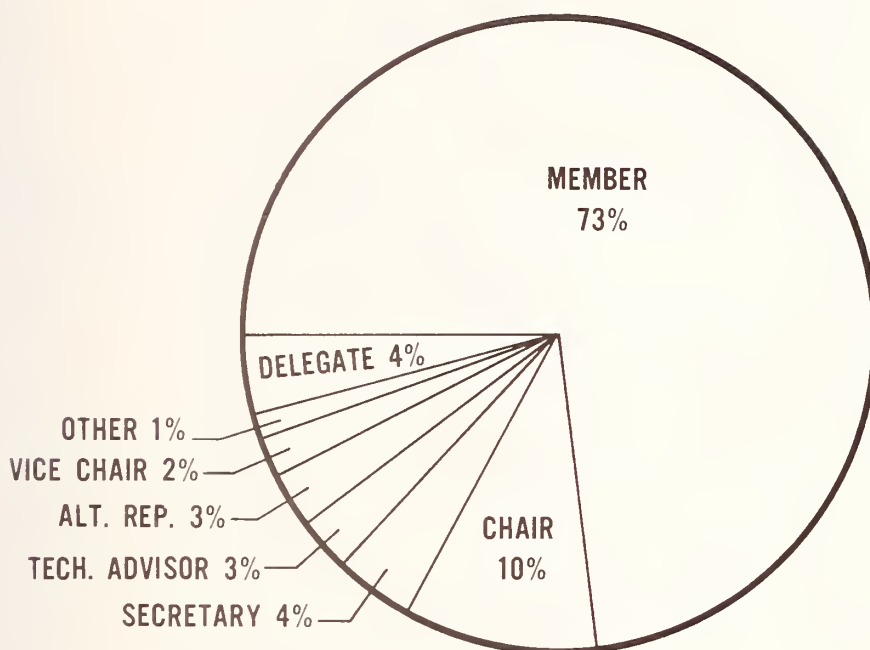
Number of NBS staff participating on standards committee:



Number of memberships on national and international committees:

	National	International
OD	2	2
OADPBF	7	1
DAIS	10	0
NML	652	117
ICST	78	7
NEL	738	50
Total	1,487	177

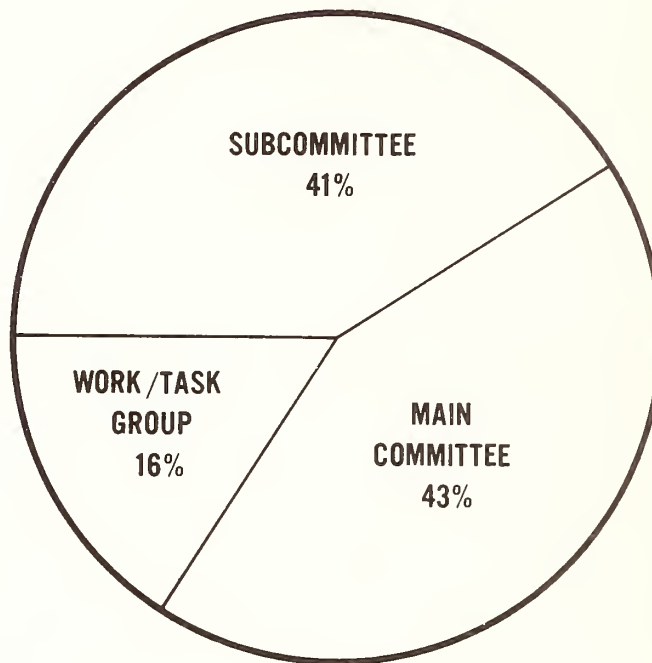
Number of memberships by committee position:



	Member	Chair	Vice Chair	Secretary	Technical Advisor	Alternate Representative	Delegate	Other*
OD	3	1	0	0	0	0	0	0
OADPBF	7	1	0	0	0	0	0	0
DAIS	6	1	0	0	0	3	0	0
NML	552	87	9	36	21	11	44	9
ICST	50	10	5	4	3	10	3	0
NEL	594	63	11	32	25	24	24	15
Total	1,212	163	25	72	49	48	71	24

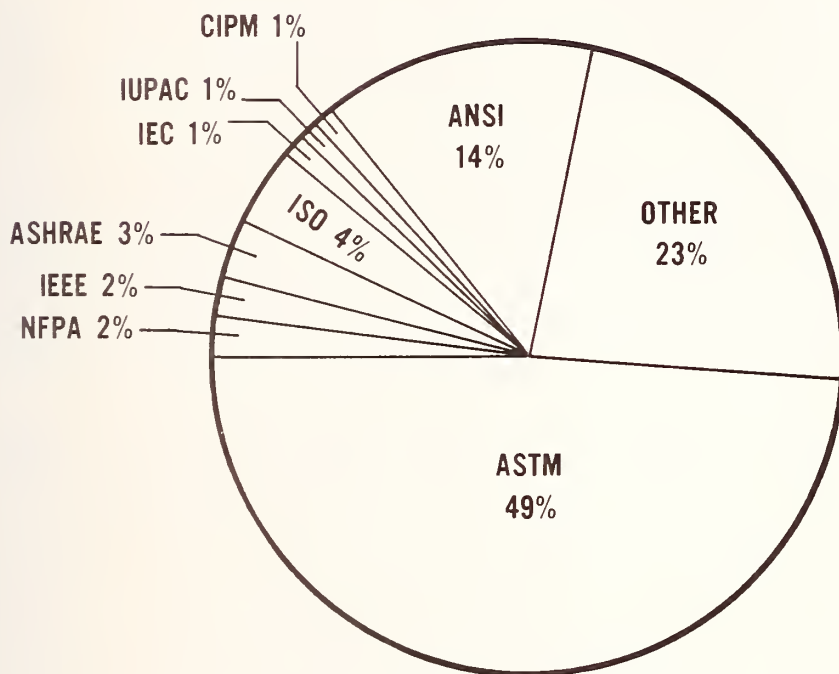
\*Other includes: Editor, Director, General Referee, Staff Advisor, Manager, Working Advisor, Consultant, and Liaison Representative.

Number of memberships by committee levels:



	Main Committee	Subcommittee	Work/Task Group
OD	4	0	0
OADPBF	4	3	1
DAIS	8	2	0
NML	328	314	127
ICST	19	30	36
NEL	352	332	104
Total	715	681	268

Number of memberships in selected standards organizations:



	ASTM	ANSI	ASHRAE	CIPM	IEC	IEEE	ISO	IUPAC	NFPA	Other
OD	0	2	0	0	0	0	0	0	0	2
OADPBF	5	0	0	0	0	0	0	0	0	2
DAIS	1	9	0	0	0	0	0	0	0	0
NML	411	52	0	15	7	9	28	16	0	232
ICST	1	57	0	0	0	2	6	0	0	19
NEL	405	107	54	1	11	18	34	0	37	121
Total	823	227	54	16	18	29	68	16	37	376





## Summary of Standards-Related Travel

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NBS committee members traveled a total of 3,961 days in 1979 to attend standard committee meetings and/or conferences. The total number of trips was 1,098 and the average trip lasted three and a half days. Standards-related travel made up 15 percent of all NBS travel costs and 17 percent of all trips.

The Standards Assistance and Management Information (SAMI) project received copies of all travel orders processed by the NBS Travel Office. Orders pertaining to standards travel are singled out and statistics on cost, hours, and number of trips are gathered. Quarterly reports are distributed to NBS managers to keep them informed on their respective units' travel time and cost. The following table describes this information in detail by MOU.

NOTE: This travel summary does not include NBS' Boulder, Colorado laboratories.

# SUMMARY OF STANDARDS-RELATED TRAVEL

Organizational Unit	Total No. of Trips	Domestic Travel Hours	Foreign Travel Hours	Total Travel Hours	Domestic Travel Costs	Foreign Travel Costs	Total Travel Costs*
OD	7	56	176	232	\$ 597	\$ 5,573	\$ 6,170
OADPBF	0	0	0	0	0	0	0
DAIS	1	16	0	16	424	0	424
NML	409	9,528	2,552	12,080	123,703	63,159	186,862
ICST	153	4,240	984	5,224	67,297	28,302	95,599
NEL	519	11,616	1,536	13,152	165,987	48,923	214,910
Other	9	184	0	184	1,483	0	1,483
Total	1,098	25,640	5,248	30,888	\$359,491	\$145,957	\$505,448

## Key:

OD —Office of the Director  
 OADPBF—Office of the Associate Director for Programs, Budget, and Finance  
 DAIS —Office of the Director of Administrative and Information Systems  
 NML —National Measurement Laboratory  
 ICST —Institute for Computer Sciences and Technology  
 NEL —National Engineering Laboratory  
 Other —NBS/STRS funds allocated to the Department of Commerce's Office of Product Standards

\*This cost includes transportation, per diem, and special expenses (excludes labor).

## NBS Standards Committee Participants and Their Units

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Adams, John W. (723)  
Allan, David W. (524)  
Allred, C. McKay (724)  
Alvarez, R. (503)  
Ambler, Ernest (100)  
Andrews, James R. (724)  
Arens, Edward A. (743)  
Armstrong, George T. (543)  
Babrauskas, Vytenis (752)  
Bagg, Thomas C. (650)  
Ballard, David (564)  
Barbrow, Louis E. (511)  
Barkmeyer, Edward J. (641)  
Barnes, I. L. (551)  
Barnes, James A. (524)  
Barnes, John D. (563)  
Baumgarten, George P. (732)  
Beausoliel, Robert W. (742)  
Becker, Donald A. (506)  
Beehler, Roger E. (524)  
Beers, John S. (731)  
Belanger, Brian C. (512)  
Belecki, Norman B. (521)  
Bender, Peter L. (525)  
Benjamin, Irwin A. (752)  
Bennett, Herbert S. (565)  
Bennett, Lawrence H. (564)  
Berg, John L. (640)  
Berger, Harold (501)  
Berger, Robert E. (763)  
Berke, Joseph G. (506)  
Berman, Gerald A. (782)  
Bertocci, Ugo (561)  
Bettwy, David S. (352)  
Birky, Merritt M. (751)  
Blackburn, David L. (721)  
Blau, Peter J. (564)  
Block, Stanley (565)  
Bloss, Roscoe L. (761)  
Boettinger, William J. (564)  
Booker, Robert L. (534)  
Boone, Thomas H. (744)  
Bowman, Thomas H. (744)  
Boyle, Don R. (713)  
Branstad, Dennis K. (640)  
Brauer, Gerhard M. (563)  
Breckenridge, Franklin R. (731)  
Brickenkamp, Carroll S. (511)  
Bright, David S. (553)  
Bright, Richard G. (752)  
Brinckman, F. E. (561)  
Brower, William S. (565)  
Brown, Paul W. (741)  
Bryson, James O. (782)  
Buchbinder, Benjamin (751)  
Buehler, Martin G. (721)  
Bukowski, Richard W. (752)  
Bullis, W. Murray (721)  
Burke, Robert W. (551)  
Burnett, Edwin D. (735)  
Burns, George W. (522)  
Burr, William (652)  
Cali, J. P. (503)  
Calvano, Nicholas J. (763)  
Campbell, Paul G. (741)  
Carino, Nicholas J. (741)  
Carlson, Allan D. (532)  
Carroll, William L. (742)  
Carter, Robert S. (566)  
Cassel, James M. (563)  
Caswell, Randall S. (532)  
Cattaneo, Louis E. (741)  
Cavallo, Lucy M. (532)  
Cellarosi, Mario J. (565)  
Cezairliyan, Ared (544)  
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Christ, Bruce W. (562)  
Chwirut, Daniel J. (731)  
Clark, Alan F. (736)  
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Collard, Javed J. (760)  
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 Davis, Richard S. (523)  
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 Guttman, Charles M. (500)  
 Haar, Lester (544)  
 Hahn, Thomas A. (565)

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Hall, John L. (525)	Issen, Lionel A. (752)
Hall, Wiley (760)	Iverson, Warren P. (561)
Haller, Wolfgang K. (565)	Ives, Lewis K. (564)
Hampson, Robert F., Jr. (542)	Jeffrey, Seymour (640)
Harman, George G. (721)	Jerke, John M. (721)
Harris, William P. (563)	Jesch, Ramon L. (723)
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Heldenbrand, Jim L. (742)	Kasen, Maurice B. (736)
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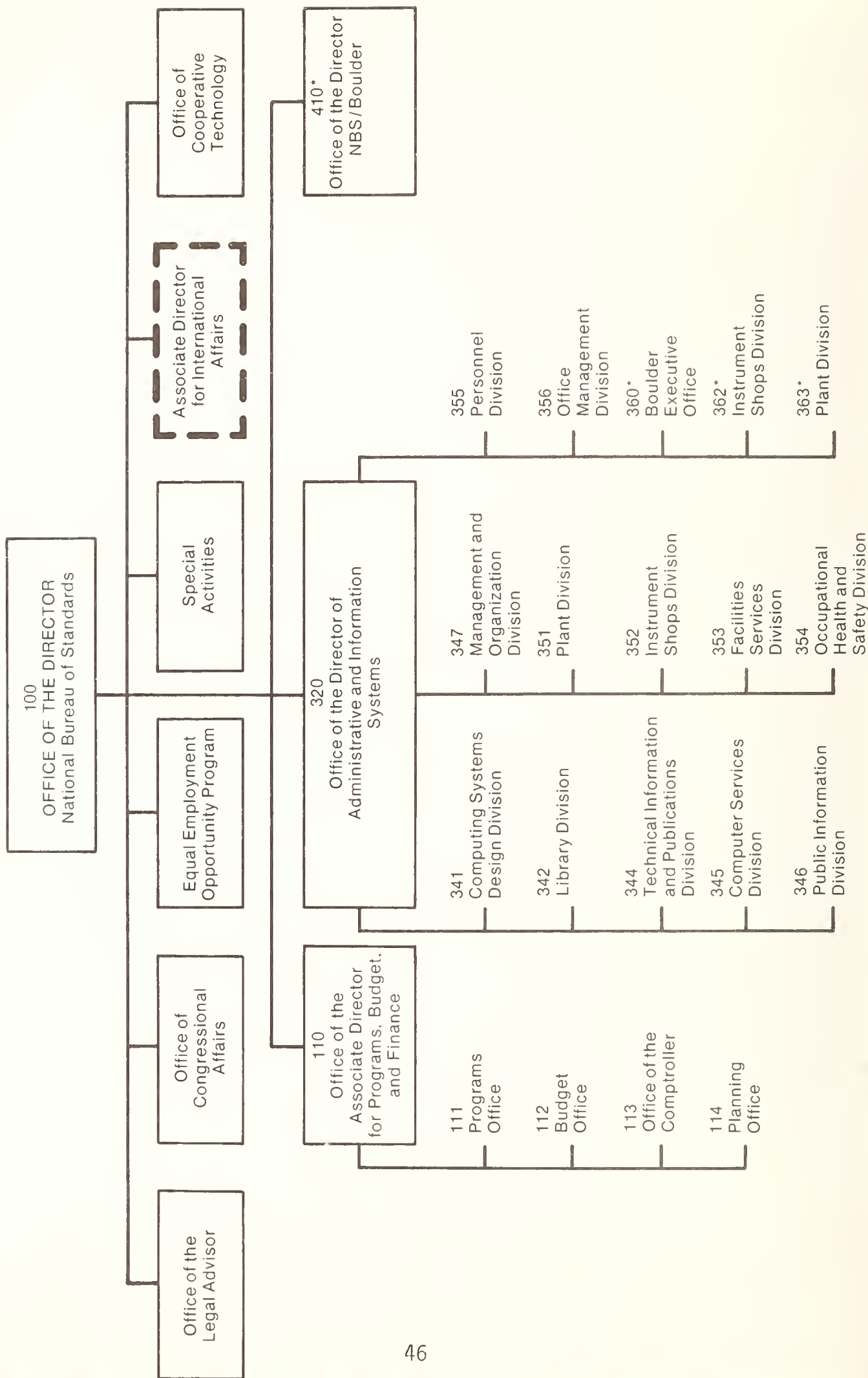
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 Post, Mildred A. (741)  
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 Randall, Edwin B., Jr. (782)  
 Reader, Joseph (531)  
 Recicar, Steve A. (650)  
 Reed, William P. (503)  
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 Richmond, Joseph C. (733)  
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 Rosenblatt, Joan R. (710)  
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 Rosenthal, Lynne S. (641)  
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 Rossiter, Walter J., Jr. (741)  
 Rountree, Robert E., Jr. (600)  
 Rubin, Arthur I. (743)  
 Rubin, Sherwin (721)  
 Ruegg, Rosalie T. (744)  
 Ruff, Arthur W. (564)  
 Ruthberg, Stanley (721)  
 Sanders, Aaron A. (724)  
 Saunders, Robert D., Jr. (534)  
 Scace, Eric L. (650)  
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 Schaffer, Robert (552)  
 Schafft, Harry A. (721)  
 Schneider, Samuel J., Jr. (560)  
 Schooley, James F. (522)  
 Schoonover, Randall M. (523)  
 Schwartz, Robert B. (532)  
 Schwarz, Frederick P. (543)  
 Schwebel, Abraham (354)  
 Sengers, Jan V. (544)  
 Sengers, Johanna M. H. (544)  
 Serbyn, Myroslav R. (735)  
 Seward, Richard W. (503)  
 Shih, James Y. (742)  
 Shumaker, John B. (534)  
 Simmons, John A. (564)  
 Siu, Chock (742)  
 Slattey, William J. (781)  
 Sleater, Gerald A. (741)  
 Smith, Bradford M. (731)  
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 Sockut, Gary H. (640)  
 Soulen, Robert J., Jr. (522)  
 Sparks, Larry L. (736)  
 Spencer, Lewis V. (533)  
 Stanley, John T. (524)  
 Stiehler, Robert D. (741)  
 Streed, Elmer R. (742)  
 Stroik, John S. (743)  
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 Swartzendruber, Lydon J. (564)  
 Swyt, Dennis A. (731)  
 Taggart, Harold E. (723)  
 Taylor, Barry N. (521)  
 Taylor, John K. (550)  
 Teague, E. Clayton (731)  
 Tech, Jack L. (534)  
 Tholen, Albert D. (511)  
 Thomas, Douglas B. (782)  
 Thomson, Robb M. (560)  
 Thurber, W. Robert (721)  
 Tilford, Charles R. (544)  
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 Tobler, Ralph L. (736)  
 Toner, Samuel D. (763)  
 Treado, Marshall J. (760)  
 Trechsel, Heinz R. (743)  
 Tucker, Jane C. (342)  
 Turgel, Raymond S. (722)

Unterweger, Michael P. (532)  
Uriano, George A. (503)  
Vadelund, Eric A. (760)  
Van Cott, Harold P. (761)  
Vanderburg, Gordon J. (731)  
Veale, Ralph C. (731)  
Velapoldi, Rance A. (552)  
Vickers, Mabel V. (640)  
Vogel, Bertram M. (752)  
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Wagman, Donald D. (543)  
Wagner, Herman L. (563)  
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Walkowicz, Josephine L. (640)  
Wan, Chiaa A. (762)  
Warnlof, Otto K. (511)  
Warshaw, Stanley I. (760)  
Watkins, Shirley W. (650)  
Weeks, Stephan J. (561)  
Weiss, Andrew W. (531)  
Wells, Thomas E. (521)  
Wharton, Kathryn M. (560)  
White, Harry S., Jr. (600)  
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Whittaker, Julian K. (535)  
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Wu, Yung Chi (763)  
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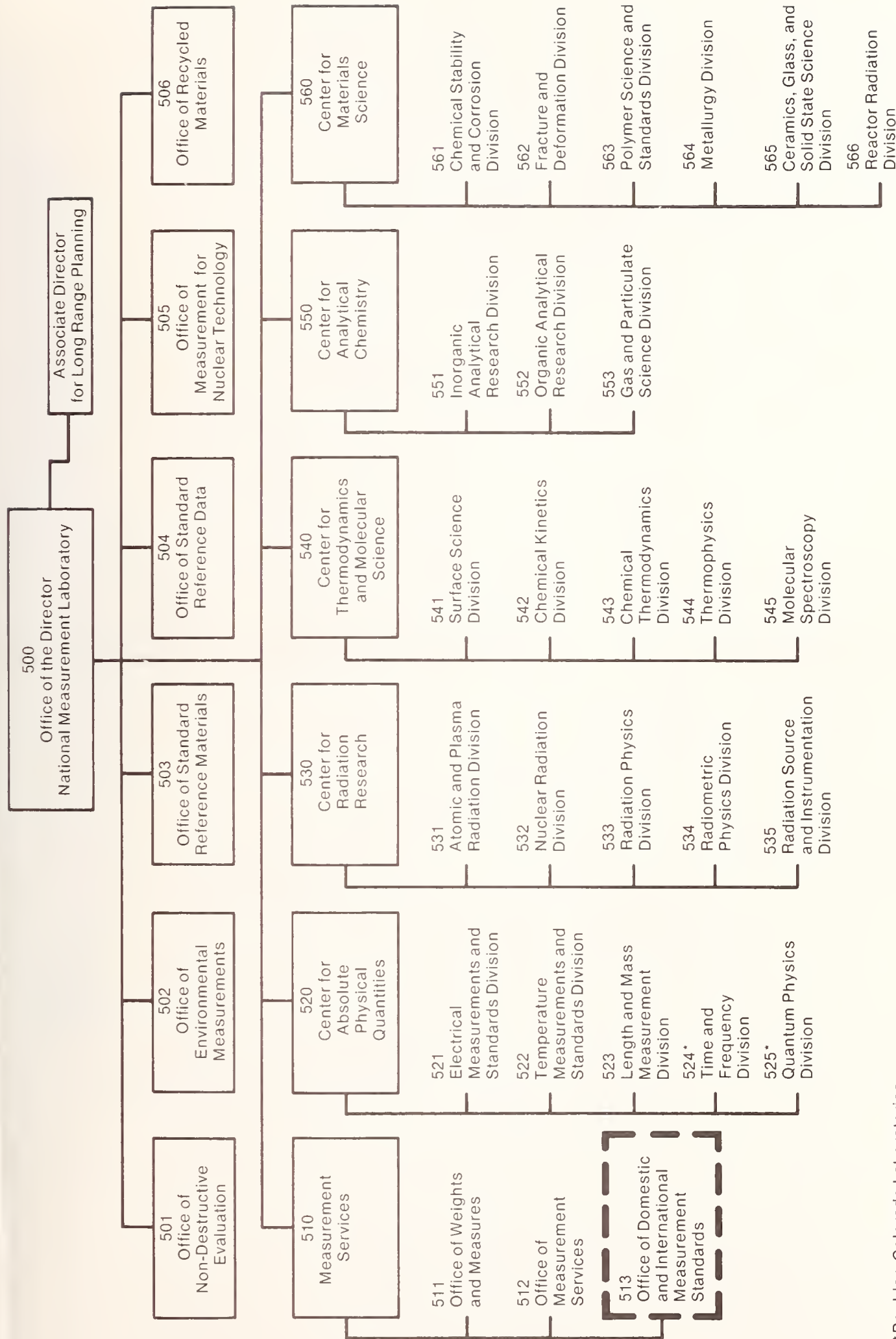
## NBS Organizational Charts

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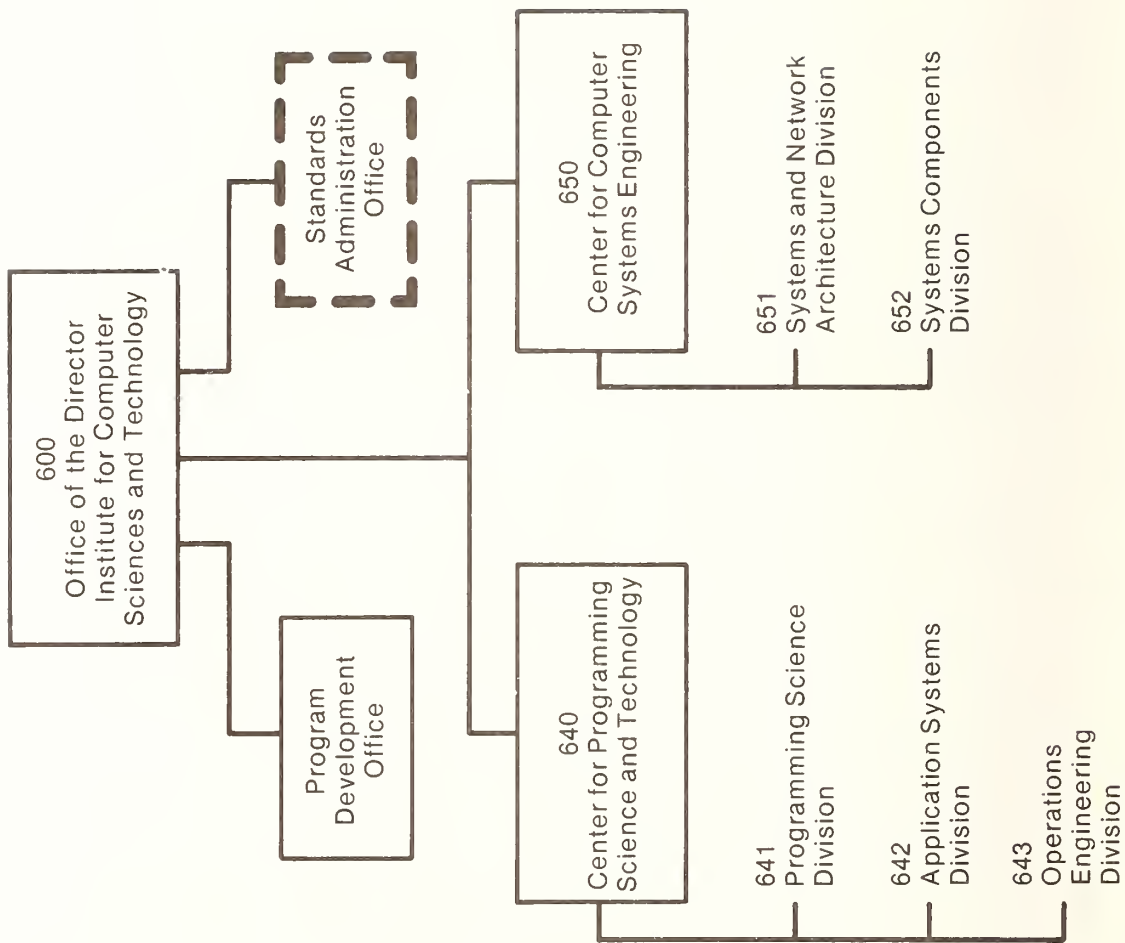
\* Units surrounded by heavy, broken lines indicate an NBS standards coordination office.

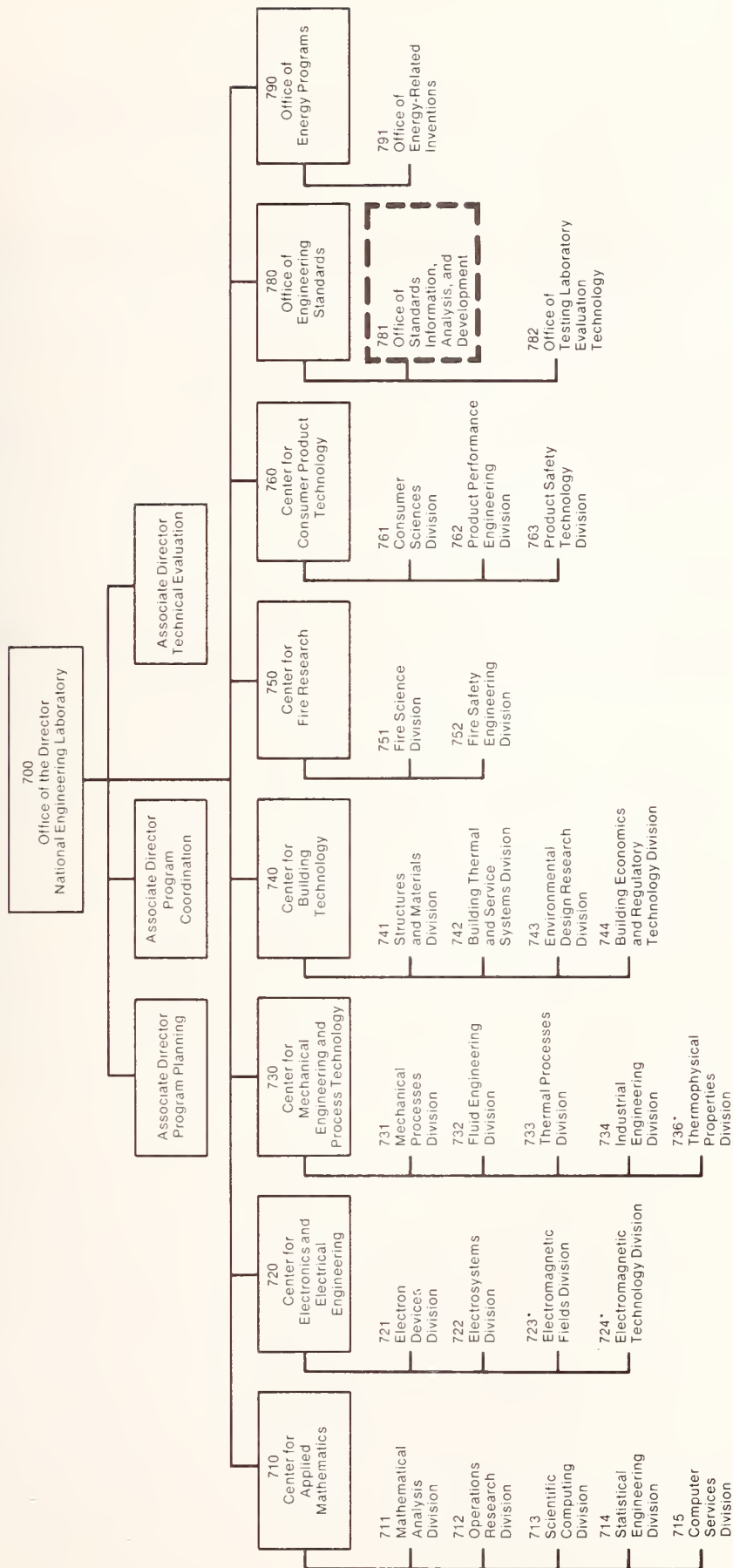






\*Boulder, Colorado Laboratories





\* Boulder, Colorado Laboratories



## Selected Bibliography

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These publications may be obtained from one of the following sources, as indicated in the citation: Superintendent of Documents, U.S. Government Printing Office (GPO), Washington, D.C. 20402; National Technical Information Service (NTIS), Springfield, VA 22161; and the SAMI Office, Office of Engineering Standards; NBS, Technology, B-166, Washington, D.C. 20234. When ordering from GPO or NTIS, please use order number.

1. Publications of the National Bureau of Standards, B. Burris and R. Morehouse, Editors, NBS Special Publication 305 and its supplements (Supplement 10 - 1978) Available from the GPO as SN 003-003-02069-9.

This 10th supplement to Special Publication 305 of the National Bureau of Standards lists the publications of the Bureau issued between January 1 - December 31, 1978. It includes an abstract of each publication (plus some earlier papers omitted from Special Publication 305 Supplement 9), key-word and author indexes; and general information and instructions about NBS publications.

2. An Index of U.S. Voluntary Engineering Standards, W. Slattery, Editor, NBS Special Publication 329, Supplement 2 (May 1975). Available from GPO as SN 003-003-01362-5.

This supplement contains the permuted titles of more than 5,700 voluntary engineering standards; specifications, test methods, codes and recommended practices published by 164 U.S. technical societies, professional organizations and trade associations. Each title can be found under all the significant key words which it contains. These key words are arranged alphabetically down the center of each page together with their surrounding context. The date of publication or last revision, the standard number and an acronym designating the standards-issuing organization appear as part of each entry.

3. Directory of U.S. Standardization Activities, S. Chumas, Editor, NBS Special Publication 417 (Nov. 1975). Available from GPO as SN-003-003-01395-1.

This Directory serves as a guide to standardization activities in the United States. Included in the Directory are summaries of the standardization activities of trade associations, technical and other professional societies representing industry and commerce, and state and Federal governments. For the first time this Directory covers current descriptive summaries of more than 580 organizations.

Organizations having standardization activities such as standards-writing, assisting in the development of standards, issuing standards or disseminating standards information are included.



The standardization activities summaries are grouped into three sections: associations, States, and agencies. In each section, the summaries are arranged alphabetically by organization. Two types of indexes are included to assist the reader in identifying an activity: 1) a subject index of key words taken from the summaries; and 2) a listing of organizations classified into 24 subject heading areas.

4. Tabulation of Voluntary Standards and Certification Programs for Consumer Products, W. Slattery, NBS Technical Note 948 (June 1977). Available from GPO as SN 003-003-01779-5.

The document lists over 1000 product areas and over 2000 standards titles covering products found in and around the home. (The major consumer product areas not included are foods, beverages, and drugs). The tabulation also indicates the applicable national, industrial, and international standards which deal primarily with either safety or performance or both aspects of the products listed. For some of the product areas there are no applicable standards. Available information on certification programs and standards under development and the Standard Industrial Classification (SIC) numbers for the products are also provided.

5. Index of U.S. Nuclear Standards, W. Slattery, NBS Special Publication 483 (August 1977). Available from GPO as SN 003-003-01822-8.

This index contains the permuted titles of more than 1,200 nuclear and nuclear-related standards, specifications, test methods, codes and recommended practices published by 34 U.S. Government agencies, technical societies, professional organizations, and trade associations. Each title can be found under all the significant key words which it contains. These key words are arranged alphabetically down the center of each page together with their surrounding context. Each entry includes the date of publication or last revision, the standard number, an acronym designating the standards-issuing organization, any cross reference standard number, and price.

6. Standards Systems in Canada, the U.K., West Germany and Denmark: An Overview, D. Hemenway, NBS Government Contract Report 79-172 (April 1979). Available from NTIS as PB 296-912.

This report provides an overview of the voluntary standards systems of Canada, the United Kingdom, West Germany and Denmark. The immediate purpose is to identify areas where further research might be useful. Ultimately, the aim is to gain a better understanding of national standards systems in other highly industrialized countries. Based on interviews and other research, the author discusses these aspects of the four standards systems: 1) history; 2) organization and finances; 3) standards development; 4) certification and accreditation; 5) international

standards work; 6) consumer and labor participation; 7) metric conversion; 8) antitrust aspects; 9) research into economic impacts; 10) the Government's use of standards and its role in standards work; and 11) other activities. The author concludes that further research is needed into standards systems of these and additional countries -- for example, Australia, Japan, and Sweden.

7. Bibliography on the Voluntary Standards Systems and Product Certification, C. Chapman, NBS Interagency Report 79-1900 (Oct. 1979). Available from NTIS as PB 80-117922.

This bibliography lists references accumulated by the NBS Office of Engineering Standards in the course of its research into the workings of the voluntary standards system and the economic and legal effects of standards. The first portion of the bibliography lists references alphabetically by author. The second portion groups references by subject. Subject categories include: standards system reform, regulatory use of standards (building, safety, environment), certification and laboratory accreditation, solar heating and cooling, product liability, and international and foreign.

8. Regulatory Use of Standards: The Implications for Standards Writers, P. Harter, NBS Government Contract Report 79-171 (Nov. 1979). Available from NTIS as PB 80-120579.

The purposes of this report are: 1) to help standards-writing organizations prepare standards that are acceptable to regulatory agencies for use in regulations or as an alternative to regulation; and 2) to suggest how regulatory agencies might improve their relationships with private sector standards organizations. The report describes how standards are used in regulatory programs and discusses the requirements imposed on agencies by administrative law. From this analysis it is possible to make some general suggestions - for example: organizations writing standards for possible regulatory use should prepare an accompanying rationale and procedural history. The report summarizes complaints of standards organizations about regulatory agencies, and suggests how agencies might improve their relationships with standards organizations.

9. NEL Staff Participation in U.S. and International Standards Development Activities (June 1979)  
NML Staff Participation in U.S. and International Standards Development Activities, 1978 (April 1979)  
ICST Staff Participation in U.S. and International Standards Development Activities, 1978 (Nov. 1978). All three reports are available from the SAMI Office.

These internal reports, prepared within the Standards Assistance and Management Information (SAMI) project, summarize the standardization committee activities for NBS' three major organizational units: National Engineering Laboratory (NEL); National Measurement Laboratory (NML); and Institute for Computer Sciences and Technology (ICST). Statistical profiles are given in such areas as: 1) number of participants; 2) organizations served; 3) committee structure and position; 4) initial involvement and committee tenure; and 5) participation funding. The purpose of these reports is to increase the effectiveness of NBS staff participation on standards committees as well as to assist NBS managers in the efficient allocation of resources for these activities.

## Acronyms

AA	Aluminum Association	ASM	American Society for Metals
AAAS	American Association for Advanced Science	ASME	American Society of Mechanical Engineers
AACC	American Association of Clinical Chemistry	ASNT	American Society for Nondestructive Testing
AAMA	Architectural Aluminum Manufacturers Association	ASQC	American Society for Quality Control
AAMVA	American Association of Motor Vehicle Administrators	ASTM	American Society for Testing and Materials
AAPM	American Association of Physicists in Medicine	AVS	American Vacuum Society
AASHTO	American Association of State Highway and Transportation Officials	BIPM	International Bureau of Weights and Measures
AATCC	American Association of Textile Chemists and Colorists	BMD	Ballistic Missile Defense
ABA	American Bankers Association	BMDATC	Ballistic Missile Defense Advanced Technology Concerns
ACI	American Concrete Institute	BRH	Bureau of Radiological Health, FDA
ACIL	American Council of Independent Laboratories	BRL	Bendix Research Laboratory
ACS	American Ceramic Society	BSI	British Standards Institution
ACS*	American Chemical Society	CAC	Center for Analytical Chemistry, NBS
ADISP	Automated Data Interchange Systems Panel	CAP	College of American Pathologists
AECL	Atomic Energy of Canada, Limited	CAPO	Center for Absolute Physical Quantities, NBS
AF	Air Force, U.S.	CAS	Chemical Abstracts Service
AFML	Air Force Materials Laboratory	CBEMA	Computers and Business Equipment Manufacturers Association
AFNOR	French Association of Standardization	CCIR	International Radio Consultative Committee
AFOSR	Air Force Office of Scientific Research	CCITT	International Telephone and Telegraph Consultative Committee
AGA	American Gas Association	CEQ	Council on Environmental Quality
AGS	American Gem Society	CGA	Compressed Gas Association, Inc.
AHEA	American Home Economics Association	CIE	International Committee on Illumination
AI	Asphalt Institute	CIPM	International Committee on Weights and Measures
AIA	American Insurance Association	CMG	Color Marketing Group
AIA*	American Institute of Architects	CMS	Center for Materials Science, NBS
AICHE	American Institute of Chemical Engineers	CNLA	Council of National Library Associations
AIF	Atomic Industrial Forum	CODASYL	Conference on Data Systems Languages
AIIE	American Institute of Industrial Engineers	CODATA	Committee on Data for Science and Technology
AIME	American Institute of Mining, Metallurgical, and Petroleum Engineers	CPSC	Consumer Product Safety Commission
ANMC	American National Metric Council	CRR	Center for Radiation Research, NBS
ANS	American Nuclear Society	CS	Coblentz Society
ANSI	American National Standards Institute	CTMS	Center for Thermodynamics and Molecular Science, NBS
AOAC	Association of Official Analytical Chemists	CTS	Collaborative Testing Services, Inc.
APHA	American Public Health Association, Inc.	DBMS	Data Base Management Standards
API	American Petroleum Institute	DIN	German Institute for Standardization
API*	American Paper Institute	DNA	Defense Nuclear Agency
APS	American Physical Society	DOC	Department of Commerce, U.S.
ARBA	American Road Builders Association	DOD	Department of Defense, U.S.
ARMA	Asphalt Roofing Manufacturers Association	DOE	Department of Energy, U.S.
ARPA	Advanced Research Projects Agency	DOI	Department of the Interior, U.S.
ASA	Acoustical Society of America	DOJ	Department of Justice, U.S.
ASCE	American Society of Civil Engineers	DOL	Department of Labor, U.S.
ASEE	American Society for Engineering Education	DOT	Department of Transportation, U.S.
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers		
ASIS	American Society of Industrial Security		
ASLE	American Society of Lubrication Engineers		

\*Denotes duplicate acronym for a different organization.



EIA	Electronic Industries Association	ISO	International Organization for Standardization
EPA	Environmental Protection Agency	ISONET	International Organization for Standardization Information Network
EPRI	Electric Power Research Institute	ISR	International Society of Radiology
FAA	Federal Aviation Administration	ITU	International Telecommunications Union
FCC*	Federal Construction Council	IUB	International Union of Biochemistry
FCST	Federal Council on Science and Technology	IUCR	International Union of Crystallography
FDA	Food and Drug Administration	IUPAB	International Union of Pure and Applied Biophysics
FHWA	Federal Highway Administration	IUPAC	International Union of Pure and Applied Chemistry
FIPS	Federal Information Processing Standards	JCP	Joint Committee on Printing
FPA	Federal Preparedness Agency	JEDEC	Joint Electron Devices Engineering Council
FRA	Federal Railroad Administration	LEAA	Law Enforcement Assistance Administration
GIDEP	Government-Industry Data Exchange Program	MIT	Massachusetts Institute of Technology
GSA	General Services Administration	MOAA	Mail Order Association of America
HEW	Department of Health, Education, and Welfare, U.S.	MPC	Metals Properties Council
HIMA	Health Industry Manufacturers Association	NACE	National Association of Corrosion Engineers
HPS	Health Physics Society	NAPM	National Association of Photographic Manufacturers
HUD	Department of Housing and Urban Development, U.S.	NAS	National Academy of Sciences
IABSE	International Association for Bridge and Structural Engineers	NAS/NRC	National Academy of Sciences/National Research Council
IACCD	Interagency Advisory Committee on Center Data	NASA	National Aeronautics and Space Administration
IAEA	International Atomic Energy Agency	NBS	National Bureau of Standards
IAHPR	International Association on High Pressure Research	NCCLS	National Committee for Clinical Laboratory Standards
IAPS	International Association for the Properties of Steam	NCI	National Cancer Institute
IAU	International Astronomical Union	NCRP	National Council on Radiation Protection and Measurements
ICAO	International Civil Aviation Organization	NCS	National Communications Systems
ICG	International Commission on Glass	NCSL	National Conference of Standards Laboratories
ICNW	Interagency Committee on Net Weights	NCWM	National Conference on Weights and Measures
ICRU	International Commission on Radiation Units and Measurements	NFPA	National Fire Protection Association
ICSU	International Council of Scientific Unions	NFPCA	National Fire Prevention & Control Administration
ICTA	International Confederation for Thermal Analysis	NIH	National Institute of Health
IEC	International Electrotechnical Commission	NMA	National Micrographics Association
IEEE	Institute of Electrical and Electronics Engineers, Inc.	NMAB	National Materials Advisory Board
IERI	Illumination Engineering Research Institute	NNDC	National Nuclear Data Center
IES	Illuminating Engineering Society	NOFI	National Oil Fuel Institute
IFCC	International Federation of Clinical Chemists	NPCA	National Paint and Coating Association
IIA	Institute of Internal Auditors	NPS	National Park Service
IIW	International Institute of Welding	NRAO	National Radio Astronomy Observatory
IMEKO	International Measurement Commission	NRC	National Research Council
IMPI	International Microwave Power Institute	NRCA	National Roofing Contractors Association
INMM	Institute for Nuclear Materials Managers	NSC	National Safety Council
ISA	Instrument Society of America	NSF	National Science Foundation
ISCC	Inter-Society Color Council		



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NSRDS	National Standards Reference Data System	USNC/IIR	U.S. National Committee/International Institute of Refrigeration
OD	Office of the Director, NBS		
OEM	Office of Environmental Measurements, NBS	VA	Veterans Administration
OHMO	Office of Hazardous Materials Operations, DOT	WHO	World Health Organization
OIML	International Organization of Legal Metrology	WRC	Welding Research Council
ORA	Operations, Research, & Administration		
OSA	Optical Society of America		
OSHA	Occupational Safety and Health Administration		
OSRM	Office of Standard Reference Materials, NBS		
OWM	Office of Weights and Measures, NBS		
PCI	Prestressed Concrete Institute		
PHS	Public Health Service		
PSI	Polish Standards Institute		
SAE	Society of Automotive Engineers, Inc.		
SAMA	Scientific Apparatus Manufacturing Association		
SAMI	Standards Assistance and Management Information		
SEMI	Semiconductor Equipment and Materials Institute		
SERI	Solar Energy Research Institute		
SESA	Society of Experimental Stress Analysis		
SFPE	Society of Fire Protection Engineers		
SIS	Swedish Standardization Commission		
SME	Society of Manufacturing Engineers		
SNM	Society of Nuclear Medicine		
SPARC	Standards Planning and Requirements Committee		
SSPC	Steel Structures Painting Council		
TAPPI	Technical Association of the Pulp and Paper Industry		
TCA	Tile Council of America, Inc.		
TRB	Transportation Research Board		
UL	Underwriters Laboratories, Inc.		
UN	United Nations		
URSI	International Scientific Radio Union		
USCC	U.S. Calorimetry Conference		
USCG	U.S. Coast Guard		
USFG	U.S. Forest Service		
USGS	U.S. Geological Survey		
USNC/CIE	U.S. National Committee/International Committee on Illumination		
USNC/ICI	U.S. National Committee/International Commission on Illumination		
USNC/IEC	U.S. National Committee/International Electrotechnical Commission		

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## Abbreviations

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A	Annuitant
APPT. DATE	Appointment Date
C	Parent Committee
CC	Committee that is subordinate to a Parent Committee
CHAIR	Chairperson
DIV	Division
EMP. STATUS	Employment Status
ENCR	Encryption
EXPIR. DATE	Expiration Date
FTP	Full-time Permanent employment status
FT TEMP	Full-time Temporary employment status
INTL	Denotes an activity under the auspices of a international organization
NATL	Denotes an activity under the auspices of a U.S. organization
NATL/I	Denotes an activity under the auspices of a U.S. organization which also has major international responsibilities
NBS,OA	Combination of NBS and Other Agency funding
NON-V	Non-voting status
NO.	Number
N/A	Not Applicable
OA	Other Agency
PARNT ORG	Parent Organization
PROF	Professional
PT PERM	Part-time Permanent employment status
RA	Research Associate
SC	Subcommittee
SSC	Subcommittee that is subordinate to another Subcommittee
TC	Technical Committee
USNC	U.S. National Committee
USNWG	U.S. National Work Group
US/TAG	U.S. Technical Advisory Group
WG	Work Group
WG2	Work Group of a Parent Committee
WG4	Work Group of a SSC
-000	Committee number assigned by SAMI office for record purposes

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## List of Organizations Sponsoring Standards-Writing Committees

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### National

Acoustical Society of America	Institute of Electrical and Electronic Engineers, Inc.
American Association of Clinical Chemistry	Institute of Internal Auditors
American Association of Physicists in Medicine	Instrument Society of America
American Association of Textile Chemists and Colorists	Interagency Committee on Net Weights
American Bankers Association	Inter-Society Color Council
American Ceramic Society	Joint Electron Devices Engineering Councils
American Chemical Society	Mail Order Association of America
American Concrete Institute	Massachusetts Institute of Technology
American Institute of Architects	Metals Properties Council
American Institute of Chemical Engineers	National Academy of Sciences
American Institute of Mining, Metallurgical, and Petroleum Engineers	National Aeronautics and Space Administration
American National Metric Council	National Association of Corrosion Engineers
American National Standards Institute	National Committee for Clinical Laboratory Standards
American Nuclear Society	National Conference of Standards Laboratories
American Paper Institute	National Conference on Weights and Measures
American Petroleum Institute	National Council on Radiation Protection and Measurements
American Physical Society	National Fire Prevention & Control Administration
American Society of Civil Engineers	National Fire Protection Association
American Society of Heating, Refrigerating, and Air-Conditioning Engineers	National Institute of Health
American Society of Industrial Security	National Radio Astronomy Observatory
American Society of Mechanical Engineers	National Research Council
American Society for Metals	National Safety Council
American Society for Nondestructive Testing	National Science Foundation
American Society for Testing and Materials	Optical Society of America
American Vacuum Society	Prestressed Concrete Institute
Army, U.S.	Public Health Service
Association of Official Analytical Chemists	Semiconductor Equipment and Materials Institute
Atomic Industrial Forum	Society of Automotive Engineers, Inc.
Chemical Abstracts Service	Society of Experimental Stress Analysis
Coblentz Society	Society of Fire Protection Engineers
College of American Pathologists	Society of Nuclear Medicine
Color Marketing Group	Steel Structures Painting Council
Compressed Gas Association, Inc.	Technical Association of the Pulp & Paper Industry
Conference on Data Systems Language	Transportation Research Board
Congress, U.S.	Underwriters Laboratories, Inc.
Council on Environmental Quality	U.S. Calorimetry Conference
Department of Commerce, U.S.	U.S. Geological Survey
Department of Defense, U.S.	U.S. National Committee for the International Commission on Illumination
Department of Energy, U.S.	U.S. National Committee for the International Committee on Illumination
Department of the Interior, U.S.	U.S. National Committee for the International Electro- technical Commission
Department of Transportation, U.S.	U.S. National Committee for the International Institute of Refrigeration
Electric Power Research Institute	Welding Research Council
Electronic Industries Association	
Environmental Protection Agency	
Federal Council on Science and Technology	
Federal Preparedness Agency	
Food and Drug Administration	
General Services Administration	
Health Physics Society	
Illuminating Engineering Society	
Illumination Engineering Research Institute	

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## **International and Foreign National**

Committee on Data Science and Technology  
German Institute for Standardization  
International Association for the Properties of Steam  
International Astronomical Union  
International Atomic Energy Agency  
International Civil Aviation Organization  
International Commission on Glass  
International Commission on Radiation Units and  
Measurements  
International Committee on Illumination  
International Committee on Weights and Measures  
International Confederation for Thermal Analysis  
International Council of Scientific Unions  
International Electrotechnical Commission  
International Federation of Clinical Chemists  
International Institute of Welding  
International Microwave Power Institute  
International Organization of Legal Metrology  
International Organization for Standardization  
International Scientific Radio Union  
International Society of Radiology  
International Telecommunications Union  
International Union of Crystallography  
International Union of Pure and Applied Chemistry  
United Nations

U.S. DEPT. OF COMM. BIBLIOGRAPHIC DATA SHEET	1. PUBLICATION OR REPORT NO.  NBS SP 573	2. Gov't. Accession No.	3. Recipient's Accession No.
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## SUPPLEMENTARY NOTES

☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.

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

NBS uses a decentralized system for managing the participation of NBS representatives in outside standards committees activities. This type of management is governed by NBS policy; coordinated through standards offices in each NBS Major Organizational Unit; and monitored and supported by the Office of Standards Information, Analysis and Development (OSIAD).

This report summarizes NBS' standards activities during calendar year 1979. It contains information on NBS staff participation on standards committees, highlights of significant technical and individual contributions made by NBS staff, a description of NBS standards management activities, and a directory of staff participating on committees.

For further information on NBS standards activities, contact OSIAD, National Bureau of Standards, Technology, B-166, Washington, D.C. 20234, (301) 921-2092.

KEY WORDS (six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons)

Annual report; standards activities; standards information; standards participation

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**NOTE:** The Journal was formerly published in two sections: Section A "Physics and Chemistry" and Section B "Mathematical Sciences."

**DIMENSIONS/NBS**—This monthly magazine is published to inform scientists, engineers, business and industry leaders, teachers, students, and consumers of the latest advances in science and technology, with primary emphasis on work at NBS. The magazine highlights and reviews such issues as energy research, fire protection, building technology, metric conversion, pollution abatement, health and safety, and consumer product performance. In addition, it reports the results of Bureau programs in measurement standards and techniques, properties of matter and materials, engineering standards and services, instrumentation, and automatic data processing. Annual subscription: domestic \$11; foreign \$13.75.

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**NOTE:** The principal publication outlet for the foregoing data is the Journal of Physical and Chemical Reference Data (JPCRD) published quarterly for NBS by the American Chemical Society (ACS) and the American Institute of Physics (AIP). Subscriptions, reprints, and supplements available from ACS, 1155 Sixteenth St., NW, Washington, DC 20056.

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## BIBLIOGRAPHIC SUBSCRIPTION SERVICES

The following current-awareness and literature-survey bibliographies are issued periodically by the Bureau:

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