REPORT OF THE

49th NATIONAL CONFERENCE ON WEIGHTS AND MEASURES 1964

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
MISCELLANEOUS PUBLICATION 263

THE NATIONAL BUREAU OF STANDARDS

The National Bureau of Standards is a principal focal point in the Federal Government for assuring maximum application of the physical and engineering sciences to the advancement of technology in industry and commerce. Its responsibilities include development and maintenance of the national standards of measurement, and the provisions of means for making measurements consistent with those standards; determination of physical constants and properties of materials; development of methods for testing materials, mechanisms, and structures, and making such tests as may be necessary, particularly for government agencies; cooperation in the establishment of standard practices for incorporation in codes and specifications; advisory service to government agencies on scientific and technical problems; invention and development of devices to serve special needs of the Government; assistance to industry, business, and consumers in the development and acceptance of commercial standards and simplified trade practice recommendations; administration of programs in cooperation with United States business groups and standards organizations for the development of international standards of practice; and maintenance of a clearinghouse for the collection and dissemination of scientific, technical, and engineering information. The scope of the Bureau's activities is suggested in the following listing of its four Institutes and their organizational units.

Institute for Basic Standards. Electricity. Metrology. Heat. Radiation Physics. Mechanics. Applied Mathematics. Atomic Physics. Physical Chemistry. Laboratory Astrophysics.* Radio Standards Laboratory: Radio Standards Physics; Radio Standards Engineering.** Office of Standard Reference Data.

Institute for Materials Research. Analytical Chemistry. Polymers. Metallurgy. Inorganic Materials. Reactor Radiations. Cryogenics.** Office of Standard Reference Materials.

Central Radio Propagation Laboratory.** Ionosphere Research and Propagation. Troposphere and Space Telecommunications. Radio Systems. Upper Atmosphere and Space Physics.

Institute for Applied Technology. Textiles and Apparel Technology Center. Building Research. Industrial Equipment. Information Technology. Performance Test Development. Instrumentation. Transport Systems. Office of Technical Services. Office of Weights and Measures. Office of Engineering Standards. Office of Industrial Services.

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*NBS Group, Joint Institute for Laboratory Astrophysics at the University of Colorado.

**Located at Boulder, Colorado.

Report of the

49th National Conference on Weights and Measures 1964

Sponsored by the National Bureau of Standards
Attended by Officials From the Various States, Counties, and Cities, and Representatives From U.S. Government, Industry, and Consumer Organizations
Washington, D.C., June 15, 16, 17, 18, 19, 1964

Report Editor: L. J. Chisholm

United States Department of Commerce
Luther H. Hodges, Secretary

National Bureau of Standards
A. V. Astin, Director

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OFFICERS

(As elected by the Forty-Eighth National Conference to serve during the Forty-Ninth)

President: A. V. Astin, Director, National Bureau of Standards.
Executive Secretary: M. W. Jensen, Chief Office of Weights and Measures, National Bureau of Standards.
Ex officio

Chairman: D. M. Turnbull, Director, Division of Licenses and Standards, Seattle, Washington.

Vice Chairmen:

B. S. Cichowicz, City Inspector of Weights and Measures, South Bend, Indiana.

W. E. Czaia, Supervisor, Department of Weights and Measures, Railroad and Warehouse Commission, State of Minnesota.

A. H. Dittrich, Chief Inspector, Bureau of Weights and Measures, Department of Agriculture, State of New Hampshire.

F. M. Raymund, County Sealer of Weights and Measures, Los Angeles County, California.

Treasurer: C. C. Morgan, City Sealer of Weights and Measures, Gary, Indiana.

Chaplain: R. W. Searles, Deputy County Sealer of Weights and Measures, Medina County, Ohio.

OFFICERS

(As elected by the Forty-Ninth National Conference to serve during the Fiftieth)

A. V. Astin, *President*
M. W. Jensen, *Executive Secretary*
Ex officio

V. D. Campbell of Ohio, *Chairman*
L. Barker of West Virginia, *Vice Chairman*
J. E. Bowen of Massachusetts, *Vice Chairman*
J. H. Lewis of Washington, *Vice Chairman*
W. I. Thompson of New Jersey, *Vice Chairman*
C. C. Morgan of Indiana, *Treasurer*
R. W. Searles of Ohio, *Chaplain*

EXECUTIVE COMMITTEE

(As elected by the Forty-Ninth National Conference)

A. V. Astin
M. W. Jensen
V. D. Campbell
L. Barker
J. E. Bowen
J. H. Lewis
W. I. Thompson
C. C. Morgan
R. W. Searles
Ex officio

N. Berryman of Florida.
J. M. Boucher of the District of Columbia.
R. J. Fahey of Illinois.
R. H. Fernsten of California.
F. M. Gersz of Connecticut.
M. Jennings of Tennessee.
D. E. Konsoer of Wisconsin.
J. F. Lyles of Virginia.
E. A. Vadelund of Pennsylvania.

STANDING COMMITTEES

(As constituted at the conclusion of the Forty-Ninth National Conference, the personnel of each of the standing committees are as listed. The remaining term of office for each committee member, in years, is shown in parentheses following each entry.)

EDUCATION*

J. T. DANIELL of Michigan, Chairman (2).
S. H. CHRISTIE, JR. of New Jersey (3).
L. A. GREDY of Indiana (4).
A. D. ROSE of California (5).
C. H. STENDER of South Carolina (1).

LAWS AND REGULATIONS*

J. L. LITTLEFIELD of Michigan, Chairman (2).
J. H. LEWIS of Washington (1).
L. BARKER of West Virginia (4).
H. L. GOFORTH of Illinois (5).
M. JENNINGS of Tennessee (3).

SPECIFICATIONS AND TOLERANCES*

R. E. MEEK of Indiana, Chairman (1).
G. L. JOHNSON of Kentucky (3).
J. F. MCCARTHY of Massachusetts (4).
H. J. MCDADE of California (2).
H. D. ROBINSON of Maine (5)

COMMITTEES ACTING ONLY DURING THE FORTY-NINTH ANNUAL CONFERENCE

Nominations: C. H. STENDER of South Carolina, *Chairman;* S. H. CHRISTIE of New Jersey; H. E. CRAWFORD of Florida; N. KALECHMAN of Connecticut; R. E. MEEK of Indiana; J. F. TRUE of Kansas; R. WILLIAMS of New York.

Resolutions: L. BARKER of West Virginia, *Chairman;* N. BERRYMAN of Florida; E. W. BUCKLIN of Maryland; F. M. GERSZ of Connecticut; F. B. JONES of Ohio: J. I. MOORE of North Carolina; F. D. MORGAN of Utah.

Auditing: A. J. ALBANESE of Connecticut, *Chairman:* G. L. DELANO of Montana; A. L. LITTLE of Arkansas.

*M. W. JENSEN, Executive Secretary of the Conference, is *ex officio* nonvoting secretary to each committee.

COMMITTEE MEETINGS, MONDAY, JUNE 15, 1964

All day Monday was set aside for meetings, both open and executive, of the Conference committees. Announcements of these meetings were carried in the National Conference Announcement and in the Conference Program.

The Conference committees that met on Monday morning were the Executive Committee and the Committee on Specifications and Tolerances. The Committee on Education and Committee on Laws and Regulations met on Monday afternoon.

All final reports of the Standing and Annual Committees can be found beginning on page 161.

REPORT OF THE FORTY-NINTH NATIONAL CONFERENCE ON WEIGHTS AND MEASURES [1]

MORNING SESSION—TUESDAY, JUNE 16, 1964

(D. M. Turnbull, Chairman, Presiding)

The invocation was delivered and the memorial service for departed members was conducted by the Conference Chaplain, Rev. R. W. Searles of Ohio.

Mr. J. F. True of Kansas led the delegates in the Pledge of Allegiance.

ADDRESS OF THE CONFERENCE PRESIDENT AND APPOINTMENTS TO STANDING COMMITTEES

by A. V. Astin, *Director, National Bureau of Standards*

I am always pleased to have the opportunity of appearing before the members of the National Conference on Weights and Measures and reporting to you on activities within the National Bureau of Standards during the past year.

This year's Conference is unique to me, and I am sure to many of you, because it is the first Conference I have attended at which Mr. W. S. Bussey was not present. I am sure we all miss him and wish him well in his retirement. His departure leaves a big gap, but fortunately we have had a most able understudy working with him for a number of years, and I am pleased to report to you that Mr. M. W. Jensen, whom all of you know, took over the responsibilities of the Secretary of the Conference early this spring. As you can see by the way the Conference has been running in its early stages, he has been doing an excellent job.

At the National Bureau of Standards during the past winter we put into effect a major reorganization. Its purpose was to relate more directly the programs and activities of the National Bureau of Standards to the responsibilities and goals of the Department of Commerce. The Secretary of Commerce has designated the Bureau as the principal focal point within the Federal Government for the application of science and technology to the Nation's industrial and economic growth. This is truly a major responsibility, and to carry it out we felt it necessary to subdivide the Bureau into four major units which we call institutes. These are the Institute for Basic Standards, Institute for Materials Research, Institute for Applied Technology, and the Central Radio Propagation Laboratory.

The Institute for Basic Standards has responsibility for the development and maintenance of the basic standards for physical measurement.

[1] With the exception of formal papers and committee reports, the record of the 49th National Conference on Weights and Measures has been edited wherever necessary to reduce the printed report to that which has reference value.

Through calibration services it provides extensions of these standards to all segments of science and engineering where uniform measurement is important.

Last year I mentioned to you that the Bureau had been given responsibility for the administration of a National Standard Reference Data System. This system is a mechanism for bringing together critically evaluated numerical data on the properties of materials and disseminating these data to scientists and engineers throughout the country. Responsibility for administering the NSRDS is also within the Institute for Basic Standards. Here efforts will be directed toward maintaining a central national file of standardized or carefully evaluated data, developing new and more effective means of disseminating information from this file, and initiating projects at NBS and elsewhere to provide inputs to the file as required to meet today's technological needs.

Heading our Institute for Basic Standards is Dr. Robert D. Huntoon, who was formerly Deputy Director of the Bureau, a scientist and an administrator with long experience in the field of basic measurement.

An important responsibility of the Institute for Materials Research is the development and dissemination of standard reference materials. These are materials whose properties or composition have been carefully characterized. They are disseminated to industrial production laboratories or to research laboratories, where their carefully standardized properties provide a basis for assuring uniformity of process control or of research results based on measurement. The Institute for Materials Research also develops standard methods for measuring properties of materials, accumulates data on the properties of materials to feed into the National Standard Reference Data System, and conducts research on the relationships between performance of materials and their composition and structure. This Institute is headed by Dr. Irl C. Schoonover, who also serves as Deputy Director of the National Bureau of Standards.

We believe that as the program of the Institute for Materials Research becomes more fully developed we shall be in an excellent position to provide an extremely important and effective service to materials development in this country.

Within the Institute for Applied Technology we have brought together those activities that are most closely related to the industrial needs of the Nation. This Institute's responsibilities include the development of criteria for evaluating technological products and services, the provision of specialized information services to meet the needs of our industrial technology, and studies on the nature of technological change.

Inasmuch as the Bureau has the responsibility of providing major assistance to the Department of Commerce in its efforts to stimulate the Nation's commerce and industry, we must try to obtain a better understanding of the nature of technological change and its impact upon economic growth. We must devise new ways of studying how technology changes our industry and our economy. At the Institute for Applied Technology we are now working to develop models of sectors of American industry in order to understand these processes better. If we can do this, we can then provide vital assistance to Government in the development of policy as it affects industrial develop-

ment and technological change, and we can allocate our resources at NBS more effectively as we come to know what information problems or criteria development problems we should give our attention to.

You will hear in more detail about the Institute for Applied Technology a little later in the program, when Dr. Donald Schon, Director of that Institute, will tell us about its plans and objectives.

The fourth institute, the Central Radio Propagation Laboratory, is located at Boulder, Colorado. This activity, which you have heard about before, provides a radio propagation prediction service to the military services and to the Nation's communications industry. CRPL also conducts research on the electrical properties of the earth's atmosphere, in order to improve our ability to utilize effectively the electromagnetic spectrum for communication purposes. The Central Radio Propagation Laboratory is headed by Dr. C. Gordon Little.

These new organizational units separate the Bureau into groups of homogeneous activities which in turn provide data and services to homogeneous customer groups. We believe that this realinement will permit us to fulfill our manifold responsibilities in the most efficient manner possible. And we are hopeful that with this new organization we shall be able to provide significant assistance to the Secretary of Commerce and to the Federal Government generally in their efforts to support and stimulate commerce and industry in this Nation through the application of science and technology.

At previous conferences I have reported to you on our progress in relocating our activities in Gaithersburg, Maryland. This year I am happy to say that the relocation is progressing favorably. In fact, during the past year we actually began moving some of our activities to Gaithersburg, and I am sure you will be interested to know that the first activity we moved was the Office of Weights and Measures, headed by Mr. Jensen. This Office has been in operation at Gaithersburg since last fall. It was soon followed by our Engineering Mechanics Section, which is now housed in the new Engineering Mechanics Laboratory. Later on in the winter these two groups were joined by a number of staff members of the Radiation Physics Division, who are installing new and important facilities for measuring and understanding the properties of nuclear radiation.

We expect that the Administration Building will be available to us before the end of this year, as well as a number of the service buildings.

As the construction of these buildings is moving along well on schedule, I am sure that we will have conference facilities at Gaithersburg next year, and if you should decide to come out and hold some meetings there on the occasion of the 50th Anniversary of the convening of this Conference, we should have the facilities to entertain you.

However, most of the laboratory activities of the Bureau will not have facilities at Gaithersburg until near the end of 1965. There are now under construction seven general-purpose laboratories, which will house most of the technical staff of the Bureau. These laboratories are scheduled for completion in the fall of 1965, and I expect that we shall be spending most of the winter of 1965–66 in moving our staff, but two years from now we should be about 95 percent relocated.

There are yet to be built at our Gaithersburg site a few very-special-purpose laboratories for which funds are not yet available. Application for these funds is now pending before the present session of the Congress.

Another activity in which the National Bureau of Standards is involved and which is of interest to this Conference is the forthcoming General Conference on Weights and Measures, now scheduled to be held in Paris this October. I believe many of you know that the General Conference on Weights and Measures is the intergovernmental organization that provides for uniformity of measurement throughout the world. It controls the International Bureau of Weights and Measures at Sèvres, France, and provides a stable, continuing mechanism for international agreement on all the basic units on which our measurement system depends.

This General Conference has been meeting every six years, but with the rapid changes of recent years in science and technology the Executive Committee that governs the International Bureau decided that the six-year interval was too infrequent. It has called the next Conference, which will be the 12th in the history of the organization, to convene in Paris this fall, two years ahead of the normal schedule.

Pending on the agenda for the 12th General Conference of Weights and Measures is a request to approximately double the budget of the International Bureau in order to help it keep pace with the growing complexity of the scientific problems with which it must deal. Also pending before the 12th Conference is a proposal to redefine provisionally the unit of time in terms of an atomic constant rather than an astronomical constant. The proposal is to provide a tentative or provisional value for one of the resonance frequencies of the cesium atom and to derive the second from this frequency.

An additional matter to be considered before the 12th General Conference is a proposal to abolish the liter as an independent unit in the International system of Units. The term "liter" would be retained, but it would be defined as equivalent to the cubic decimeter, a unit derived directly from the meter. As you know, the liter is now defined as the volume of one kilogram of water under specified conditions, whereas the cubic decimeter, its near equivalent, is merely a cube with sides one decimeter in length. Initially these two units were expected to be identical, but current measurements show them to be different by 28 parts in a million, and in some fields of precision measurement this difference has presented difficulties. We hope that this matter will be resolved at the meeting of the 12th General Conference of Weights and Measures.

It is now my privilege and pleasure as ex officio President of this Conference to announce appointments to the standing committees.

Mr. J. E. Bowen, of Newton, Massachusetts, has completed his term on the Committee on Education, and to succeed him for a five-year term I appoint Mr. A. D. Rose, of Kern County, California.

To succeed Mr. H. M. Turrell, of Pennsylvania, whose term on the Committee on Laws and Regulations has expired, I appoint Mr. H. L. Goforth, of Illinois, for a five-year term.

To succeed Mr. A. H. Dittrich, of New Hampshire, on the Committee on Specifications and Tolerances, I appoint Mr. H. D. Robinson, of Maine, for a five-year term.

In addition, I should inform you that Mr. T. C. Harris, of Virginia, left the field of State weights and measures during the past year, and this necessitated his resignation from the Committee on Specifications and Tolerances. To fill Mr. Harris' unexpired term, which ends in June 1965, I appointed Mr. R. E. Meek, of Indiana, during the year.

I have attempted to touch on a few of the highlights in the affairs of the National Bureau of Standards which I thought might be of interest. However, none of our activities, I am sure, are of more interest to you than those of our Office of Weights and Measures and our dealings with the committees of this particular Conference. I am planning to leave the details of these matters to Mr. Jensen as he is much better able to tell you about them than I. However, I want to assure the members of this Conference that our Office of Weights and Measures, which is now a part of our Institute for Applied Technology, has the wholehearted support of the Bureau. We believe that this Office is one of the outstanding examples of Federal-State cooperation in this country. In fact, we are considering the possibility of carrying on additional activities within our Institute for Applied Technology which would be patterned on the program of our Office of Weights and Measures.

We at the Bureau are very proud of this activity as it has been developed, since 1950 under Mr. Bussey's guidance and more recently under Mr. Jensen. You may be assured that as the needs of the Conference members are presented to us, the Bureau will give its unqualified support to the solution of these problems through our Office of Weights and Measures.

Thank you very much for the opportunity of reporting to you.

PRESENTATION OF HONOR AWARDS

Dr. Astin presented Honor Awards to 26 members of the Conference who, by attending the 48th Conference in 1963, reached one of the four attendance categories for which recognition is made—attendance at 10, 15, 20, and 25 meetings.

AWARD RECIPIENTS

25 Years

R. M. Bodenweiser
H. E. Crawford
G. H. Leithauser

20 Years

Nalls Berryman
J. P. Leonard
Alfred Lirio
William Miller

15 Years

K. C. Allen
R. W. Crouch
E. E. Dawson
Nathan Kalechman
W. A. Kerlin
M. J. Santimauro
J. J. Seres
R. K. Slough
J. Fred True

10 Years

J. A. Bovie
J. Ellis Bowen
E. W. Bucklin
W. J. Dubsky
C. G. Gehringer
J. G. Gustafson
J. T. Harper
T. C. Harris, Jr.
E. W. Teagarden
C. H. Wrenn

THE INSTITUTE FOR APPLIED TECHNOLOGY OF THE NATIONAL BUREAU OF STANDARDS

by D. A. Schon, *Director*,
Institute for Applied Technology, National Bureau of Standards

Sometimes things work so well and become so familiar that we forget what is still new and significant about them. This happened to the man who was delighted to discover that, all his life, he had been speaking prose. I think it is in danger of happening, too, in connection with this National Conference on Weights and Measures and, in general, with the Federal-State Weights and Measures activity.

As you know better than I, the Weights and Measures function is an old function of Gov ernment, antedating the National Bureau of Standards itself. But to someone like myself, who sees it for the first time, it displays a number of unusual characteristics. What I see here is:

1. State and Federal representatives working together to settle an important part of the language of commerce, and to adapt that language to new developments in commerce and in technology.
2. Each of the States performing this function for itself, but coordinating it with those of the other States, and working out new standards and criteria as the need arises.
3. The Federal Government stimulating this coordination and providing technical support for it.

The weights and measures activity of the State and Federal Governments is, in effect, a model of Federal-State cooperation in promoting commerce and technology, and promoting the welfare of those who use the results of commerce and technology. It is no less effective for being old. It is a model that will serve us well as we attempt to meet the most recent demands on our society's ability to stimulate the economic use of new technology, and to work out new means of Federal-State and Federal-Regional cooperation in order to do so. This is particularly true of the Institute for Applied Technology in the National Bureau of Standards which was formed, as part of the National Bureau of Standards' overall reorganization, in order to concentrate and strengthen the Bureau's traditional contributions to our national effort to put new technology to economic use.

I would like to discuss with you the programs and some of the hopes of this new organization. Before getting to these matters, however, I would like to outline some of the recent happenings and trends that have made the need to put new technology to economic use so much a matter of national concern.

During the last, roughly, 50 years, American industry has moved from a stage in which production was largely a matter of "craft," to the gradual application of scientific method to production, to a stage in which research and development has become a central activity in its own right. Industries have moved through this cycle at different rates, and experienced different problems in connection with new tech-

nology. Industries in the earlier stages of their cycle—like textiles and fisheries—need to learn about new technology, and about the research process; to develop nonrestrictive industrial standards based on performance criteria, which will help bring new products into being. More advanced industries, like petrochemicals and electronics, need to develop standards for consistency and compatibility of product, and to solve the marketing and entrepreneurial problems associated with new technology.

Major technical innovations in industries in the early stages of their cycle have tended to come through invasion by advanced industries. As a result, companies, workers and areas of the country have been displaced. Appalachia is an example.

We are also being confronted by a peculiar kind of technical invasion—the replacement of workers by numbers and machines, rather than by other workers. This invasion carries with it the danger of a type of dislocation impervious to the building of new industry, new technology, retraining, etc. There is a need for a new kind of social adjustment to such technical change. In the last year, we have been confronted with a leveling off and apparent decline in the rate of national expenditure for defense. This decline has affected both production and the development of new technology. In the immediately coming years, therefore, we will have to provide, as a nation, for the absorption of some sizable percentage of our defense resource into the civilian economy. This means: The threat of technological unemployment, possibly unparalleled in our recent history; a shift in the nature and source of sponsorship for research and technology; availability of a technical resource, developed for work on great systems of war, for civilian purposes.

With all of these events, attention is being called to certain gnawing social problems which exceed in scope any one industry, company, or region of the country. These include:

1. the control of air, land, and water pollution.
2. the inadequacy of our systems of land transportation (particularly in urban areas) and the unsolved problems of our nation-wide transportation system.
3. the inadequacy of our low- and middle-income housing.
4. the well-advertised pockets of poverty in the midst of plenty.
5. the problem, for much of the population, of adjusting to the constructive use of large quantities of leisure time.

There is concern over the regional technical development of our country. Our technical resources are unevenly distributed over the land. Our universities, research institutes, and technically based industries tend to be concentrated in the Northeast, the far West, and the Great Lakes region. Iarge areas of the country—the South and the Midwest, among others—have little in the way of technical resource and, therefore, participate only slightly in the growth of the economy associated with new technology. Partly in response to this problem there is, nationwide, an awakening of the states and regions of the country to the potentials of science and technology for regional economic development; to the need for building technical resources in the universities and for bringing them into direct contact with industries of the area in order to stimulate technically based economic growth.

As a result of these issues and events, we are currently faced with

new demands to put technology to economic use—to create new markets, to compete with foreign industry, to apply technology to our public problems, create jobs, and put our technical resources to maximum use as well as to cope effectively with the social consequences of technical change.

These problems must be solved by the industry and the communities of the country. Since these are national problems they are also Government problems and the Government is concerned with them in many areas and at all levels.

We at the National Bureau of Standards are concerned with them in special ways appropriate to our resources and our traditions. They are reflected in the program of the Institute for Applied Technology, which consists of four principal activities, one of which is dissemination of technical information to industry and to the States and regions of the country. The Federal Council for Science and Technology has established within the Department of Commerce, building on the Office of Technical Services, in the Institute for Applied Technology, a Clearinghouse for Federal Scientific and Technical Information. Its scope includes the physical sciences, engineering, and related technology and it is meant to serve as a central point of contact in Government for industry and the technical community (paralleling the Library of Agriculture and the Library of Medicine, in their fields). Specifically, it is to do four things:

1. Make available to industry and the technical community all unclassified and unlimited Government technical reports. In this connection, it is important to note that the Office of Technical Services has taken over, on a reimbursable basis by agreement with the Department of Defense, all technical document handling activities in the unclassified, unlimited domain.

2. Develop a Government-wide index to scientific and technical literature—taking leadership in setting the new interagency standards in technical information-handling which such an index requires—and provide prompt reference service.

3. Provide referral service to sources of technical expertise in the Government technical community.

4. Provide information concerning Government-sponsored research and development currently under way, in the physical sciences, engineering, and related technology.

As a part of this effort, the Clearinghouse will provide regional dissemination of Government research and development results. It will develop "packages" of report titles, abstracts and bibliographies, under subjects of industrial technological interest ("new means of metal-forming" would be an example), and disseminate these to industry through trade associations, the technical press and intermediate groups in the States (university-industry programs, economic development groups, Chambers of Commerce, and the like).

As I have already indicated, there is a national need to stimulate industrial use of advanced technology—not only Government-generated technology, but all technology—which is best understood and best attacked on a local level throughout the country. For this reason, the Department of Commerce has proposed legislation for a State-Federal Technical Service program. Under this program, the Federal Government would provide matching funds to technically based universities throughout the country on a state-by-state basis in order to

support programs of seminars, conferences, demonstrations, workshops, field visits, and the like aimed at bringing advanced technology into wider industrial use. We hope this program will be approved and presented to Congress during this session. On a far more modest scale, the Office of Weights and Measures is currently launching a program of regional conferences to help coordinate the various local technical/economic efforts of the States.

Performance Criteria

The National Bureau of Standards has a historical role in the development of standards for industrial products as well as standards of measurement for physical quantities. The Bureau's policy with respect to industrial standards is that—with the exception of relatively few standards, mostly concerned with safety and assigned by law in the public interest to the Department of Commerce—the Bureau will not set or promulgate standards. It leaves this role to the private standards-producing bodies—industrial associations and professional societies, and groups such as ASTM and ASA. Its role is to serve as a technical resource to these private groups. It is available for expert and objective contribution to the development of methods of test, measurement, and criteria for the performance of industrial materials, products, and processes which lay the technical basis for industrial standards.

Performance criteria are here distinguished from specifications based on particular materials or on a particular product configuration. Performance criteria spell out, instead, in terms as quantitative as possible, the functions a given product must perform—regardless of its materials or configuration. But their importance is great and varies with the state of the technology in question. Where the technology has been relatively constant over long periods of time—as in the case of wall paneling or foundations, in the building industry—the function of performance criteria, particularly performance criteria for whole systems rather than for components, is to facilitate the introduction of new technology, to permit it to be judged by performance rather than by tradition. The required pull-out strength of prefinished panels is usually taken to be equal to that of so many 6d or 8d nails, not because we have ascertained the forces to which such panels are subject in their lives, but because this fastening method is traditional. The introduction of new wall, roof, foundation, and mechanical systems, to take a few well-known examples, will depend on the development of performance criteria which are not now in existence.

In fields of fast-moving technology—such as, for example, the industrial use of radiation or devices for the recognition of optical characters—the role of performance criteria may be more nearly that of insuring compatibility and consistency of product and devices (making sure that my characters will be suitable for your reader) in such a way as to be based on performance requirements rather than on arbitrary selection.

In both cases, the development of sound performance criteria is essential to the introduction of new and more efficient technology.

The Institute will engage in the development of performance criteria in the fields of building, electronics, textiles, and information processing, among others. In all these areas, we will identify projects of high priority through industry's concern with the problem, as expressed in

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trade associations, professional societies, and private standards bodies.

While the Institute is not concerned with standards for consumer products per se, it is concerned with providing technical service to Government as a purchaser, and for this reason is in the process of establishing a test development laboratory, bringing together parts of the Bureau of Standards currently engaged in the development of tests for products and materials purchased by the Federal Government—ranging from photographic equipment to detergents. The function of this test development laboratory will be to develop performance criteria and tests of performance for products purchased by the Federal Government. It will issue no standards and will test no products, leaving the testing to the agencies concerned, but it will do the technical development of appropriate tests and will make these available to the public.

Of course, standards of weights and measures are essential to all industrial and consumer product standards, since all involve in one way or another agreement as to the language of weights and measures. The Office of Weights and Measures will continue to provide technical service to the states in their effort to establish, promulgate, and enforce standards for commercial weights and measures. It will extend, so far as our resources allow, its programs aimed at providing supporting information, and training and education concerning the importance of the Weights and Measures function.

Many of our most serious technical and technical/economic problems are so large as to cut across industry boundaries; they cannot be located wholly in one industry or wholly in another. Many of these, in turn, cut across boundaries between industry and the Federal Government; both share a concern with them. Examples are to be found in:

1. urban and national transportation.
2. low-cost housing, for the military as well as for civilians.
3. man-machine systems for receiving, sorting, processing, storing, and displaying data.

In these cases, many industries join in production and service, and Government figures as user and purchaser as well as, on occasion, regulator.

Because of the scope of these problems, as well as the fragmentation of some of the industries concerned with them, they are seldom considered as whole systems even though in many instances they are most effectively considered in that way. Often, the very tools needed to treat them as systems are missing. The Bureau has traditionally provided consultation to Government in its systems problems and in its use of new technology. Frequently in the past—as in the case of the early computer, SEAC—it has developed tools for systems problems of interest to Government and industry alike. The Institute for Applied Technology will continue to fill these functions, in a few areas of special competence.

The Institute's major objective—that of stimulating the application of science and technology to national needs—requires an understanding of the problems and obstacles that keep science and technology from being applied to needs, and of the sort of activity that would stimulate their application. This means:

1. analysis of major problems of technical innovation, in industry and Government alike.

2. analysis of the likely effects on new technology of programs currently undertaken or planned within the Institute; e.g., in the areas of performance criteria, technical information, or systems analysis.

As a case in point, IAT is now engaged in an analysis of the economic importance to the building and construction industry of the development of uniform building standards based on performance criteria.

In all of its program areas—the dissemination of technical information; the development of performance criteria; the development of tools for the analysis of large-scale problems that cut across Government-industry lines; and analysis of problems associated with the introduction of new technology—the Institute for Applied Technology has been guided by the major problems of new technology affecting our economy, particularly as these become apparent on a regional and local level, and by the traditional functions and resources of the National Bureau of Standards.

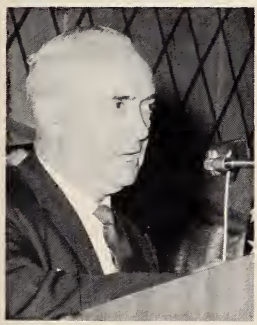
In all of these efforts cooperation between Government and industry, and Government and the states and regions of the country, is critical. We are now actively seeking industry and State and regional participation in order to:

1. identify problems associated with new technology that affect States and regions of the country although they cannot be resolved exclusively at the local level.
2. establish cooperative programs to formulate and solve these problems.

As one of the criteria governing the success of our efforts, we hope and expect to do things which are as effective in their way as this National Conference on Weights and Measures.

ADDRESS OF THE CONFERENCE CHAIRMAN

by D. M. Turnbull, *Director, Division of Licenses and Standards, Seattle, Washington.*



This, traditionally, is that part of the Conference where the Chairman's address is delivered.

It is a distinct honor and privilege as your current chairman to welcome each and every one of you to this opening Conference session. The sincere hope and desire of your officers and committees is that this may be the most rewarding and successful Conference yet held.

There is no fear of contradiction when I say that this dedicated body of people who have come here with a common purpose will achieve much and benefit greatly by their participation in the various programs that have been arranged.

An eminent group of speakers has been selected. Their messages on the various subjects should be most educational, interesting, and helpful to all of us. Not only do we owe them our deepest gratitude but also our undivided attention and regular attendance at all of the sessions of the Conference.

It has been very gratifying and interesting to read the reports of progress from the various jurisdictions throughout the past year. The acquisition of new equipment including such items as medium- and heavy-duty test trucks, provers for petroleum products and low-pressure gas, added personnel, and accelerated training programs.

At this time, I would like to thank all the members of the standing committees for their invaluable work, and believe me, it is work. Also I wish to thank our industrial friends who have done so much to help make the weights and measures program a success.

I now wish to explore the question of why the National Bureau of Standards involves itself in sponsorship of this Conference. It was the first director of the Bureau, Dr. Samuel W. Stratton, who helped begin this Conference in 1905 when he sent out a general invitation to State officials to convene in Washington for the purpose of exploring means and methods whereby equity could be assured in commercial transactions. Why did the Bureau and the State officials who attended that first Conference feel that such a meeting was necessary? To my mind, there is one major reason—uniformity.

You are all familiar with the "Commerce Clause" of the Federal Constitution which, in effect, says that there shall be no barrier to commerce among the several States. Let us consider interstate commerce for a moment in its relation to weights and measures, a field that is certainly most basic to commerce. What greater barrier to interstate commerce could there be than if we had 50 and more individual weights and measures jurisdictions, each originating its own weights and measures laws, rules, and regulations and most probably, in such a situation, with no real similarity among the several jurisdictions? We can all easily imagine what the result would be.

I should like to direct a question to those participants in this Conference who represent nationwide industries and who therefore ship their product into many of the 50 States. Just consider for a moment, how conveniently would your firm be able to operate if it had to design or package its product to suit the whims and fancies of 50 and more varying jurisdictions? With each State having individual authority to regulate weights and measures, such a chaotic situation is within the realm of possibility. It is possible, that is, if it were not for the meeting which you are now attending.

The State and local jurisdictions can legislate beyond the Federal statutes as long as that legislation does not conflict with those Federal statutes. If legislation were enacted in such an independent manner, it could very well result in great confusion, and could comprise a definite restraint of trade. For this reason, we have this National Conference on Weights and Measures, and this Conference has worked very effectively to create an exceedingly smooth flow of commerce among the several States.

Congress, down through the years, has left it pretty much up to the States to handle the weights and measures authority. To fill the void, the States, one by one, have enacted weights and measures statutes that, in essence, make it unlawful to deliver less, or take more, than the quantity represented in a commercial transaction. But we are a single government, and as mentioned, our Constitution prohibits barriers to trade among the States, so there must be some form of national leadership in commercial weights and measures. This is the role and the function of this National Conference on Weights and Measures, under

the sponsorship of the National Bureau of Standards and its Office of Weights and Measures.

Thus, this National Conference provides one means through which the States and the industries can participate in the development of uniform codes and fulfill their obligation to nation-wide uniformity. Perhaps this is best stated in our published organizational brochure—*The National Conference on Weights and Measures, Its Organization and Procedure*—where, in the very first paragraph the objectives are set forth as follows:

> The objectives of the National Conference on Weights and Measures are (a) to provide a national forum for the discussion of all questions related to weights and measures administration as carried on by regulatory officers of the States, Commonwealths, Territories, and Possessions of the United States, their political subdivisions, and the District of Columbia; (b) to develop a consensus on model weights and measures laws and regulations, specifications and tolerances for commercially-used weighing and measuring devices, and testing, enforcement, and administrative procedures; (c) to encourage and promote uniformity of requirements and methods among weights and measures jurisdictions; and (d) to foster cooperation among weights and measures officers themselves and between them and all of the many manufacturing, industrial, business, and consumer interests affected by their official activities.

As we all participate in this, the 49th National Conference on Weights and Measures, let us keep these objectives in the forefront of our thoughts.

A University Curriculum in Measurement Science

THE INTEREST OF EQUIPMENT MANUFACTURERS

by Mack Rapp, *Vice President, Detecto Scales, Inc., Brooklyn, N.Y.*

At numerous meetings over the years, the need for a university-based technical course, concerned with scale technology and related areas, has been discussed again and again. Scale manufacturers individually and collectively have recognized the important need for such a training program at a college level. The individual scale dealers and servicemen also have endorsed such effort and it received the full support of the Scale Manufacturers Association and the National Scale Men's Association. Weights and measures officials also have displayed keen interest in this type of a project. Thus important representatives of industry, of scale users, and of enforcement officials have given encouragement to such an undertaking.

All were in agreement. There were varied ideas on matters of emphasis, but the need for a common source of supply for properly trained personnel gave the necessary purpose and strength to the project idea.

The recognition of the far-reaching importance of this to all facets of the weighing industry lent encouragement to many of us who were constantly attempting to secure support for this program from the field of education—the engineering schools, the colleges, the universities.

We were fortunate. In April 1963 the subject of a technical course for our industry was being discussed at the annual conference of the National Scale Men's Association at Cleveland, Ohio, and, shortly thereafter, at a meeting of the Scale Manufacturers Association, a committee was appointed to investigate the possibilities of discussing this project with educators.

Little did any of us realize that, at about the same time, various Deans of the University of New York were discussing the same subject.

On June 4, 1963, we met with Paul B. Orvis, Executive Dean of State University of New York. We discussed with him the need for a formal training program providing appropriate education in scale technology. We outlined for him how, with the advent of highly sophisticated weighing systems and the increasing expansion of scale technology, the need for a basic training program was becoming increasingly more important.

Walter C. Hinkle, president of State University Agricultural and Technical Institute at Alfred, New York, picked up the ball. A meeting was arranged with George Whitney, Chairman, Engineering Technologies Division. His report was favorable and Milo Van Hall, Dean of Student Academic Programs, invited a committee representing our industry to visit with the University staff at Alfred.

Kenneth C. Allen, president of the Scale Manufacturers Association, Inc., called for volunteers to serve on an advisory committee. Ten representatives from manufacturers, Arthur Sanders, Executive Secretary, Scale Manufacturers Association, Inc., and Malcolm Jensen, Chief, Office of Weights and Measures, National Bureau of Standards, accepted the task.

Both groups, the industry's advisory committee and the University staff, met at Alfred, New York, in September of 1963. In one day, a tentative curriculum was prepared and subcommittees properly oriented for future actions. With slight modification, the curriculum was approved early in December, with the course in Measurement Science starting September 1964.

At long last, a technical course for the weighing industry need no longer be discussed. It is now a reality.

Scale manufacturers, and scale people throughout our country and even in Canada, have promised full-hearted support. We will supply equipment for the laboratory, we will assist the instructors, we will help with text material and visual aids. We are talking of scholarships, we will provide summer jobs, and we can assure full-time employment for graduates.

Better trained technicians employed by industry in the scale plant and in the field to supervise service and installation will mean better scales, better weighing, better weights and measures!

There is always the possibility that some of these graduates trained in Measurement Science will find their way into weights and measures at the National Bureau of Standards, in State departments, and in local jurisdictions.

All of us, we in manufacturing and industry and you in weights and measures, have a proper source for personnel, technically educated for our needs.

You can help this important effort by contacting guidance counselors in the high schools in your jurisdiction and telling them about the first Measurement Science course at State University of New York at Alfred, New York.

THE PHILOSOPHY AND PLAN OF THE UNIVERSITY

by M. E. VAN HALL, *Dean of Student Academic Programs, Alfred State Tech, Alfred, New York*

The creation of six Agricultural and Technical Institutes in the State of New York more than half a century ago was predicated on the need to offer training in those fields for which there were demands for trained employees.

As our country and its peoples' work changed during those 50 years, so these two-year colleges have changed their curricula to meet new requirements in fields of work. From an agrarian economy in the early 1900's, the 40's, 50's, and 60's have brought technology and engineering with its ever increasingly sophisticated machines and have forced our colleges into a new and fanciful world—a never-never land today.

The Alfred Agricultural and Technical Institute has always been aware of this change. Curriculum development has reflected a determination to keep pace with our changing society and the world of work.

At one time we offered only study in the fields of agriculture and domestic science. For a brief period, we were in the rural-teacher-training business. In 1937, however, we made our most dramatic giant step when we introduced industrial-technical programs in the electrical, mechanical, air conditioning and refrigeration, and diesel areas. Along with these came a full complement of business curricula including accounting, executive secretarial science, sales and marketing, and business administration.

It is worth noting, at this juncture, I believe, that before State University of New York approves the teaching of any curriculum, that curriculum must be substantiated by documental evidence of need by industry. In other words, the University insists on evidence by industry that: (1) there is a need for trained technicians, (2) that industry will offer responsible employment opportunities to the college's graduates, (3) that it will assist in planning and developing of curriculum content, (4) that it will supply an advisory committee to assist the college in the operation of the curriculum, and (5) that it will be receptive to the idea of supplying equipment and scholarship monies to the college so that an effective program might be offered and so that the best kind of student can be attracted to the program.

If these requirements appear stringent, you should realize that a multitudinous number of requests (for a great variety of curricula) constantly come in for adoption by the college. Should we heed without thorough investigation all such requests, we would have a proliferation of impoverished curricula: too small and too poorly structured to make a contribution to anyone. So, the State University asks industry and the college to meet certain specific requirements before a curriculum can be approved.

If you are now confused by such terms as college, institute, and university—for I have used all three thus far—let us pause and ex-

amine the higher educational structure within which we operate.

The State University of New York is a complex of some 50 institutions including university centers engaged in graduate study and research, four-year colleges, and two-year community colleges and agricultural and technical institutes. Alfred, one of the latter, is located in the foothills of the Alleghenies, 20 miles from the Pennsylvania border. The town of Alfred with a population of 3,000 is the home of three colleges; a private four-year Liberal Arts College, a four-year Ceramic College, incidentally one of the most famous in the world, and our college—the two-year technical institute. Of the three institutions, ours has the highest enrollment.

Our 1,600 Institute students study some 25 different curricula. They come mostly from New York State, but 10 other States and six foreign countries are also represented on the campus. We offer the Associate of Applied Science degree. Our curricula are certified by the New York State Education Department. The Institute is accredited by the Middle States Association of Schools and Colleges. Most of our Engineering Technology curricula are approved by Engineers Council for Professional Development, familiarly known as E.C.P.D.

So much for history and background.

When we were first approached about a possible curriculum dealing with weights and measures, I think it would be an understatement to say that we knew little or nothing about your discipline, your industry, your problems, your hopes, and your aspirations.

Indeed, it was when dialogue had taken place nearly a year ago between interested members of your industry and our college people that we began to grasp the fantastic and incredible advances you have made and the problems you faced. It became all together clear, too, that with no college or institution of higher education directing attention to the training of technicians for your industry, a tremendous challenge was presented us.

So it was with enthusiastic and insistent endorsement of a nucleus of your leaders, of Malcolm Jensen, of Arthur Sanders, that we undertook the project. We have never started a program that enjoyed such complete support by an industry as did Measurement Science.

Our preparation included an exhaustive reading program concerned with various phases of your industry, trips and visits to the National Bureau of Standards, George Washington University, and to over 15 individual industries. An Advisory Committee was appointed and approved by the Institute's Council, and this group met in April at the Hotel Concord with Dean George Whitney, who will direct the program on the campus. A modest brochure announcing the new program was produced, and over 3,000 copies have been sent out to your leaders throughout the country.

Throughout this past year, constant encouragement has been given by the original group who came to our campus last July. Mack Rapp, from whom you have just heard, has been particularly enthusiastic. An added thanks should go to him for speaking to over 100 high school guidance counselors and principals at our annual Fall Festival Educator's Luncheon on the campus in early November. He represented you well, and we continue to receive favorable comment on his speech. As you would imagine, the success in developing a University Measurement Science Program has hinged on the art of communication. Your representatives found it necessary first to communicate with us as to the needs and opportunities of technically trained men for your in-

dustry. Next, our task is to communicate these needs and opportunities to the high school guidance counselors and high school students throughout the country.

Now we ask you to accept this as a report regarding our progress. We feel somewhat like the automobile makers in Detroit unveiling a new model. We are unveiling a pioneer college curriculum. But, unlike Detroit who must please its one audience—its buying one—we hope we are able to please two audiences. First, you—who are the ones we are most anxious to please. For a college effort such as this would be of little value without your confidence. It is you whom we are asking for continued advice. It is you who, we hope, will hire our graduates. It is you whom we will be asking for scholarship monies. It is you we will ask for some laboratory equipment. It is you we will ask for some summer jobs for our students in your plants. It is you we ask to carry on an active recruitment program for young men with promise, who we hope will come to Alfred and study with us.

Secondly, we have an obligation to the Measurement Science student. He must be attracted to this field: one he probably knows little or nothing about, in spite of the glamour and high-pressure recruitment devices used by hundreds of other disciplines. Next, he must feel the course of study in Measurement Science at Alfred is worthwhile and challenging. In fact, he must feel that he is the most fortunate boy in the world to be a student in this program. Thirdly, of course, he will want some sense of security from the industry itself—first, that he will be financially respectable when he enters employment, that he will be given an opportunity to grow with the company, and, lastly, that he will have the fringe benefits offered by other industries.

We ask you to help us find the finest type of student available. Talk to your friends, talk to your local school officials, inform the press in your community and, finally, may we suggest that you encourage your employees to urge their youngsters to consider this opportunity.

Now, what should you expect from us? You should expect a continuing flow of well-trained technicians to fill the critical personnel needs of your industry. Let me warn you, however, of competition from other industries. Let me illustrate. One of our Nation's largest farm machinery manufacturers has said to us "If you ever interview a prospective student who you think has potential to become president of our company, wire us collect. We want to know about him." Another company executive said to us "We are interested in your graduates. Look around our executive offices—all men about 55 or 60." "Who," he said, "will be running our company ten years from now?"

We, at Alfred, hope that we can furnish you with technicians, but we also hope that some of them will be able to serve you in leadership capacities.

These things can only be accomplished through a real team effort. A partnership if you will—Alfred Tech and you, the leaders of this most important industry.

I commend you for having the vision in seeing the need for better trained people. I assure you that my college stands dedicated to doing all it can to supply the educational needs for young men wishing to go into weights and measures.

I appreciate the honor you have bestowed upon me by including me in your exciting program and, on behalf of all the faculty and administration of my college, I extend to each and every one of you a cordial invitation to visit us so that we may become better acquainted.

AFTERNOON SESSION—TUESDAY, JUNE 16, 1964

(F. M. Raymund, Vice Chairman, Presiding)

(This session began with the Report of the Executive Committee, presented by D. M. Turnbull, *Conference Chairman, Director, Division of Licenses and Standards, Seattle,* Washington, which can be found beginning on page 159.)

(Following the Report of the Executive Committee, the Report of the Committee on Education was presented by J. E. Bowen, *Chairman, City Sealer of Weights and Measures, Newton, Massachusetts,* and can be found beginning on page 161.)

THE NEW BRITISH WEIGHTS AND MEASURES LAW, ITS DEVELOPMENT, ENACTMENT, AND PRINCIPAL FEATURES

by T. L. E. Gregory, *Chief Inspector of Weights and Measures for the County of Nottingham, England*

On July 31, 1963 the Parliamentary Bill which became the Weights and Measures Act 1963 received the Royal Assent and took its place among the Laws of the United Kingdom of Great Britain and Northern Ireland.

On January 31, 1964, a considerable part of the new Act, including the administrative provisions, came into operation and the Weights and Measures Act of 1878 which, with the amending and supplementary Acts of 1889, 1892, 1897, 1904, 1926 and 1936, had controlled weights and measures in Britain for 86 years was quietly and unceremoniously laid to rest. That the grand old lady and her more or less elderly daughters had been decrepit and unsatisfactory for many years was generally accepted, but I have a feeling that on January 31 a few of the older inspectors shed a silent tear and wondered whether her sophisticated but much more flexible successor would stand the ravages of time and change quite so well. Only time will tell but personally I think it probably will.

In order that no misunderstanding should arise from the use of the word "British" in the title of this paper, it should be explained at the outset that the generality of the provisions of the new Act are applicable to Great Britain (i.e. England, Wales and Scotland) only. Parts of the Act, relating mainly to standards and units of measurement, apply to Northern Ireland but the generality of the provisions do not do so. There are also procedural differences in the application of the Act to Scotland because, under the Act of Union, Scotland retains its own judicial system.

Development

The inadequacies, perhaps rather than the weaknesses, of the old legislation began to be apparent long ago, at least as far back as the first World War. Between the Wars there was sporadic agitation for improved legislation but the political climate was never really conducive to a thoroughgoing revision. All that was done in this period was to patch up the old structure with supplementary legislation controlling prepacked foods, liquid fuel and lubricating oil measuring

instruments, and the sale and carriage by road of sand and ballast. In this period, and more particularly in the years immediately following the last War, local authorities grew impatient alike with the inadequacies of the outdated law and disinclination of the Central Government to move in the matter. Many authorities sought and obtained from Parliament legislation of local application (i.e., legislation enforceable only in the territory of the particular authority) which did something towards relating weights and measures control to the changing needs of the times but never really touched the fundamental defects in the corpus of legislation. Local legislation also produced a lack of uniformity of requirement as between different areas which made difficulties for traders operating on a national basis, or even in territory covering several authorities' areas. This combination of adapted, but outdated, national legislation with varying local supplementary requirements produced many difficulties and sorely tried the patience of both inspectors and traders.

The first real move towards a revision and consolidation of weights and measures law was made in 1943. In that year, a small subcommittee of four leading inspectors (representing the Institute of Weights and Measures Administration, then known as the Incorporated Society of Inspectors of Weights and Measures) discussed with officers of the Board of Trade present as observers, the post-war reconstruction of the weights and measures service. This subcommittee produced a Report (which came to be known as the "Green Book") which was published by the Incorporated Society. This Report undoubtedly led to the appointment by the President of the Board of Trade of a Departmental Committee under the Chairmanship of Sir Edward Hodgson, K.B.E. (previously a distinguished civil servant) with terms of reference "To review the existing weights and measures legislation and the administration thereof and to make recommendations for bringing these into line with present-day requirements." This committee sat for two years and received evidence from no less than 187 sources, mostly nationally recognised associations. The Committee's lengthy Report, called the "Hodgson Report," was published and presented to Parliament in 1951 (Cmd. 8219 H. M. Stationery Office, London) and recorded what was probably the most valuable and exhaustive study of weights and measures problems and administration ever undertaken anywhere up to that time.

By the time the Report was presented, a General Election had changed the political complexion of the Government. The new Government, in its early life, was concerned with what they no doubt regarded as being more fundamental issues than weights and measures. Apart from a prompt and forthright rejection of the only really revolutionary recommendation in the Report—that Britain should adopt the metric system—very little apparent progress was made towards new legislation for about nine years, although it was known that the departments concerned had quietly undertaken considerable and detailed consultations with various interested bodies. In the meantime, excellent as it was, the Hodgson Report had become a decade out-of-date in important respects, particularly in relation to commodity control and the practices and techniques of the distributive trades, although those responsible for the content of the contemplated legislation must necessarily have adjusted their ideas from time to time.

The difficulties and compromises necessarily involved in the production of a comprehensive weights and measures statute which, in one way or another, touches every trading and industrial interest and indeed practically every human activity, are self-evident. Add to this that the statute must satisfy the present and be sufficiently flexible to serve the forseeable future, it is not surprising that the first Bill introduced into the House of Lords on November 1, 1960 failed to satisfy everybody—indeed, the subsequent debates gave the impression that it satisfied nobody. In fact, this was far from true—the general concept was good and the objections at that time were mainly related to details in which, significantly, the Bill departed from the firm and excellent recommendations of the Hodgson Committee. In the early debates in the House of Lords, it quickly became apparent that there was much more in weights and measures and its impact on trade and industry and the consuming public than many people had hitherto imagined. The result was that this First Bill was promptly dropped after it had received a very rough handling in their Lordship's House, particularly by Peers representing local authority and consumer interests. In due course, a "No. 2" Bill, improved in a few minor respects, was introduced into the House of Commons but made no progress whatever. The Third Bill which, after many lengthy debates and further improvements in both Houses ultimately became law, was introduced in the House of Commons on October 31, 1962. Numerous amendments were tabled against this Bill in both Houses. In the House of Commons there were so many that it is doubtful whether anybody counted them but they certainly greatly exceeded 100. Subsequently, in the Lords, over 70 amendments were debated in Committee and over 60 (including a few new ones) when the Bill was reported to the House.

In all and particularly if the abortive No. 1 Bill is included (No. 2 was introduced but never debated), more Parliamentary time was spent on the Weights and Measures Bill than on any other similar Bill in recent years. Indeed, in the later stages in the House of Lords, the Bill had to be forced along by the Government by the imposition of late sittings, which were far from popular with their Lordships, in order that it might complete its course in time to receive the Royal Assent before Parliament rose for the Summer recess and, for practical purposes, the end of the Legislative Session. Much to everybody's relief, the Bill completed its course on the day before the Summer recess. Had it not done so, it would, in common with other uncompleted legislation, have become a nullity as was the case with the No. 1 and No. 2 Bills.

Features of the Legislation

1. *General.*—The Act recasted and greatly extended existing weights and measures legislation. When in full effect it repeals nearly all existing weights and measures statutory law, and these repeals extend to no less than 36 public general statutes (including the considerable subordinate legislation made under some of them) and to 155 local Acts. The Act is divided into 6 major Parts, 10 Schedules, and 65 Sections, running in all to 119 pages. It covers a vast field from the definition of the pound and yard in terms of the kilogramme and metre respec-

tively to the control of the sale of rust remover and cosmetics and a host of things in between. In respect of many matters, the Act contains only the "headlines" and leaves it to the Board of Trade to make regulations and orders legislating for the details, including in some instances the extension and restriction of the application of the provisions of the Act itself. Already the first batches of subordinate legislation have appeared and it is clear that, in bulk, this will soon exceed that of the Act itself.

The Act is evolutionary rather than revolutionary in concept. To a large extent, it follows the basic principles of the earlier legislation, but the improvements in detail, technique, scope, and flexibility are immense. One of the many problems which faces the draftsman of revisory legislation affecting such an important field of human activity and capital investment as weights and measures is to provide for continuity—for a smooth and gradual changeover from the old to the new. This has been achieved mainly by the provison of periods of allowance for existing practices during which traders, inspectors, and enforcement authorities can, without undue inconvenience, make the necessary changes.

2. *Units and Standards of Measurement.*—Probably the most profound and concise pronouncement ever made on the basic importance of weights and measures is to be found in the words of John Quincy Adams, later a distinguished President of the United States, in 1821 when he said:

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

These rhetorical words of 140 years ago, when "consumer protection" would have been regarded as an expression in doubtful taste, if not in restraint of trade and therefore a good deal worse, in fact reiterated one of man's earliest discoveries: namely that a state-controlled system of uniformly accurate weights and measures is a basic essential of civilised progress. Parts I and II of the new Act bring up-to-date provisions for this purpose which have existed in Britain, in one form or another, for centuries.

Part I of the Act, and Schedules 1, 2, and 3, prescribe the lawful units of measurement of length, mass, volume, capacity, and electrical energy; their bases and derivation; the status of various classes of physical standards; and the weights and measures denominations permitted for use in trade. Provision is also included for the maintenance of physical standards, for the determination and redetermination of their values, for the definition of new and additional units, and for the setting up of a permanent expert scientific Commission to keep these and similar matters under systematic long-term review. An innovation of importance historically and in other ways is that the fundamental units on which our system of weights and measures will henceforth be based will be the international metre and kilogramme.

The yard is defined as being 0. 9144 metre and the pound as 0. 453 592 37 kilogramme, thus bringing the U.S. and British units of linear measure and weight into practical conformity. The gallon is defined in Schedule I (Part IV) as being "the space occupied by 10 pounds weight of distilled water of density 0. 998 859 gramme per millilitre weighed in air of density 0. 001 217 gramme per millilitre against weights of density 8. 136 grammes per millilitre." (Under the repealed 1878 Act, the gallon was less precisely defined as "containing ten imperial standard pounds weight of distilled water weighed in air against brass weights, with the water and air at the temperature of sixty-two degrees of Fahrenheit's thermometer and with the barometer at thirty inches.") The British Gallon is the basis of both liquid and dry measure, although dry measure is little used nowadays. The Bushel is defined as being equal to eight gallons and the Peck to two gallons, but both will cease to be lawful units after the expiry of 5 years.

U.S. and British measures of capacity of similar denominations, of course, have never represented the same quantities. The considerable disparity in volume of these derived units, due to historical differences in derivation and long usage in our respective Countries, clearly made it impossible to bring our measures of capacity into conformity. Although the differences are usually well-understood by international traders, they do very occasionally cause us a little difficulty, particularly in relation to the retailing of imported prepacked goods.

An important feature of Part I is the provision for the establishment of a Commission on Units and Standards to advise the Board of Trade on the definition and redefinition of units of measurement: the provision, nature, construction, and custody of the United Kingdom Primary Standards and copies thereof and the frequency with which their values should be redetermined; the method by which the values of secondary and other Board of Trade Standards should be derived from the primary standards and the general control of standards provided at Government establishments. The Board are empowered to give effect to any recommendation by order or regulation which, *inter alia*, may amend, extend, or repeal any provision of the Act itself. The advantages of the flexibility of these provisions in an era of rapid technological development, and in furthering worldwide agreement on weights and measures, will be obvious.

Weighing and Measuring in Trade

Part II of the Act prescribes the manner in which the control is to be exercised over weighing and measuring equipment in trade and the manner of using such equipment, including the prescription of the units of weight and measure lawful for use in trade. Here again, apart from prescribing penal offenses, the Act contains (voluminous as they are!) merely the headlines, leaving many details to be worked out in subordinate legislation. This legislation, in the form of regulations, has already appeared in considerable quantity to enable this Part of the Act to come into operation as scheduled on January 31, 1964. Controls which have hitherto applied are greatly extended in scope and application and supplemented in important respects. The application of Part II is conditioned by a novel and ingenious definition of "use for trade." The definition is about as all-embracing as language permits and reflects great credit on the draftsman. For the purposes

of the Act, "use for trade" is use in connection with, or with a view to, a transaction for:

(a) the transferring or rendering of money or moneysworth in consideration of money or moneysworth; or
(b) the making of a payment in respect of any toll or duty, where:
  (i) the transaction is by reference to quantity or is a transaction for the purposes of which there is made or implied a statement of the quantity of goods to which the transaction relates; and
  (ii) the use is for the purpose of the determination or statement of that quantity.

The definition further provides that equipment made available for public use (e.g., personal weighing machines) whether on payment or otherwise, and machines for grading hen eggs by weight are to be treated as being "in use for trade."

An interesting feature of this Part of the Act is that stamping (I think you call it "sealing") is required only in the case of "prescribed" equipment, i.e., equipment of a class or description "prescribed" for that purpose by regulation by the Board of Trade. Any weighing or measuring equipment may of course be "prescribed" and the great majority of the various types of such equipment commonly used in trade have already been so-prescribed. The following are examples of equipment used for trade which have *not*, so far, been "prescribed" and, therefore, are not required to be "passed as fit" and stamped by an Inspector *before* being put into such use: fabric and leather measuring instruments, and water meters. Inspectors are, however, empowered to inspect *any* weighing or measuring equipment (whether "prescribed" or not) found in use; and the penal provisions as to the use or possession for use of unlawful equipment or of false or unjust equipment, or fraud in the use of it, apply. Where weighing or measuring equipment is found in the possession of a person carrying on trade or on any premises used for trade, it is to be deemed, in law, to be in use for trade unless the contrary is proved.

Another point of interest in this Part is that, after five years, the Bushel, Peck (dry measures), and the Pennyweight (precious stones) will disappear from the list of lawful units of measurement for use in Britain. Provision is also included similarly to exclude weights and measures of the Apothecaries series (drugs) at a date, not earlier than five years, to be appointed by the Board of Trade.

Provision is included for the Board of Trade to grant formal certifications of approval to patterns of equipment and an Inspector may not refuse to pass or stamp equipment of a pattern so approved on the ground only that it is not *suitable* for use for trade. If, however, he is of opinion that it is intended to be used for a particular *purpose* for which it is not suitable he may refuse to stamp it until the matter has been referred to the Board of Trade. The Board may, in appropriate cases, also give conditional and/or temporary approval to a pattern, and may also revoke any certificate of approval after consultation with interested parties.

Penalties, recoverable on conviction before a court of justice, are provided for a variety of offences relating to the improper or unauthorised use of equipment. In relation to stamping (sealing), it is an offence for any unauthorised person to mark in any manner any

seal or plug provided for the reception of an Inspector's stamp, to forge, counterfeit, or deface (except in the case of manufacturers or repairers destroying or obliterating a stamp in the course of adjustment or repair) any stamp, or to insert it in any other equipment, or to make any alteration to stamped equipment so as to make it false or unjust. In nearly all offences relating to the unlawful use or stamping of equipment, the equipment itself is liable to seizure by an Inspector and to forfeiture if a Court so decides.

Public Weighing or Measuring Equipment

Part III deals with weighing and measuring equipment provided or available for use by the public (except person-weighing machines for which other provision is made). Weights and Measures Authorities are empowered to provide for public use such weighing or measuring equipment as appears to be expedient. They may also employ persons to attend the equipment and may make such charges for the use thereof as they think fit. This is a very useful provision as the rapid closure of rural and intercity railway stations in Britain (and the weighbridges provided at such stations) is leaving many towns and villages without any means of readily checking loads of roadborne goods. A new and overdue provision is the requirement that persons attending on public weighing or measuring equipment must obtain a certificate of qualification from a Chief Inspector of Weights and Measures. This Part does not come into operation until July 1965.

Equipment available for public use is provided by many private undertakers in Britain as well as by local authorities. The controls of Part III apply generally. Persons appointed to attend to weighing or measuring by equipment available for public use are required to do the work on demand and to do so fairly. They are also required to give a statement of the weight or measurement in writing, to keep records, and to retain and make them available to any inspector during the period of two years. Any person bringing anything for weighing or measuring must, on request, give his name and address.

Commodity Control

Part IV deals in broad principle with commodity control. It prescribes the general rules which the Courts and Inspectors must observe in dealing with commodity offences. Schedules 4 to 8 inclusive, which are associated with this Part, prescribe in detail the requirements as to quantity control for a vast number of named commodities. These include practically all foods and packeted and canned shop goods, in addition to sand, ballast, solid and liquid fuels, lubricating oils, ready-mixed concrete, cement mortar, inorganic fertilisers, liming materials, wood fuel, toilet preparations, soap, detergents, paint, antifreeze, postal stationery, intoxicating liquor, and many other items. This Part and the associated Schedules replace in an up-to-date and greatly extended form the excellent principles of quantity control laid down in a number of earlier statutes, including local Acts. These principles are not only extended to a vast range of consumer goods to which they previously did not apply, but power is also given to the Board of Trade still further to extend and amend the provisions in the light of experience.

Commodities are required to be sold by weight, measure, or number, as appropriate, and the quantity is to be made known to the purchaser

or, in the case of prepacked goods, marked on the packet. Many kinds of prepacked goods are required to be made up only in specified simple quantities. Unfortunately, the Act permits many kinds of goods to be sold by "gross" weight (i.e., with the weight of the wrapper or container included in the weight purported to be sold) if the wrapper weight satisfies a prescribed scale. Consumer opinion in Britain generally regards sale by "gross" weight as an indefensible trading practice. It runs contrary to the firm recommendation of the Hodgson Committee and was a point of heated controversy during the Parliamentary passage of the Bill.

One of the most important provisions of Part IV is the general prohibition against short weight, measure, or number. This prohibition extends to delivering to a buyer a lesser quantity than is purported to be sold or than corresponds with the price charged, and to the making of any misrepresentation by word of mouth or otherwise as to quantity, or any other act calculated to mislead either the buyer or the seller as to quantity.

It is not proposed to go into the detail of the statutory defences which run into six pages of the statute. On the whole they are to protect inadvertent offenders and appear to be reasonable despite their complications. They will however, present inspectors and those who must advise traders independently with considerable mental exercise and, despite the quality of the draftsmanship, there is little doubt that the legal profession and the Courts will spend much time—and litigants much money—in determining precisely what is meant by some of the expressions in this Part and the Schedules which are to be read with it. The responsibilities and duties placed on Inspectors investigating matters which may result in legal proceedings are particularly onerous and time-consuming and there is no doubt that considerable additions to the existing strength of the inspectorate will be necessary when the Act is in full operation.

Local Administration

Part V prescribes the units of local administration. In England and Wales, excluding the London Metropolitan region, these will, as a general rule, be county and county borough councils. There are, however, in the case of county areas, important exceptions to this rule which made the subject of areas of administration one of the most highly controversial during the Parliamentary Debates. Shortly, non-county borough or urban district councils with populations of 60,000 or more may become independent weights and measures authorities by mere resolution. Further, the councils of boroughs or urban districts with populations less than 60,000 or of *any* rural district may make representations to the Board of Trade and to the county council that they should become independent weights and measures authorities. If the Board are satisfied after consultation that there are "special" circumstances, the Board may direct any such council to be the weights and measures authority. In Scotland, the administrative units are to be the county councils and the councils of large burghs as defined in the Local Government (Scotland) Act. In the Metropolitan area of London, the Act leaves it to the Board of Trade to direct which authorities shall have weights and measures responsibilities. It has since been announced that these are likely to be the 32 new borough councils set up under the London Government Act which was passing through

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Parliament at the same time as the Weights and Measures Bill. Many experienced administrators would have preferred to see weights and measures responsibilities vested in the Greater London Council so as to provide a uniform and much more economical administration throughout the Metropolitan area. Indeed, the permissive fragmentation of the service, and the ancillary consumer-protection services which run with it, among the smaller units of local government, both in the Metropolitan area and in the provincial counties, is regarded by many as a legislative blunder. These proposals were among the most strongly contested during the Parliamentary passage of the Bill in both Houses.

Powers of Board of Trade in Relation to Administration

Part V of the Act gives the Board power to make regulations as to the "manner" of the performance of the local authority's functions. Otherwise, apart from local authorities being required to provide such standards and testing equipment as the Board approve and, in the case of standards, to keep and use them on approved premises, the powers of the Board in relation to local weights and measures authorities are rather extraordinary. Shortly, the Act gives them power to inspect, criticise (publicly if they so choose), persuade, and cajole, but the power to make regulations is the ultimate control.

Inspectors of Weights and Measures

Inspectors of Weights and Measures are the officials on whom the effectiveness of the legislation ultimately depends, and considerable personal responsibilities are placed upon them.

Part V of the Act requires local weights and measures authorities to appoint a Chief Inspector and such number of other inspectors (including a Deputy Chief, if desired) necessary for the discharge of the functions imposed by the Act on Inspectors. All Inspectors must hold the statutory professional qualification referred to below and be remunerated, thus excluding the appointment of unpaid honorary officers. The Chief Inspector is responsible to the authority for the custody and maintenance of the standards and equipment and generally for the operation of the authority's arrangements to give effect to the Act in their area.

This Part of the Act requires the Board to provide for the holding of the qualifying examinations for Inspectors and the grant of certificates to successful candidates who are not under the age of 21.

The powers, functions, duties, and responsibilities of Inspectors are very many and are mentioned at appropriate places throughout the Act and the subordinate legislation made under it. I shall not attempt to catalogue them but merely to say that throughout, in the ultimate, his responsibility for the proper discharge of his statutory functions is to the Crown through the Courts of Justice and not to any Government Department or other body or person. The Act itself gives him no security of tenure of office. Indeed, it provides that he shall hold office during the pleasure of the appointing authority. In practice, however, he is protected by the law as to wrongful dismissal and the appeals machinery of the Conditions of Service applicable to the Local Government Service in Britain. Under Part V of the Act, an Inspector who stamps any equipment in contravention of the Act or any

Regulation made under it, or derives any profit from or is engaged in the making, adjusting, or selling of weighing or measuring equipment or knowingly commits a breach of any duty or otherwise misconducts himself in the execution of his office is himself liable to prosecution and heavy penalty, as is any person, who, not being an Inspector, acts or purports so to act.

Inspectors are required to take prescribed fees on the stamping of equipment and to account for them to the authority.

Part V also provides that the Board of Trade may make regulations with respect to the manner of the performance by Inspectors of their functions. Many such regulations, relating mainly to the testing and stamping of equipment, have already been made.

Powers of Inspection and Entry

Part VI of the Act gives an Inspector extensive powers of inspection and entry to premises within the area of which he is appointed. Shortly, he is given power, at all reasonable times, to inspect and test any weighing or measuring equipment which he has reasonable cause to believe is used for trade or in any person's possession or upon any premises for such a purpose; to inspect any goods to which the Act or any subordinate legislation applies or which he has cause to believe to be such goods; to enter any premises (except premises used *solely* as a dwelling house) at which he has a reasonable cause to believe there are any such goods or equipment and to take with him such other persons and equipment as he thinks necessary. He is also given power to seize and detain any article liable to be forfeited under the Act and any document displayed with goods on sale which relates to prices or quantity and which may be required in legal proceedings under the Act. In prescribed circumstances, the Inspector may obtain a warrant from a Justice of the Peace authorising entry by force if that should be necessary.

For the purposes of the Act, "premises" include any place, stall, vehicle, ship, or aircraft, but the Act specifically says that it does not authorise the inspector to stop a vehicle on a highway. A vehicle, being "premises," the Inspector has power to enter it for the purposes of inspection. The prohibition against stopping a vehicle was severely critised, even ridiculed, during the Parliamentary progress of the Bill.

It is further an offence under Part VI willfully to obstruct an Inspector or, without reasonable cause, to fail to give him any assistance or information reasonably required for the performance of his functions or knowingly to give false information.

Part VI also deals with the prosecution of offences and provides that where an offence has been committed by a corporate body with the consent or connivance of, or is attributable to any neglect by any director, manager, secretary, he as well as the corporate body is liable to conviction. It also prescribes maximum penalties for offences. In the case of specified minor offences (e.g. use of unstamped equipment, failure to comply with conditions of approval and similar "technical" offences) the maximum penalty is £20 ($56) but for the great majority of offences the penalty for a first offence is a fine not exceeding £100 ($280) and for a second or subsequent offence under the same provision £250 ($700) or three months imprisonment or both.

Operation

The Act comes into operation in progressive stages on the dates indicated:

31st July, 1963:	Section 61(4) permitting sale of milk in 6d. cartons from vending machines (quantity to be declared on carton).
31st January, 1964:	Part I, Units of measurement, primary standards, local authority standards, and the testing of standards and equipment. Part II Weighing and measuring equipment used in trade. Part V Administration and enforcement by local authorities and their inspectors, and the qualifications and appointment of inspectors. Part VI Powers of entry and inspection, prosecutions, and miscellaneous matters. Schedules 1 to 3 Standards and lawful units, Schedule 9 (Part I), Repeals of other public general Acts or parts thereof, and Schedule 10 (relating to Northern Ireland).
31st July, 1965:	Part III Public weighing and measuring equipment and the issue of certificates to keepers thereof by Chief Inspectors. Part IV and Schedules 4 to 8 (except Par. 3 of Part VI of Schedule 4, dealing with the sale of spirits for consumption on the premises). Sale of commodities by weight, measure, or count. Parts II and III of Schedule 9. Repeal of public general Statutes or parts thereof and the great majority of local legislation dealing with weights and measures.
31st July, 1966:	Par. 3 of Part VI of Schedule 4. Requiring gin, rum, vodka and whisky for consumption on the premises to be sold only in one of the following quantities or a multiple thereof: ¼ gill, ⅕ gill, or ⅙ gill to be chosen by the seller and declared in a notice exhibited on the premises.

Conclusion

As indicated earlier, the Act has not satisfied everybody. When the balance is drawn, however, the consumer will enjoy immensely greater protection in weights and measures matters than he has ever had previously and the Inspector will no longer have to adapt to the space age ancient legislation enacted in an era when transport literally meant horsepower. Traders, whilst having to accept the increased controls, will in return enjoy the advantage of certainty of requirement in quantity control, uniformly enforceable and applicable to fair traders and competing slick operators alike. They will also have the benefit of extended safeguards against prosecution in circumstances of genuine inadvertence.

So far as the Act prescribes the national weights and measures system and controls weighing and measuring equipment for use in trade, it leaves little to be desired. As a measure of consumer protection, it goes a long way to meet modern requirements. In this respect, however, it could so easily have been so much more effective if more of the improvements suggested by local authority associations and the Institute of Weights and Measures Administration had been accepted. Among those, which, in the opinion of experienced observers, would have been of enduring benefit to consumers are: the abolition of sale by "gross" weight; the declaration of price-per-unit of quantity in the case of many kinds of goods sold by retail from bulk; and some control of the use of misleading containers. Very recently (and since the Bill became an Act), the Government has published a Report on Meat Marketing and Distribution which, *inter alia*, points out the advantages to the consumer of a price-per-unit of quantity declaration in the case of meat. It seems probable that public opinion will demand legislation to deal with this and

other consumer protection matters in the not too distant future. In this connection, the recent Message from the President of the United States to your House of Representatives (Document No. 220) is an excellent and timely reminder that your Country and my own have much in common in very many things, even in consumer protection problems. It points the way to a solution of many of these and serves to emphasize the value and advantages of the exchange of ideas and experiences between those interested in various aspects of consumer protection in our respective Countries.

DISCUSSION OF FOREGOING ITEM

MR. JENNINGS: You have frequently mentioned the Board of Trade. What person, groups, or agencies comprise your present Board of Trade to which has been delegated so much authority?

MR. GREGORY: The Board of Trade is directed by a President, who is one of the principal Ministers of the Crown; it has vast offices and employs a host of officers and staff. It is indeed one of our most important Ministries of Government, but the Board itself has not met since 1850. Like many of our institutions, it started as one thing and, over the centuries, gradually evolved into something quite different. It originated as a Consultative Committee set up by the Privy Council in 1621 to advise the Government in matters relating to trade. How the Board evolved from this into a major government department is a long story. As to the persons, groups, and agencies comprising the Board, in ancient times it included the Archbishop of Canterbury and most of the principal officers of State. Today and for many years past the Board's quorum has apparently been one—the President himself.

MR. JENNINGS: Is your law so constructed as to eliminate the possibility of its becoming top-heavy, that is, having more regulations provided than basic law?

MR. GREGORY: No, I don't think delegated legislation necessarily makes the body of law top heavy. Within limits and so long as it does not change the basic principles laid down by Parliament, I think it can be very good and necessary in the times in which we live. You see, Acts of Parliament, with us at any rate, are rare. If an Act of Parliament is necessary to change some detail of law or procedure, you have to find parliamentary time, which is in very short supply and available only on the basis of priority. Sometimes years and years go by before parliamentary time can be found for an Act. But if you already have in an Act a provision enabling a Minister of the Government to make regulations varying details of the law, then it is much easier to get desirable changes made, very much easier and speedier than trying to get an amending Act through Parliament. When you get changes in detailed requirements, as we do in the weights and measures field, which, due to rapid technological and commercial developments, is probably changing more rapidly now than ever, representations can be made to the Government, interested parties consulted, and necessary changes in the legal requirements made comparatively quickly. Delegated legislation provides a flexibility very desirable in technical legislation in times of rapid changes and development.

MR. JENNINGS: You mentioned consumer dissatisfaction on commodity control. Will that action be counteracted by legislation, or what steps will be taken to counteract it?

MR. GREGORY: When I said there was a consumer movement for greater protection I had in mind, also, things outside the precise field of weights and measures. I think weights and measures is pretty well

looked after now in this new Act, but there is a strong feeling that the consumer needs a lot more protection in other fields, such as, for example, deceptive packaging, dishonest advertising, and the various gimmicks and practices aimed at obscuring the true prices of articles. We expect that there will be further legislation to deal with these things in the not too distant future.

J. H. Lewis: I believe you indicated that Part III of the Act provided for public weighing services to be performed by the weights and measures authorities. How widespread is this, and in what capacities are these weighings being provided? Do they charge fees?

Mr. Gregory. Many of the larger cities and towns have provided public weighing machines, for the use of which a charge is made, for many years. Generally speaking, a local authority in Britain cannot spend public money for any purpose, however good, unless there is statutory authority enabling him to do so. We have had enabling powers for many years in one form or another, for local authorities to install weighbridges, but they have been restricted as to purpose and application. The new Act gives the powers generally to weights and measures authorities to provide weighing and measuring equipment of any kind and to make charges for use. The fees charged are usually planned to cover the cost of providing, maintaining, and operating the equipment. I have heard it said that some authorities do rather well financially with their weighbridge, but I do not think this is generally the case.

M. Greenspan. During your discussion you mentioned the fact that your legislation provides for certain commodities to be packaged in only specified quantities. How do you overcome the opposition of the manufacturers of the containers when restricting them to these specifics?

Mr. Gregory. There was a lot of controversy about it, of course, but we had the advantage of precedent in Britain. This precedent goes back a long time. Towards the end of the 1914–18 War, when prepackaging began to get going in Britain, we decided that it was a good thing to have packages made-up in well-understood, simple, specified quantities. When we got rid of the emergency legislation after the 1914–18 War, we embodied the specified quantities provision in an Act in 1926, and we have had it for certain basic foodstuffs ever since. The trade in Britain was, therefore, conditioned to the idea. We have extended the application of the principle to many additional items in the recent legislation, but there was considerable trade opposition, as you suggest, to the extension. The trade used the argument that the varying densities of different products would require an extravagant multiplicity of sizes of containers if specified weights were prescribed. In a very few cases this was probably a bona fide and genuine difficulty, but the advantage to the shopper of being able to judge values by comparing quantity was, in our view, the overriding consideration.

F. M. Raymund. I understand that Mrs. Yates, who is traveling with you and Mrs. Gregory, is a County Councillor. Would you tell me what Mrs. Yates' position is and what she does?

Mr. Gregory. Well, I will try to. She is a leading figure in the public and political life of Nottinghamshire. I hope she will forgive me, but I nearly said "a politician"—but I have to be rather careful you know, in the terms I use. I have discovered they sometimes mean different things over here.

Mrs. Yates is an elected member of the Nottinghamshire County Council, which is the principal local governing body of Nottinghamshire. It is difficult to explain all the implications of this in a few words because our systems of government are so different. For instance, there is no corresponding authority to our county council, as far as I can see, in the United States. The county council is perhaps, in force of numbers nearer to your State setup than to your county setup, although, unlike your State, it is an administrative rather than a legislative body. It is a very much bigger body than your county or city councils, but, like yours, it consists of elected representatives. For instance, there are 85 members of the Nottinghamshire County Council. They divide into committees, and each committee has assigned to it responsibility for a section of the County Council's services, e.g., education, highways, public health, public control.

Mrs. Yates is Chairman of the Public Control Committee of the County Council, which is broadly responsible for all functions of the County Council in the control of trading activities and includes the administration of the Weights and Measures, Food and Drugs, Explosives, and Merchandise Marks Acts in which I am interested.

She is active in many other things besides weights and measures. She is a Governor of the University of Nottingham, the Technical College and of many schools in the County, and past Chairman (and present Vice Chairman) of the County Libraries Committee, Chairman of the Nottingham Consumers Association—to mention only a few. In short, she is a very hard-working and—I hope I spare her blushes—a very important and worthy personality in the public life of Nottinghamshire. I am proud to have her with me on this occasion.

Mr. Raymund. I wonder if Mrs. Yates would go to the microphone and just say a word to us.

Mrs. E. A. Yates. I would like to join with Mr. Gregory and Mrs. Gregory in thanking you all for your great kindness since we have been to your Country. I thank Mr. Gregory for his remarks, too, and I hope you all believe some of them.

I have asked many people since we have been in your Country about your setup as far as local government is concerned, and we can't find anything which is quite the same in the two countries. I think we are something between your State and your city, and possibly a little more corresponding to your State. There are 85 of us, 64 County Councillors elected by popular vote and the others are aldermen elected by the County Council. As Mr. Gregory said, we do divide into committees, and, of course there are only two political parties on the Nottinghamshire Council, and my party is unfortunately in the minority.

I would like once again to thank you all very much for inviting us here.

R. E. Meek. Mr. Gregory, in this country we have a limited number of States that provide for type or pattern approval. I know this is a controversial subject here, and possibly I should not raise it, but I would like to know what your feeling is in Great Britain regarding pattern approval. Has it worked out and does it have the support of the manufacturers of weighing devices and measuring devices? I am assuming, of course, that you still have that in your new law.

Mr. Gregory. Yes, we still have it, and it is a very, very good thing indeed. I can strongly recommend it to you. We have had it for many years. We have had it since 1904.

Your Office of Weights and Measures corresponds very closely to our Standard Weights and Measures Department of the Board of Trade. They have a very fine body of scientists and technicians, as I gather your Office of Weights and Measures has, and all new patterns are submitted to the Department for approval. If they give a certificate of fitness for use in trade, no inspector—and this is the law—can refuse to accept equipment of that pattern for use in trade in his area, provided it is accurate and satisfies the prescribed tests. This saves inspectors and the trade a lot of headaches. It puts the responsibility for pattern approval on a central body, it ensures uniformity throughout the Country, and I think it is a very good thing for both the trade and the inspector. The trade know where they stand and the inspector does not have to worry himself about questions of design. It works well in practice and I strongly recommend the idea to you to consider.

Question. Would you say your specifications written by the Board of Trade compare favorably with other patterns throughout the world, such as we have. Would you say that in any way they are comparable?

Mr. Gregory. I am not sure of the details of your system of approvals, but traveling about the United States I have seen quite a lot of weighing and measuring machines, and many correspond closely to the types which have been approved in Britain. I am not sure of the number offhand, but there are about 1,400 individual patterns which have been approved by the Standard Weights and Measures Department of the Board of Trade.

I don't know whether this is perhaps the background of the question—I may be wrong—but I would emphasize this: So far as the Board of Trade approval is concerned, the Board and their examiners are not concerned one iota whether a pattern is produced abroad or at home. It gets the same impartial treatment, i.e., on its merit and fitness for use in trade. There are in fact a considerable number of approval patterns which are manufactured in foreign countries. The foreign exporter to Britain needn't worry a scrap on that ground. He will get impartial treatment and be on level terms with our own manufacturers. I am sure the same position would obtain here if you had a central national approval.

THE NATIONAL SCALE MEN'S ASSOCIATION—ITS PROGRAM FOR THE FUTURE

by W. J. Schieser, *Vice President in Charge of Product Development, Exact Weight Scale Company*

It is an honor and a pleasure for me to have this opportunity to talk to you about the National Scale Men's Association and its program for the future. NSMA numbers among its ranks many weights and measures officials. In a very real sense, they can hardly be considered separate groups.

The National Conference was only eleven years old when the National Scale Men's Association was born in 1916. This Conference, many sealers' associations, and the National Scale Men's Association have certainly come along together and have cooperated in promot-

ing many common objectives.

Men prominent in weights and measures work, and men concerned with the science of scale design and application, had much to do with the forming of the National Scale Men's Association. These were professional men who felt a need for organization and who did something about it. These were men whose daily lives were intimately intertwined with scales and weighing.

It is essential to review the objectives and purposes of NSMA as a prelude to outlining its program for the future. Just a few years ago the NSMA forged a code of ethics which amply describes its objectives and purposes in addition to establishing a code under which scale men have agreed to conduct themselves. I think the code tells a great deal about NSMA, and for that purpose I will read it. It is set forth as follows:

As a member of the National Scale Men's Association, I will, to the best of my ability, abide by the Association Code of Ethics as it is here set forth:

I. Keep uppermost in mind the fundamental importance of the weighing scale to our way of life.

II. Endeavor to impress all the vitally significant part which scales play in providing the most important measurement of most of the world's mediums of exchange, including real goods and moneys.

III. Diligently promote the use of scales as the most precise means of measuring mass or weight.

IV. Conduct myself according to the highest standards of professional ethics in regard to representation of, and charges for, goods or services rendered, and to thereby reflect credit on my Association and the scale industry.

V. Strive diligently at all times to render services in keeping with the best policies of proper weights and measures interpretations.

VI. Take an active interest in existing laws and regulations, in proposed legislation pertaining thereto, and to aid in procuring such laws and regulations as are in the best interests of the general public.

VII. Keep abreast of new developments in weighing equipment and methods, to encourage the procurement of, and to recommend the proper usage for, equipment which will effect greater precision and efficiency in weight measurement.

VIII. Support the National Scale Men's Association, its policies and programs, and to participate in local division activities for the mutual benefit of all its members and the clients which it serves.

IX. Endeavor to earn, and to carefully guard, a reputation of good moral character, good citizenship and common honesty, and to support and promote all the uplifting influences of the community.

X. Strive to raise the standards of efficiency of myself and my associates and to elevate the professional standing of the scaleman to a position in keeping with the responsibilities of the weighing industry.

Today, the organization is comprised of 18 divisions in the United States and Canada, and its membership varies between 650 and 800. It has a national headquarters with a part-time paid Secretary-Treasurer—and I might add that it has seemed more like part-time paid and full-time work the last couple of years. I am sure a great many of you know our Secretary-Treasurer, Sylvia Pickell, who, along with her husband, publishes the *Scale Journal*.

In developing its program, NSMA looks on scalemen as a professional group, and this is a matter of great significance. As a profes-

sional scalemen's organization, NSMA can, and should, be capable of accomplishments that no other existing organization can perform. As all of you know there is a very fine Scale Manufacturer's Association which provides a real service to its members and which works very closely with this Conference. Its Executive Secretary, Arthur Sanders, its officers and some of its committees frequently are part of your program. However, scale manufacturers cannot speak for professional scalemen as a group because the professional men's organization does have a great many members in its ranks that are not directly associated with manufacturers. In other words, there are a great many matters which could benefit the public that could be promoted by the National Scale Men's Association which, if promoted by the manufacturers, might be construed as a promotion by a group with an "ax to grind." An example of such a matter is the widespread promotion of conversion to the metric system. Can't you see the headlines "Scale Manufacturers promote equipment obsolescence!"

Another area of great public interest is in legislation pertaining to weights and measures. It has been expressed to me by some enforcement officials that even though they may feel strongly about pending legislation, they cannot publicly take a stand for or against. They look upon their duties strictly as enforcers of existing laws, not promoters of new laws. NSMA, however, representing as it does a cross section of all scalemen who are concerned with all facets of scales and weighing, is in a position to make an educated and unbiased appraisal of the facts. It can and should promote all that is in the public interest.

All of you are aware, I am sure, that the offices in NSMA are elective, and therefore the holders of those offices change each year. To insure program continuity it has been traditional, though not mandatory, that Executive Committee members advance each year to a new responsibility and are ultimately elected President. NSMA's program for the future is predicated on another tradition, and that is the improvement of the status of the professional scaleman. The present Executive Committee of NSMA is constantly striving to implement a program that will achieve that broad objective.

A few months ago, at the Southeastern Division meeting at Myrtle Beach, some of you may have heard Mr. Bill Fuller, the present Chairman of the Executive Committee, define "professionalism." Bill stated it along these lines: "Scalemen recognize that their work is important to society and that they have a definite public responsibility. They are men dedicated to the advancement of their art, and they are always seeking additional knowledge to improve themselves." All of us concerned with its management believe NSMA can and should be a most important adjunct to such self-improvement. Every one of you in this audience should read the copy of that speech. It is carried in the December 1963 issue of the *Scale Journal*, and it reflects the thinking of one who is helping formulate NSMA's plans for the future. I think it goes way beyond the casual thoughts that many have about the needs and purposes of a scalemen's organization.

NSMA's program includes strong and active divisional activities. Among these are technical meetings on scale design, service, and application, with emphasis on new techniques in the industry. These technically oriented meetings are supported by plant tours of major scale-using industries and by demonstrations of service techniques on actual equipment. Several divisions have been particularly outstanding in

this regard. In essence the major portion of each program is aimed at enhancing the scaleman's knowledge of his profession. The degree to which this is accomplished is, of course, dependent upon the effort put into it by the individual, and upon the management of his particular division. Recently our national headquarters has provided all of the division officers with an organizational manual that contains a wealth of information of the operation of a division. The manual lists such things as program suggestions, duties and responsibilities of officers, requirements for forming a new division, constitution and bylaws, and many other aids to effective operation.

But then, neither time nor your interest will permit going into the many details of division activities.

Of great importance also is the social function of the divisions, and what might be called just plain acquaintanceship. Some would thoughtlessly belittle this activity, but I remind them that many great men have cited and continue to cite a lack of communication as one of the greatest obstacles to human progress. The man who is truly interested in his profession will be interested also in a closer acquaintance with his fellow scalemen and will seek out opportunities to discuss topics related to his work. This is a real part of NSMA's program, and it is effectively conducted in many of the divisions and at the annual conference.

The National Executive Committee is responsible for the welfare of NSMA generally, and this Committee includes those important functions pertaining to membership, legislation, publicity, and the annual conference. As with your yearly Conference on Weights and Measures here in Washington, our annual conference is a highlight of our activities. Some of you attended last year's conference and scale exhibit at Cleveland, Ohio, and some attended this year's conference at the Concord Hotel in Liberty, New York. Those who did will know that these were truly memorable events, both from educational and enjoyment standpoints. None will say that these conferences cannot be improved however. Scalemen's skills must be highly diversified today. They require a basic knowledge of physics, mechanics, electronics, and particularly application knowhow. They require salesmanship to sell not only equipment but also ideas. It will never be possible to jam all of the information scalemen want into a three- or four-day conference.

The annual business meeting of the Association is held during the conference, and at this time the divisions participate through their official representatives, which gives them a definite voice and influence in the running of its affairs.

Included in NSMA's programs are some projects which are momentarily beyond our reach, but like most worthwhile objectives they start with dreams that usually cannot be achieved without great effort and without more money than is usually available. Among these is the publication of a technical book on scales and weighing tentatively entitled *The Scale Man's Handbook*. It would include virtually all the information on scales and weighing normally required by the professional scaleman in the execution of his everyday duties. This project is past the dream stage. A table of contents has been drawn up following much study and discussion. Major hurdles are yet to be overcome and they comprise time and money. NSMA's primary source of income under its present organization is membership dues, and it

cannot presently underwrite the book project. Other underwriting sources are being investigated however, and, hopefully, progress can be reported soon.

The brightest star on the horizon for scalemen, insofar as improvement in their professional status and the advancement of scale technology are concerned, is the recognition of weighing as a technology by the State University of New York and the resulting establishment by that University of a course in measurement science. NSMA will be a strong supporter of this course, and it has an active committee studying a means whereby we can help perpetuate this truly worthwhile and long-overdue answer to an educational need. It would be inappropriate indeed if I did not give great credit to Mack Rapp for initial and continuing efforts in bringing about the establishment of this course.

Mack is well known to all of you for his many, many untiring efforts in every phase of weights and measures, and while Mack has many affiliations with your National and State organizations and with the Scale Manufacturers, he is a past president of NSMA and an extremely active member on an everyday basis, and NSMA is mighty proud of him and the results he has helped achieve.

Last year NSMA compiled a complete library of the weights and measures laws in effect throughout the fifty States. This is on file at the Chicago headquarters. It required a great deal of time to compile it, and it will require time to maintain it, but according to information available to us at the time it was compiled there existed no other single source for all that information; perhaps the same thing can be said today.

Greater participation in NSMA by the scale using industries is most desirable, and is being promoted. At the Cleveland conference, a very good scale and weighing equipment exhibit was held. It was many times greater in scope and in attendance than any previous exhibit. This year, a special industry brochure received wide circulation to well over 6000 process engineers. This was intended primarily to announce the 45th conference but it also called attention to NSMA's activities.

A yearbook has been printed the last two years. I am sure most of you have received them, and you know it contains a roster of members, advertisements covering equipment and services, and other valuable information.

My only regret is that time does not permit giving credit to all those who have worked so hard on these many projects. They have done so at considerable sacrifice in time and money, and their accomplishments stand as real tributes to their dedication to their profession.

In summary I can tell you that NSMA will continue to strive for excellence in all that scalemen stand for. We live in a world where the accurate measurement of goods is vital to all mankind. This is not a new situation, but the achievement of accurate weights is often overlooked or assumed to be an effortless fact. It is inconceivable that those men who are responsible for quantity measurement by weight in a great world economy, would not have a strong organization to help them, to represent them, and to coordinate their activities. No organization has a greater cause for being, and few have a greater responsibility.

We are prone to think that we have progressed a long way, and truly we have, but a short exposure to the needs of automated industry today, and to the needs of the missile age, will soon dispel any notion that we

can do all that needs to be done. There is a crying need for advances in scale technology.

Through the efforts of all our associations, technology and enforcement can and will advance together to insure both equity and efficiency. The National Scale Men's Association is pledged to the support of these efforts.

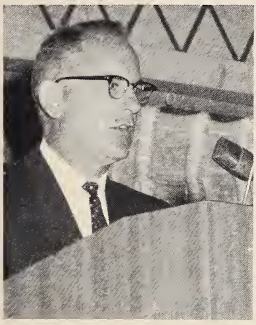
DISCUSSION OF FOREGOING ITEM

R. J. Cord: Among your membership, has there been any promotional work on metric conversion and has there been any official position taken on it?

Mr. Schieser: Last year at the National Conference we went on record as supporting the more widespread use of the metric system; as you know, its use was allowed in the United States by the Law of 1866. Even further than that, we have made it the topic of many of our meetings and promoted it among scale buyers. We see a considerable trend toward metric specifications in scales. I am sure that everyone here will agree that, in most areas of measurement, metric values are far easier to work with and more readily understood.

ACTIVITIES OF THE OFFICE OF WEIGHTS AND MEASURES, NATIONAL BUREAU OF STANDARDS

by M. W. Jensen, *Chief, Office of Weights and Measures*, and Staff



The Office of Weights and Measures, operating within the Institute for Applied Technology of the National Bureau of Standards, functions in the following fields of reference:

(a) Technical services to the States and to business and industry in the area of measurement.
(b) The design, construction, and use of standards of weight and measure and of instruments associated with such standards.
(c) The development of testing equipment and techniques.
(d) The consideration of measurement problems.
(e) The training of State and local officials in the technical aspects of weights and measures programs.
(f) The collection, arrangement, and dissemination of data on units and systems of measurement, and on standards, testing equipment, procedures, and technical investigations.

The Office of Weights and Measures staff presently is made up, in addition to the Chief, of four engineers, a technical coordinator, a technical writer, an engineering aid, and five stenographers. Each of the men will participate in this report to you.

First, a brief report on a special item. During October of 1963, we undertook, on an experimental basis, a device manufacturers' technical seminar. Scale manufacturers were invited to send to Washington either their top service official or their national weights and measures representative, or both, to participate in a 2-day seminar on weights and measures. Approximately 40 individuals responded under the gentle but firm prodding of Arthur Sanders, head of the Scale Manu-

facturers Association. We spent two rather vigorous days exploring weights and measures laws, regulations, and methods of inspection. The response to the seminar was enthusiastic, and more of the same seems to be indicated.

Now, to look at certain specific phases of our program and to favor you with brief presentations by other members of our staff.

H. F. Wollin, *Engineer*

Tomorrow's Facilities for Standards and Measurement

As you drive along interstate route 70S about 25 miles northwest from downtown Washington, D.C., through the lovely Maryland countryside, you will notice an impressive group of buildings shaping the skyline that once was dominated by farms and farmland. In this setting will be located the new National Bureau of Standards. During this presentation I shall try to convey an impression of this highly respected scientific institution—looking at its past, present, and particularly to its future at the new site.

In 1901, Congress, in response to the demands of many engineers, manufacturers, scientists, and representatives of National and State Governments established the National Bureau of Standards—using the Treasury Department's Office of Weights and Measures as the nucleus for the new Bureau. The first, and most urgent, task of the Bureau was to create the central basis for a national system of physical measurement. Before this time, it was common practice for American manufacturers as well as our own Government to send abroad for calibrated apparatus and standards which could not be obtained in this country. Even so, our industrialists in that period of the industrial revolution were reluctant to rely on calibration of precision measuring instruments in foreign laboratories.

The groups to be served by the specialized services of the National Bureau of Standards were well defined by the Congress at the time the Bureau was founded. The Committee on Coinage, Weights, and Measures, in recommending to the House of Representatives in May of 1900, that a National Bureau of Standards be established, reported:

> It is therefore the unanimous opinion of your committee that no more essential aid could be given to manufacturing, commerce, the makers of scientific apparatus, the scientific work of the Government, of schools, colleges, and universities, than by the establishment of the institution proposed in this bill.

And so it was. The Bureau, consisting of three buildings, costing, with equipment, approximately $700,000, was located on a 7.5 acre tract of land about 3.5 miles from the center of the city in a northwest suburb of Washington. According to a publication of that time, the object in going out of the city was to secure freedom from disturbances due to city traffic and also to be free from electrical currents common to the modern city. Incidentally, this sounds familiar. Similar reasons were given 60 years later—and justifiably—for the relocation in Maryland.

Back at the turn of the century, we started out with a meter bar and kilogram. They were our national standards and, of course, we still have them today along with literally hundreds of other standards that have been developed. And the end is not in sight. In fact, our job in measurement will never be finished as long as science moves forward

into new areas, and technology exploits these new areas to the benefit of society.

As an example, years ago many production parts were manufactured to tolerances of one thousandth of an inch. To achieve this precision, men needed to set their calipers with gage blocks that were accurate to one ten-thousandth of an inch. As mass production pushed forward, dimensions of interchangeable parts became increasingly critical. Today tolerances for many elements—fuel injectors, bearings, gyroscopes, transistors—are expressed in hundred-thousandths or even millionths of an inch. Master standards must be even more precise, since accuracy is lost at each stage of calibration. Machine tool makers now request that NBS calibrate their master gage blocks to one part in one million.

Our standard time and frequency broadcasts are now controlled by an atomic clock that has a precision of one second in 3,000 years.

When the Bureau first opened, there was no Government research laboratory in the fields of physics and engineering, and so it was probably inevitable that other Government agencies would turn to NBS, from time to time, for advice and assistance in technical problems in these areas. This service function is actually written into our enabling legislation, and is responsible for many of the unusual jobs we have accepted. Our early work in testing and evaluating materials for use by other Government agencies led to a broader program of cooperation with industrial standardization groups in giving the technical backup for industrial standards.

In 1904 the American Chemical Society asked the Bureau to develop standards of purity for chemical reagents. A year later the American Foundrymen's Association turned over a project on the standardization of cast iron. From these beginnings has come the standard reference materials program of the Bureau, which now provides almost 600 different standard samples of materials to industrial, university, and Government laboratories. These materials include metals, ores, chemicals, spectroscopic standards, radioactivity standards— all analyzed and certified by NBS as to their composition, or with respect to some chemical or physical property. The standard materials are used to check the accuracy of analytical methods, for example, and are invaluable in a quality control program.

During the first two decades of its existence, the Bureau, in addition to its basic research and measurement work, carried on a great many industrial research activities. Typical were projects focused on lubricating oils, automotive engineering, refrigeration, electrolysis, corrosion, properties of steels, ceramics, industrial coatings, rubber, textiles, paper, and glass. The efforts in these fields were withdrawn or greatly reduced as industry developed its own research capabilities.

In World War I, the Bureau engaged in the actual production of gage blocks and optical glass, because normal supply lines for the Nation were cut off. We also tested aircraft engines in the first simulated-altitude laboratory, and developed sound-ranging equipment to locate the position of enemy artillery for purposes of counterfire direction.

The industrial problems encountered during World War I led, in the next two decades, to greater efforts by NBS in the field of standards of practice, standards of performance, codes, and specifications. This

work included a long effort devoted to screw thread standardization and the development of the National Electrical Safety Code. At the same time, of course, measurement work and basic research continued to be a large part of the Bureau's activity.

World War II was a different kind of war, reflecting a greatly advanced technology, and the Bureau's efforts were shaped accordingly. I am sure some of you have heard the story of the letter Albert Einstein wrote to President Roosevelt suggesting the possibility that the principle of atomic fission might be exploited into the development of a weapon. President Roosevelt appointed a committee of scientists to investigate and to report on the subject. The committee was chaired by Dr. Lyman J. Briggs, the Director of the National Bureau of Standards. This led to the establishment of the Manhattan Project. The work of Bureau scientists in developing methods for the purification of uranium was important in the development of an atomic bomb. Incidentally, intelligence gathered after the War indicated that one of the primary reasons for the failure of German efforts to develop an atomic bomb was due to their decision that materials with the required purity simply could not be produced. What a different world we might have been living in today had these decisions been reversed!

Other projects during World War II included the development of the radio proximity fuze for nonrotating projectiles and the work on the first guided missile actually used in warfare, the Navy BAT.

A most important development after the second World War involved NBS as an institution. This was the transfer of the military research programs to the Department of Defense, and led to a reemphasis of our oldest responsibility, providing the central basis for the Nation's system of physical measurement. The result was a concentration of basic research and basic measurement standards. This reorientation of the Bureau was a wise move in helping us meet our responsibilities of the space age, which opened so dramatically in the fall of 1957.

Thus it is seen that over the 60 years of its existence the Bureau has constantly examined itself, its mission, and its responsibilities, and has reshaped its efforts to meet national needs as necessary and appropriate. Several years ago, such reevaluation involved the Bureau's physical as well as its organizational structure. From the physical standpoint, it was determined that the Bureau facilities in Washington were too small and had grown too old for the demands of the future. The crowded buildings, now numbering over 30, were scattered over some 70 acres in an attractive residential area—but it had become a poor location for scientific measurement. The town of Washington had grown around the Bureau and only a few minutes now separate it from the hub of our great Capital City. For these and many other obvious reasons, the decision to move the Bureau was made.

In 1956, 550 acres of carefully selected land were purchased, and planning for this massive new facility started to move steadily forward. On June 14, 1961 ground-breaking ceremonies were held, inaugurating Phase I of the construction contracts.

Before proceeding further with details on the new physical facilities, let me pause here for a few moments and turn your attention to the organizational structure of NBS which, only a few weeks ago, underwent a major change. Under the new organization, four institutes have been established. They are the Institute for Basic Standards, the Institute for Materials Research, the Institute for Applied

Technology, and the Central Radio Propagation Laboratory. The new organization was created to permit more effective management, and to identify NBS activities more closely with the specific needs of science, industry, and commerce.

A chart of the new NBS organization, showing the general programs under each Institute, is found in figure 1. The Bureau is headed by the Director, Dr. Allen V. Astin, with, as his Deputy Director, Dr. Irl C. Schoonover. Each Institute has its own Director and is nearly autonomous in operation.

The Institute for Basic Standards is responsible for those longstanding programs in the field of basic measurement standards—activities which grew out of the meter bar and kilogram we started with in 1901. This Institute also includes the recently established National Standard Reference Data Program, which is planned to provide the country's scientists and engineers the reference data they need, when and where they need it.

The Institute for Materials Research combines our programs in chemistry and metallurgy, aimed at developing reliable and uniform methods of measurement for the properties of materials. Such data are essential for improving the efficiency of production processes in modern industrial technology.

The Central Radio Propagation Laboratory, located at Boulder, Colorado, has a national responsibility for conducting research and

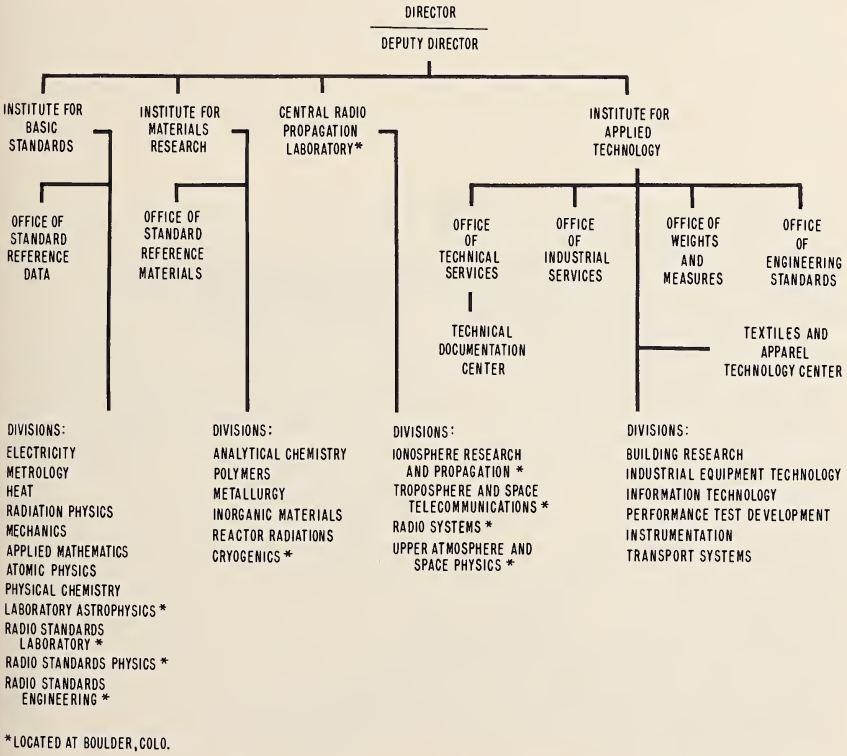


FIGURE 1. *NBS organizational chart.*

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disseminating information on the propagation of radio waves along the surface of earth, through the atmosphere, and in outer space. It serves the military and space programs, radio and television broadcasters, and the communications industry in general.

The Institute for Applied Technology will bring together some previously scattered NBS activities, such as building research, instrumentation, data processing systems, and engineering standards. The Office of Weights and Measures, that unit of the Bureau that I represent and whose activities are known to most of you, is well suited to this Institute. To these programs are added such industry-oriented operations, as the Civilian Technology Program in Textiles and the Office of Technical Services, both of which have previously been administered under the Office of the Secretary of Commerce.

We remain, therefore, a scientific and technological institution, the organization being keyed to serve science, engineering, Government, and commerce, with interests from the supermarket scale to the structure of the atomic nucleus.

Shown in figure 2 is a scale model and general layout of the new Bureau grounds and buildings. There will be 20 major buildings having a total assignable space of 1.2 million square feet. Total cost will run about $105 million. The staff will number over 3,000 employees.

Construction of the facilities, which began in 1961, was divided into four phases. We are well along in Phase II and if present schedules are adhered to, we can expect completion by the latter part of 1966. Here briefly is a breakdown of each phase:

Phase I—Included excavation and development of the site grounds, and construction of the Power Plant, the Engineering Mechanics Building, and a Nuclear Reactor.

Phase II—Saw the start of the Administration Building, the Supply and Plant Building, Instrument Shops Building, Service Building, and the Radiation Physics Laboratory.

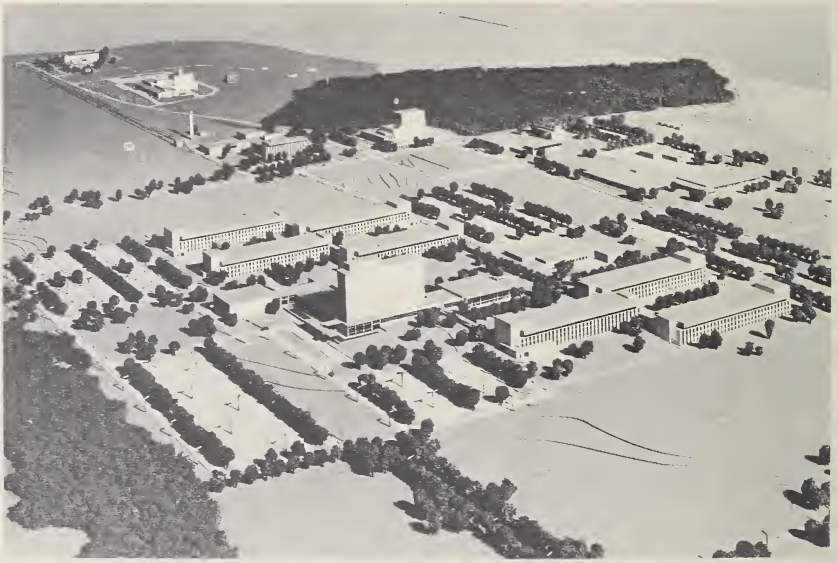

FIGURE 2. *Architect's model of NBS.*

Phase III—Will include construction of the seven General Purpose Laboratory buildings.

Phase IV—Final construction will include several special-purpose laboratories, identified as the Fluid Mechanics, Sound, Industrial, and Hazard buildings.

The landscaping of the grounds has started and will be carried on through each phase. Many trees and shrubs have been planted, seeded lawns are growing around completed buildings, and even a small lake is planned near the central combine of buildings. It should be a truly attractive installation when all is done.

An architect's rendering of the Administration Building, shown in figure 3, pictures a long, low building with extensions for an Auditorium, Cafeteria, and Library, and with an 11-story tower for offices. The Director's office and most management activities will be housed in this building. The Office of Weights and Measures will be located on the seventh floor of the tower. Also included will be classrooms and lecture rooms, in addition to the main auditorium a smaller one seating 300, a studio in which motion pictures will be produced and from which television science shows can originate, a computer, a museum of NBS contributions to science, and, of course, the vault displaying the national standards of measurement.

Figure 4 shows a view of the General Purpose Laboratories. There will be seven such buildings, comprising about half the total space at the new facility. The seven buildings will have three floors above ground, and will be joined to one another and to the Administration and Shop Buildings by glass-enclosed connection corridors. These modern laboratories are of a modular design, having a network of movable metal partitions, and containing all necessary laboratory utilities and services. The major part of the Bureau's technical program will be carried out by the divisions housed in the General Purpose Laboratories. There are a few activities of special character and of interest to this group that I shall discuss shortly. First, let me tell you about some of the other buildings. The Supply and Plant Divisions will be located in a very large one-story building that covers about 3 acres of ground. The Supply Division is concerned with procurement and distribution of all equipment, materials, and supplies. The Plant Division operates, maintains, and repairs the physical facilities at NBS.

There will be an Instrument Shops Building where machinists, welders, instrument makers, and glassblowers, will combine their tools and skills to produce the instruments and equipment needed in the work of every scientist.

A most fascinating and important research activity will be centered in the Radiation Physics Building, figure 5. Radiation Physics is concerned with three main areas of work: Research with radiation produced by high energy accelerators and sources; research on radioactive materials; and electronic instrumentation and investigations. A new powerful electron linear accelerator (called the LINAC) will be installed and will produce one of the world's most intense high-energy electron beams. In a nutshell, NBS will soon be able to establish standards, develop measurement techniques, and determine shielding requirements for the high radiation dose rates that are now being employed by industry to do such things as sterilize pharmaceuticals, preserve food, polymerize plastics, and vulcanize rubber.

FIGURE 3. *Administration building—drawing.*

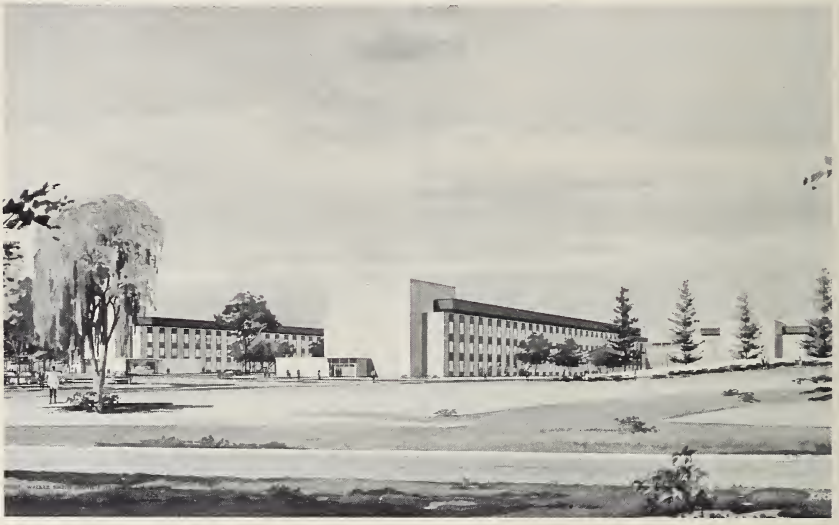

FIGURE 4. *General purpose laboratories.*

The reactor complex, a separate installation, will include a high-flux research nuclear reactor that will enable the Bureau to fulfill its growing responsibilities in the many rapidly expanding fields of atomic energy. This installation will be shared with other government agencies in the Washington area that also do work in this field.

The Engineering Mechanics Building is shown in figure 6. This is presently the temporary home of the Office of Weights and Meas-

FIGURE 5. *Radiation physics laboratory.*

FIGURE 6. *Engineering mechanics building.*

ures—and is a center of activity familiar to many of you. Once again the Office of Weights and Measures was privileged to inaugurate the beginning of a new era. We pioneered the move to the new NBS site, moving into this building shortly after it was opened last October. Our permanent location, as mentioned earlier, will be in the Administration Building.

Another familiar activity, located in a wing of this building is performed by the Mass and Volume Section of the Metrology Division. This section has the standards and equipment for precise and efficient large mass calibration up to 50,000 pounds for a single object. Three

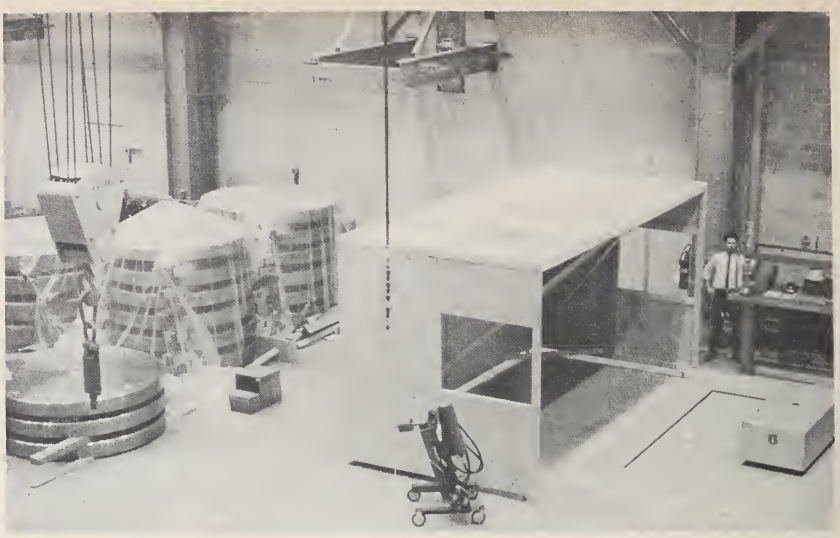

FIGURE 7. *Calibration of large weights for deadweight testing machine.*

new stainless steel standards of 10,000-pound, 20,000-pound, and 30,000-pound denominations have been procured recently. A new 50-ton capacity platform scale has been installed in the laboratory along with several other new scales and balances. The new facilities have increased the capabilities to handle large mass calibrations—particularly those needed by the space and aircraft industries. Plans are also being made to develop methods and equipment such that large mass calibrations could be done by others away from NBS when desired, with sufficient precision and accuracy to meet their own special requirements. Experimental work along these lines is underway with both multiple lever scales and elastic weighing devices. With respect to large mass, as well as small mass, increased attention is being given to provide service that will satisfy the specific needs and requirements of those who submit standards for calibration. These and other innovations under consideration point up the progress that can be looked for in mass calibrations at the new NBS.

The measuring of forces is a large part of the Mechanics Division program. It is, in fact, a large operation in more ways than one. Force measurement work and structural research requires complex, heavy equipment that makes special demands on the building design. The Engineering Mechanics Building has a very large test area, which is necessary to house some of the giant testing machines. The ceiling is nearly 100 feet high.

A spectacular new 12-million-pound vertical testing machine will soon be installed for use in the calibration of force measuring devices above 1 million pounds. The loads to be applied by this giant machine are measured by previously calibrated load cells. NBS will now be able to calibrate more accurately devices used to measure the thrust of jet engines, and rocket motors, and the weighing systems of large missile launching sites. Also, large sample parts of structures, bridge columns, and steel beams can be tested on the machine for resistance to the forces of compression, tension, and flexure.

A huge horizontal testing machine will be installed near the vertical testing machine. This machine will have a capacity of 2,300,000 pounds in compression and 1,150,000 pounds in tension. It will be operated hydraulically and will take specimens up to 33 feet in length. Safer buildings, bridges, and other structures and a more economical use of materials are made possible through the tests conducted with this type machine.

One of the most important features of the new Engineering Mechanics Building will be the installation of seven deadweight testing machines, ranging in capacities from 10,000 pounds to 1,000,000 pounds. The largest machine the Bureau presently has in operation in its old location has a capacity of only 111,000 pounds.

Some of the weights for the deadweight machines have been delivered and are now undergoing calibration as seen in figure 7. Incidentally, these weights are made of stainless steel and range in denominations up to 30,000 pounds each.

Deadweight t esting machines are used to test the force-measuring devices employed as secondary standards in industrial or scientific programs throughout the Nation. Force-measuring devices, such as proving rings and load cells, are now widely applied in everything from automatic machinery control to space exploration weighing. Calibration of these devices and NBS services in force measurement work has been immeasurably improved by the creation of the new facility.

The history of measurement at the National Bureau of Standards is one which we at the Bureau look upon with considerable pride. The meter bar and kilogram have taken us a long way over these past 60 years. But, as one chapter in its history closes, a new chapter now begins to unfold for the National Bureau of Standards. We eagerly await completion of the new facilities and the challenge of tomorrow's demands for standards and measurement.

D. R. Mackay, *Engineer*

Odometer Investigation

In January 1962, shortly after the problem of inaccurate odometers in rental automobiles was discussed at the interim meeting of the Committee on Specifications and Tolerances, a technical investigation was initiated by the Office of Weights and Measures. The investigation involved (1) the development and calibration of standard testing equipment, (2) the development of standard testing procedures, (3) the determination of the accuracy of odometers on rental automobiles and trucks, (4) the identification of the factors that affect odometer accuracy, and (5) the development of technical requirements for the consideration of the States. A report of this investigation was made to the National Conference last year during the Friday morning session, along with the report of other OWM projects. Later, a written report was published as an NBS Technical Note.

The investigation was not terminated at that time but was continued at the specific request of the automobile manufacturing industry. This industry, speaking through the Odometer-Speedometer Committee of the Automobile Manufacturers Association, urged that efforts be made toward developing a single vehicle speed for odometer testing, and that further studies be conducted on tolerances. The

Odometer Subcommittee of this A.M.A. Committee specifically requested that the National Bureau of Standards: First, develop detailed test procedures for weights and measures officials which would be acceptable to the industry; second, conduct further tests coordinately with the industry so that independently derived data could be compared; and finally, work toward mutually agreeable odometer requirements. The last part of this request was predicated on the assumption that all odometer specification requirements would have to be changed in order to comply with the requirements established for commercial vehicles.

During the course of the tests conducted by the Office of Weights and Measures and those conducted by the industry, it was definitely determined that there was a significant difference between the results derived from those tests conducted with the simulated-road testing device and the results derived from the tests conducted with the fifth wheel. (It is probable that these differences were caused by the new passenger tire designs involving two-ply tires with four-ply ratings. These tires are currently being used by the industry to provide a "softer" ride. The "softer" tires caused a significantly smaller rolling radius on the simulator than on the road.) The differences between the results derived from the use of the two types of testing equipment were neither sufficiently patterned to allow mathematical correction nor directly relatable to tire pressure so as to permit pressure-adjustment reconcilability. Also, the use of front wheel drives for certain automobile odometers precludes the use of the simulator for testing these vehicles. The limitations of the simulator were described to the Specifications and Tolerances Committee at the interim meeting in February.

The results of the studies conducted jointly but separately by the Office of Weights and Measures and by the automobile industry proved: (1) that the test procedures developed by OWM were entirely acceptable, (2) that a single speed for odometer testing was entirely feasible, and (3) that the simulator should not be used for odometer testing.

These results were reported to the Specifications and Tolerances Committee along with OWM recommendations concerning the amendment of the Code for Mileage-Measuring Devices.

The Office of Weights and Measures will continue to cooperate with the automobile industry in this area of measurement and will conduct or participate in further tests as the need arises. Any information resulting from such tests will be promptly reported to the Specifications and Tolerances Committee.

Latin American Situation

For a number of years, the National Bureau of Standards has been involved in a program of cooperating with Latin American countries in developing standards and establishing standards programs in the fields of physical measurement and properties of materials. NBS has felt that such a program would promote and strengthen inter-American cooperation in science and technology and ultimately it would increase commerce between the United States and Latin American countries. This program is based on the same principles as our Alliance for Progress programs of increased assistance to our hemispheric neighbors to the South.

There has been considerable interest and some activity in the weights and measures phase of this Latin American program. You may remember that Mr. Jensen and I made a trip through five Central and South American countries during May of 1962. The purpose of this trip was to survey weights and measures conditions in these five countries, and we found that there certainly was a need for an assistance program in the weights and measures area.

To date, the Bureau's contribution in the weights and measures field has been centered in three activities: Translations, standards, and training. The translation of certain weights and measures documents into Spanish and Portuguese was deemed to be appropriate because of the complete lack of such publications in the various Latin American countries. Contracts were signed in 1962 for translating the Model Law, the Model Package Regulation, Handbooks 44, 67, and 82 and certain other publications into both Spanish and Portuguese. These documents will be published soon.

The Office of Weights and Measures was asked to design a set of prototype metric standards appropriate for use as national weights and measures standards. The designs developed for the new State standards program were revised to metric denominations and modified to some further extent to incorporate improvements which evolved through the use of the original prototypes. Purchase specifications were written and a complete set of mass, length, and capacity standards, including appropriate balances and other instruments, were ordered. Plans are currently being considered to display these standards in Latin American countries.

The third area of NBS participation in this program has been in the training of weights and measures officials from various nations. Programs have been developed to suit the individual needs of the trainees. The training period has been as short as a few weeks or as long as six months, and has involved both administrative and technical procedures.

The future of the total weights and measures program for the Latin American nations depends on the interest of these nations in the program, and upon the support received from our Department of State. It is interesting to note, however, that there has been increasing interest on the part of the United States officials, both in Washington and in the embassies abroad, in the weights and measures assistance program.

R. N. Smith, *Technical Coordinator*

Technical Training

Most of the members of this Conference are aware that one of the basic missions of the Office of Weights and Measures is providing technical services to State and local weights and measures officials, to agencies of the Federal Government, and to others affected by, or interested in, weights and measures standardization and control. One of the principal means by which the Office of Weights and Measures implements this mission is by providing technical training for State and local officials. Since about 1954, when our formal training program was started, we have consistently felt that the program should be expanded to enable us to reach a greater number of officials on a wider variety of subjects.

As weights and measures enforcement work has become more technical and specialized, the need for careful selection and training of qualified personnel has increased proportionately.

We realize that, with our limited staff and facilities, we cannot begin to handle the total training effort required, but it is our hope that, through method improvement (such as refining content presentation to its maximum efficiency), we can assist all jurisdicitons in establishing and maintaining adequate training programs on a continuing basis.

Our assistance in the training effort takes many forms. During the past year OWM staff members conducted formal training schools in the States of California, Montana, North Dakota, South Carolina, Arkansas, Kansas, New York, Indiana, Missouri, Tennessee, and Virginia. These schools, held at the request of the States, are directed principally to the field inspector, and usually concentrate on field examination procedures.

Field training was conducted in a number of other States on specific devices or on special package checking procedures. For example, training sessions have recently been held on the testing of odometers and slow-flow meters. At the request of the States, one of our engineers is sent to the jurisdiction to conduct laboratory and field training with the personnel who will be engaged in the control of the devices. This training may include advice in the purchase of, and assistance in setting up, special test equipment before the actual testing is undertaken. Time allotted to a particular activity is dictated by the needs of the individual jurisdiction.

Training on proper procedures for checking special packages is conducted as the need arises. In this phase of our activity, two staff members will usually arrange to spend a day or more with the officials engaged in package checking in the jurisdiction. Examples of special packages are (1) viscous or semi-viscous products sold by volume, such as mayonnaise, (2) products sold by count or sheets but checked by weight, such as facial tissues or notebook paper, and (3) products sold by net drained weight, such as olives.

Visits were made to still other States to discuss informally, with directors and staff, particular areas of their total programs. Any existing or planned activity may be covered during such a discussion. Possibly a new program has been started or new areas of responsibility added to an existing program. New physical facilities may be planned for the administrative offices or laboratory area, or both. Perhaps it is the desire of the director to revamp job descriptions and explore the areas of responsibility of his inspectors. He may want to have his men specialize in certain areas and add new personnel in others. Any and all such items are discussed in what we term our "technical visits." We find such visits quite helpful to us; through them, we are able to keep abreast of the activities and the needs of the weights and measures officials of the States, counties, and cities.

Assistance was given to the Committee on Education in developing a Home Study Course for weights and measures officials. Planned study outlines were supplied with appropriate examination questions. The widespread use of the Home Study Course by weights and measures officials has been gratifying to the Committee and the staff of OWM.

The first technical presentation, titled "The Examination of a

Computing Scale," has been developed by the Office of Weights and Measures and is available for loan or purchase. Audio and visual instruction is given in a step by step procedure as recommended in the Examination Procedure Outline for a Computing Scale. This will be shown to the Conference on Friday morning. The second presentation on the "Examination of a Single Service Gasoline Pump" is under development now, and future presentations on other commercial devices are planned. These training aids are designed to lend themselves to individual or group instruction and are designed to be used both by weights and measures officials and industry service personnel.

The Examination Procedure Outline series has been revised and brought up-to-date with two new outlines added. Copies of the outlines are available without charge from the Office of Weights and Measures.

It appears that the plans and the resources for comprehensive technical training are available. The effectiveness of such training rests with the administrator in each of the many jurisdictions. We stand ready and willing to assist you if you will make us aware of your individual needs. The rewards for training effort are substantial: Professional confidence, public recognition, prestige, dignity, and, most importantly, Statewide, and then nationwide, uniformity.

S. Hasko, *Engineer*

The Development of a Technical Investigation

The development of a technical investigation may be compared to being dropped off in a strange, uninhabited wilderness and told to make your way to a described area 40 miles due north. Your objective has been defined and now it is up to you to determine the fastest route to your rendezvous. If the terrain between you and your destination is intertwined with rivers, mountains, and dense forests, a straight line approach may be a possibility; however, its practicality may be limited. One would be inclined to generally follow the path of least resistance even if a considerable amount of zigzagging were necessary. On occasions, when confronted with a wide, swiftly moving stream or a steep mountain, it may be advisable to retreat and climb a hill to survey the terrain for possible fords across the stream or passes around the mountain. It is not unusual to find ourselves backing up to get the entire problem in the proper perspective or to see if we have overlooked a simpler solution. However, we must first know where we are going or what we are trying to do.

Thus, in the development of a technical investigation the first questions that should be answered before anything is done are, "What are we trying to accomplish or prove?" and "Why are we trying to do this?" We must have definite ideas concerning this primary objective; otherwise, we will be floundering about in a sea of confusion. The importance of a clearly defined objective cannot be overemphasized. It is the cornerstone upon which the entire investigation is laid.

With the purpose of the investigation clearly defined, a flurry of activity is initiated to review the history, literature, and work available on the problem or subject. The purpose is threefold: First, it thoroughly familiarizes the experimenter with the subject or problem

(in many cases his initial knowledge may be limited). Second, it aids the investigator to plot wisely his course of action and avoid the repetition of good sound work by others (it is also a timesaver in that it will probably answer many questions raised in his mind); and finally, in surveying the work of others, the development of new ideas and approaches is stimulated.

Having completed the literature and work survey, it may be advantageous to visit other laboratories or plants with kindred interests in order to gain first-hand knowledge, the latest information, and to have questions answered that have been plaguing the investigator. These visits are frequently referred to as "brain-picking" expeditions, for obvious reasons.

A general informal get-together with the supervisor and other qualified investigators will result in a "brain-storming" session that will put to severe test any proposed plans. In addition, it will serve as a source of suggestions and ideas, some of which will have considerable merit.

At this point, it is practical to establish limits, boundaries, parameters, or whatever you choose to call them. They will serve as the ground rules for the investigation. Thus, we try to qualify, or pin definitions onto, all specialized terms, properties, equipment, materials, etc. This will avoid any drifting tendencies that would cast a shadow of uncertainty over the investigation.

Since it is possible that no blanket method will be applicable to the entire problem, a classification system should be considered to permit flexibility in the solution. In addition, special problems may have to be considered.

Wherever possible, a theoretical approach is developed and the experimental methods are designed to remain within this theoretical framework.

Thus far, very little actual experimental work has been performed. Available and newly developed techniques are now evaluated. Modifications are made of some of these techniques and they are reevaluated. The overall results are now analyzed on a statistical basis for validity (accuracy, or precision) and for pertinence (i.e., whether or not a test has measured an intended property). Other criteria are: Simplicity, specific advantages, or disadvantages. Additional modifications or techniques may be needed if the initial methods prove unsatisfactory.

While it is axiomatic that no stone should be left unturned in an investigation, it is good common sense to intelligently apply "screening" and "leap-frogging" procedures to cover as much ground as possible in the development of experimental techniques. As stated by B. N. McQuate in his *Basic Rules for System Engineering*, "A quick good design is better than a protracted best design"; and, "Measurement, not argument, will lead to improvement." Sir Robert Watson-Watts, developer of radar, once said, "Give them the third best to get on with; the best never comes, and the next best comes too late." Thus, one must avoid falling into the trap of spending too much time in trying to optimize a method to a high degree in the early stages of the investigation.

The most satisfactory method or technique is selected and the experiment is designed. Where no one method is outstanding, two or more methods may be employed. The design of the experiment is the

proving ground of a technique, method, or piece of equipment. If properly carried out, it will reveal any shortcomings.

An appropriate and representative sample selection now is made. The known variables—such as time, temperature, humidity, pressure, effect of operator, distribution of samples—must be carefully controlled. In many cases, the effect of some of the variables is negligible and may be discounted. In other cases the variables may have a pronounced effect on the results (i.e., hygroscopic materials versus humid atmosphere or volume expansion versus temperature). The effect of the variables may be determined by the inclusion of a controlled limited range of any variable in the design of the experiment.

With the experimental work completed, the effect of the variables under the same controlled conditions within each set of runs is studied. The study is aided by the preparation of tables and graphs. The data are carefully analyzed to extract as many significant generalizations as possible. The possible sources of experimental error are reviewed. Ranges of uncertainty surrounding experimental values are developed.

The investigator now is able to show how his work may or may not provide a solution to the problem. If the latter is the case, the work will serve as a guide for additional new or modified techniques. If a satisfactory solution is developed for the problem, a list of recommendations is prepared.

This is one approach to the development of a technical investigation.

L. J. Chisholm, *Technical Writer*

Tech Memo

It could very well be that the first question that occurred to many of you on hearing a Tech Memo mentioned is, What is it? Our Tech Memo is still a fledgling enterprise; there have been two issues so far, one in August of last year, and another this past February.

The Tech Memo is a multilithed publication with a title design in red, superimposed on a screened photograph of the architectural model of the new National Bureau of Standards Gaithersburg site. In this Tech Memo we include information of both technical and nontechnical nature that we feel will be useful to the weights and measures official.

The philosophy behind the Tech Memo, the reason for its creation, was expressed very well by Harold Wollin in his talk before the Western Weights and Measures Association in August 1963. Although Harold was not speaking specifically of the Tech Memo, what he said then very specifically applies to it, and to our hopes for it.

In a talk that discussed cooperation and communication in the weights and measures field, it was stated that we should give effort to forming a network of communications, and these should be of two kinds: The first should be a network of information extending from Federal through State to local, and back again; the second should be one that flows between State directors.

In this latter category, there are, of course, several quite good newsletters. In the former category—information between Federal, State, and local officials—we are publishing the Tech Memo in the hope that it will, at least partially, fill the need for a formalized distribution of information.

Weights and measures is concerned with uniformity; the concept

of uniformity is, of course, implicit in all of our work. And I think it has also become true that now, in our generation, effective uniformity is inseparable from effective communication. In the flow of commerce today, innovations, alterations, and new concepts come at a fast and furious pace, and effective communication has become indispensable to our work.

This pinpoints the philosophy behind our Tech Memo, and our hopes for what it will become. The main subject matter that will go into the Tech Memo is implied by its name. We will report on technical studies, investigations, and problems, usually those that are of national scope and pertinent to the whole field. We feel that if our technical studies can be effectively communicated to the weights and measures officials throughout the Nation, they can perhaps provide an automatically beneficial effect to weights and measures work.

With a national information source such as the Tech Memo now available, we can eventually form a line of communication that we hope may save you some headaches and, in general, keep everyone informed as to what we are doing. Items covered in the first two Tech Memos concerned, for example, such things as our aerosol and odometer studies, two subjects on which discussion is still very current at this 49th Conference. Also, we included a few not-so-technical items, for instance, the historic Jefferson Report and the Adams Report. We feel that knowledge of the history of what has made weights and measures what it is today has an important effect on today's activities. Paradoxically, the effect of a historical understanding of weights and measures cannot often easily be measured; but a study of weights and measures history can bring about a vivid appreciation of why many weights and measures problems have developed into what they are now. And quite often, this historical knowledge can lead one to a more direct practical solution to a problem.

We also have been, and will continue to be, printing in the Tech Memo interesting little stories that we may run across from time to time. We receive, in our office, several bulletins, magazines, periodicals, publications of all kinds from other countries, and we feel that reprinting translated short articles from these sources might be interesting also. A knowledge of what other countries do about their weights and measures problems can often provide perspective on our own.

The Tech Memo has started out as a limited-circulation publication. What this means is that the Tech Memo is sent only to State weights and measures offices, to offices of cities and counties with populations of 200,000 or more, and to officers and standing committee members of this Conference. It is our sincere hope that all State offices will duplicate each Memo for distribution to each active official, State and local. We will, of course, do our best to make the Tech Memo a publication that is worth duplicating.

The Tech Memo will not be issued as a periodical. It will be issued as the need for it arises, as information of interest to you comes up. If two Tech Memos are needed in any given month, then two can be published. We like this freedom of frequency of publication; without the pain and strain that comes with being required to publish a certain number of words by a certain date, we are able to publish only those items which will be, we hope, interesting and pertinent to weights and measures officials.

Right now would be a good time to ask you to send us any comments or suggestions that may occur to you concerning the Tech Memo. We can assure you that any comments mailed to us will be thoughtfully considered. This is your Tech Memo, and we'd like to hear your ideas about it.

The Metric System in the United States

I bought some gas for my car the other day and they charged me for it by the gallon, and that is about the most pertinent thing that can presently be said about the current status of the metric system.

However, significant developments continue to occur and I'll take a few minutes here to sum them up for you.

On the legislative front, there have been entered, in this current session of Congress, four bills advocating a study "to determine the practicability and desirability of the adoption by the United States of the metric system of weights and measures." Three of these proposals were House bills and one was a Senate bill; all are fairly similar in wording. They call for the National Bureau of Standards to conduct extensive comparative studies of the standards of weights and measures used in scientific, engineering, manufacturing, and commercial areas and in educational institutions; to determine the economic advantages of a general change to the metric system; to cooperate with foreign governments in determining the advantages in international trade and commerce to be derived from a universal standardized system of weights and measures; and to investigate the attitudes of the departments and agencies of the Federal Government and of the several States with respect to possible practical difficulties which might be encountered in accomplishing a change.

The only bill on which any action has been taken so far is the Senate bill, S. 1278, sponsored by Senator Claiborne Pell of Rhode Island. Hearings were held on this bill, before the Senate Committee on Commerce, the first half of the hearings being held on January 7, 1964. At that time, witnesses who appeared before the committee were Dr. A. V. Astin, Director, National Bureau of Standards, Alexander H. Flax, Assistant Secretary of the Air Force (who represented the Department of Defense), Lansing Simmons from the American Geophysical Union, the President of the Metric Association, Mr. Robert Fischelis, and Senator Pell himself. The second half of the hearings, to be held primarily for spokesmen who are opposed to metric adoption, was scheduled for May 19 but was cancelled for lack of witnesses.

Aside from the usual human resistance to change, per se, I don't believe that opposition to metric adoption has as much to do with the relative merits of the metric system as it does with fear of the great costs involved in changing. However, I don't know if it's ever been shown to anyone's satisfaction whether or not metric adoption would cost as much as some of the estimates suggest, or whether it would cost a lot less. This is one issue that a nationwide study would provide valuable help in resolving.

In other nonlegislative areas, use of the metric system continues to increase in our country, following an evolutionary progression that, to a great extent, characterizes weights and measures history in the United States.

I don't think that anyone could deny it, or even make a good case against it, if I stated that, at this point in U.S. history, there is

just as much a chance that the metric system will come into general use through an evolutionary development as there is a chance of its being legislated into use.

One thing supporting such a hypothesis is our relative economic self-sufficiency. This was a matter of concern to the British Standards Institution recently. A survey conducted by them indicated that British industry was ready to go along with metric adoption in that country. But when the question arose as to whether a decision to change should be made dependent on a parallel decision by the United States, many of those supporting a change argued that Britain should not await a decision from us because, due to our relative self-sufficiency (exports account for only about 3 percent of our Gross National Product and we are able to domestically produce most of our necessities), we can afford to go much more slowly than they can.

In summary, the use of the metric system in the United States today is confined to particular areas. It is, of course, used almost exclusively in scientific work, all the major pharmaceutical companies have practically converted to its use, and the U.S. Army is eliminating its inch-millimeter quotations, in favor of the metric, for weaponry purposes. Teaching of the metric system is increasing in the schools, particularly at the elementary level. The National Council of Teachers of Mathematics has given emphasis and support to both teaching of the metric system and its national adoption. The American Society for Testing and Materials has decided to publish metric equivalents in all its publicatons, and many other publications, too numerous to list here, publish only in metric units.

As a general concluding statement, it can be said that, at the levels of most industry, commerce and trade, the U.S. "customary" units (yard-pound-gallon) continue to enjoy exclusive use, with few exceptions.

W. C. Bandy, *Federal-State Technical Services*

Federal-State Technical Services

Although it is true that I am a newcomer to Mr. Jensen's office, I actually began working for the National Bureau of Standards in April 1960. My work, until about a month ago, was devoted to the detailed planning of our new home near Gaithersburg, Maryland, which Harold Wollin described so well to you a few minutes ago. For the past four years, I was Chief of the Gaithersburg Planning Group, which is a small office of engineers and draftsmen serving as liaison between the National Bureau of Standards and the firm of architects and engineers who designed the functional aspects of the new buildings around the information we supplied to them. I can honestly say that I saw those massive, complex structures develop from the merest embryo, through the planning and design phases, into the final construction stages now underway at Gaithersburg. I am very happy to have had a part in such a large undertaking. Without question, my previous job was a most challenging and interesting one to me as a civil engineer.

However, that part of my career is now behind me, and I believe it is only natural to look forward with even more enthusiasm to the

new job facing me. My immediate task will be to organize and direct a new office which will work with and assist the States to solve local and regional industrial problems, whenever possible, by direct applications of recent advances in science and technology.

Perhaps some of you are aware that a Conference on State Science and Technology was held here in Washington last February in the new Smithsonian Museum of History and Technology. This Conference was sponsored by the Department of Commerce and its express purpose was to explore what the States and others are now doing to stimulate technological progress in industry, to explore what more could be done, and to determine what the Federal Government can properly and effectively do to support State programs that are engaged in actively promoting technological progress.

The speakers who were invited to participate in the Conference were selected to present the views of some of our leading universities, industries, State governments, and the Federal Government. The State Governors gave their wholehearted support to the Conference and delegates from 44 of the 50 States were in attendance, as were representatives from several of our Federal agencies. The response and enthusiasm exhibited at the Conference, as well as the many letters we have since received, clearly indicate the need for an energetic program in this area.

One of the official recommendations coming out of the Conference was that the Department of Commerce should establish a permanent secretariat to serve as a central information source, thus providing for an interchange of information about the activities within the different States and regions in technological matters. This office would also plan and conduct a National Conference on State Science and Technology on an annual basis, and help to arrange regional meetings when and where required. In accordance with this recommendation, the Department of Commerce assigned this function to the National Bureau of Standards. Our Director, Dr. Astin, recognizing that distinct similarities in administrative and operational characteristics existed between the new program and the Office of Weights and Measures, asked Mr. Jensen to assume this additional responsibility. It was understood, of course, that a new office would be required, operating under Mr. Jensen's general supervision, but without direct relationship to the Office of Weights and Measures.

I've been in the office for slightly more than a month now, and I am beginning to get a better feeling for the enormousness of the job to be done. First of all, personal contacts must be established in each of the 50 States, the District of Columbia, and Puerto Rico. These contacts must be with responsible people both in the engineering departments of State universities, and in the State governments. The States must then be grouped into meaningful regions, acceptable to all member States, so that regional problems can be identified, discussed, and solved if possible, at regional conferences.

As I said in the beginning, the role of the Federal Government will be to assist the States to solve their own problems by bringing to their attention pertinent developments arising out of national research and development efforts, to provide them with a technological reference source when they need it, and otherwise to provide help and advice upon request. Obviously, only a few problems can be adequately considered at national conferences. Therefore, the regional

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conferences will be of prime importance if the Federal-State Technical Services program is to bear fruit.

One of the most important things we must remember is that industrial technological progress sometimes brings about deemphasis of certain skills and trades which can result in serious areas of unemployment, as in the coal mining industry. If we are to avoid similar problems in the future, establishment of new science-oriented industries must be encouraged, and displaced workers must be retrained in new skills.

As you can see, there is a significant service to be performed here, one of great importance to the entire country. I hope that my efforts will contribute to the success of this endeavor.

Mr. Jensen: That covers, in general terms, our program as administered by our professional staff—all except one, the fellow who does most of the work and who has this afternoon handled the slide projector—John Griffith, our Engineering Aid.

As we reported to this Conference last year, we intend to pursue a vigorous publications program. We feel that an investigation or a development is really completed only after it is available to you in a useful form. During the year we have completed and had issued Miscellaneous Publication 247, *Weights and Measures Standards of the United States*, and two Technical Notes—195, *Report on Technical Investigation of Odometers*, and 196, *Report of the Investigation of Slow-Flow Meters for Fuel Oil Distribution Systems.* We also have prepared articles for the *Scale Journal* and other technical periodicals. At the printer now, and soon to be released, are Handbook 94, *Examination of Weighing Equipment* (the successor to Handbook 37), and Handbook 98, *Examination of Farm Milk Tanks.*

The latter is the first of a series of small, pocket-size handbooks on measuring devices that, in total, will succeed Handbook 45, *Testing of Measuring Equipment.* We decided to publish these as small, individual handbooks for the convenience of the official and because, at the industry level, there is no true relationship between farm tanks and taximeters, for example.

We have in preparation, and soon to be handed to the printer, a handbook on LP Gas Liquid-Measuring Devices and one on Mileage-Measuring Devices.

During the coming year we expect to prepare several additional handbooks in the measuring-device series, a publication on units and systems of weights and measures, additional Tech Memos, and other publications, as the need arises.

Many of you received a request from us for assistance in the lumber area, and you responded magnificently. We were asked by the Director to undertake an operational responsibility in determining the appropriateness and acceptability of a new standard for softwood lumber. This turned out to be quite a job, requiring thousands of hours of staff time and tens of thousands of items of correspondence and other forms of communication. I want to thank each of you for going to the trouble that you obviously did in developing the information that we needed.

Finally, to maintain continuing knowledgeability and to provide experienced expertise in the special fields, I have assigned, as staff assistants to the standing committees of the Conference, individuals

with particularly appropriate backgrounds and capabilities. Dick Smith will serve the Committee on Education, Harold Wollin the Committee on Laws and Regulations, and Don Mackay the Committee on Specifications and Tolerances. I will continue as secretary to each of the committees and, together with the assigned staff assistant, will provide each committee all possible help.

As you already know, next year the Conference will celebrate its Golden Anniversary—50 years of service to the people of this great Nation. We will plan a very special program and will offer the first national exhibit of weights and measures standards, testing equipment, devices, and techniques. We earnestly and sincerely solicit your ideas and your advice.

It seems appropriate at this very special time to take a serious look at this National Conference of ours. Are there some changes in format, in plan, in program that might make it more effective, a more useful tool to nationwide uniformity, effectiveness, and efficiency in weights and measures supervision?

I should like to issue a challenge to the States, counties, and cities, and to our associates in industry and business, to give us the ideas to make the National Conference exactly the meeting you want it to be. Give us your thoughts, in person or in writing. Let's not be bound by tradition to the extent that we are sacrificing improvements.

That, then, constitutes the report of the Office of Weights and Measures to this, the 49th National Conference. As most of you know, ours is a double mission—on the one hand, to prosecute vigorously a program aimed at bringing the measurements throughout the Nation into accord with the National standards of measurement; on the other hand, to provide technical assistance to the weights and measures officials of the States, counties, and cities, and to the businesses and industries interested in or affected by weights and measures supervision. Stated simply, our aim is to serve you. To do this best, we, of course, need your help, your requests, your identification of problem areas. You may be confident that ours will be a diligent effort and that together we will work for, and our efforts will result in, uniformity, equity, and effectiveness in our field, the field of weights and measures.

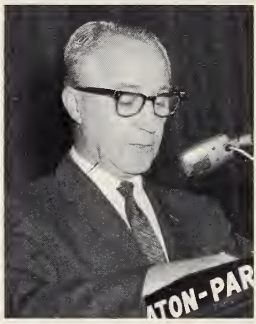
MORNING SESSION—WEDNESDAY, JUNE 17, 1964

(W. E. Czaia, Vice Chairman, Presiding)

ACTIVITIES OF THE U.S. GOVERNMENT IN THE WEIGHTS AND MEASURES FIELD

(1) Food and Drug Administration

by V. H. Blomquist, *Assistant Chief, Food Technology Branch, Division of Food Standards and Additives, Food and Drug Administration, U.S. Department of Health, Education, and Welfare*



There are several provisions of the Food, Drug, and Cosmetic Act that may be of special interest to you in considering the quantity of contents of food products. Three of these relate to misbranding and one to adulteration. Not all of them may apply to every food product, and the weights and measures officials should consider those that are applicable to the particular product in question.

The *first* requirement is that the product shall bear "an accurate statement of quantity of the contents in terms of weight, measure, or numerical count . . ." This applies to all foods and drugs in package form. Our regulations have interpreted this as permitting a statement either of average net contents or, if so indicated, of minimum contents. In the latter instance, no variation below the declared minimum is legally tolerated. The exception is dealt with in Section 1.8(j) which provides for variation below the stated weight or measure caused by ordinary and customary exposure to conditions which normally occur in good distribution practice and which unavoidably result in decreased weight or measure. Similarly, Section 1.8(k) permits variations from stated weight or measure where the statement does not express the minimum quantity, but an average. Where the net contents statement expresses the average of the lot, this average shall be met, except as just stated, but variations above and below this average may be expected in individual containers. The extent of the variations is limited by good manufacturing practice for the particular product. This may change somewhat over the years as packaging materials, techniques, and filling equipment improve. In any event there should be no unreasonable variation below the declared net contents in any container.

Regulations have dealt with the fill of containers and it might be well to review here some of the more important parts of these regulations. They are available in full by writing to the Food and Drug Administration.

I wish to quote from pertinent paragraphs of the General Regulations:

Section 1.8(e)(1) The statement of quantity of the contents shall reveal the quantity of food in the package, exclusive of wrappers and other material packed with such food.

Section 1.8(e)(2) The statement shall be expressed in the terms of weight, measure, numerical count, or a combination of numerical count and weight or

measure, which are generally used by consumers to express quantity of such food and which give accurate information as to the quantity thereof. But if no general consumer usage in expressing accurate information as to the quantity of such food exists, the statement shall be in terms of liquid measure if the food is liquid, or in terms of weight if the food is solid, semi-solid, viscous, or a mixture of solid and liquid; except that such statement may be in terms of dry measure if the food is a fresh fruit, fresh vegetable, or other dry commodity.

The Regulations further state that "A statement of weight shall be in terms of avoirdupois pound and ounce. A statement of liquid measure shall be in terms of the United States gallon of 231 cubic inches and quart, pint, and fluid ounce subdivisions thereof, and, except in case of frozen food which is so consumed, shall express the volume at 68° Fahrenheit (20° Centigrade). A statement of dry measure shall be in terms of the United States bushel of 2150.42 cubic inches and peck, dry quart, and dry pint subdivisions thereof . . ." In some cases numerical count may be adequate. In others it may be necessary to include, in addition, a statement of weight, measure or size of the individual unit. For units of less than one-half ounce, the quantity of contents statement may be omitted.

"Section 1.8(g) Statements shall contain only such fractions as are generally used in expressing the quantity of the food. A common fraction shall be reduced to its lowest terms; a decimal fraction shall not be carried out to more than two places." Examples of declaring contents are also included in the general regulation, but the short length of time allocated to me here precludes going into detail.

The industry has had little difficulty in meeting the requirements of the Act insofar as declaring contents is concerned.

A *second* provision of the Act of interest to the weights and measures official is that which defines a food as misbranded if its container is so made, formed, or filled as to be misleading. In interpreting this provision of the Act we are still guided by a policy that was enunciated under the Food and Drugs Act of 1906 in Food and Inspection Decision 144, issued May 27, 1912. We expressed the opinion that "The can in canned food products serves not only as a container, but also as an index of the quantity of food therein. It should be as full of food as practicable for packing and processing without injuring the quality or appearance of the contents."

This brings us to the *third* provision of the Act touching upon quantity of contents. The Secretary of Health, Education, and Welfare is authorized to promulgate reasonable standards of fill of container for processed foods. Food is misbranded if it purports to be, or is represented as, a food for which a standard of fill of container has been prescribed when the article falls below such standard of fill, unless it bears labeling stating that fact.

Several such standards have been established for fill of containers. Examples are canned fruit cocktail, canned oysters, canned shrimp, canned tuna, canned mushrooms, and canned tomatoes.

The *fourth* requirement has to do with adulteration. Many canned foods consist of a solid characterizing ingredient in a liquid packing medium. The requirements I have touched upon so far relate to the total quantity of the combination. Obviously, the quantity of the more valuable solid characterizing ingredient may vary within a can which is well filled with total contents. Abuse may occur from excess packing media. The consumer may not be dealt with fairly in this

respect. We still need to develop objective measures of fill for the solid portion rather than to attempt to rely on directions which are indefinite.

Those standards covering foods with a packing medium should provide the maximum practicable quantity of the solid food ingredient and no more packing medium than is necessary for proper processing. Owing to a number of technical difficulties it has not been easy to write such standards with meaningful requirements that can be determined objectively. Food and Inspection Decision 144 has already been mentioned. It states:

> Food may require the addition of water, brine, sugar, or sirup, either to combine with the food for its proper preparation or for the purpose of sterilization—for instance, peas. In this case the can should be packed as full as practicable with the peas and should contain only sufficient liquid to fill the interstices and cover the product.
>
> Canned foods, therefore, will be deemed to be adulterated if they are found to contain water, brine, sirup, sauce, or similar substances in excess of the amount necessary for their proper preparation and sterilization.

This principle was later incorporated in that provision of the 1938 Act under Sections 402(b) and defines food as adulterated "(1) If any valuable constituent has been in whole or in part omitted or abstracted therefrom; or (2) if any substance has been substituted wholly or in part therefor or . . . (4) if any substance has been added thereto or mixed or packed therewith so as to increase its bulk or weight, or reduce its quality or strength, or make it appear better or of greater value than it is."

In summary, a food for which a standard of fill of container is in effect becomes misbranded if it contains headspace or packing media in excess of that permitted by the standard, unless it is labeled in a specified manner to show that it is substandard in fill.

An unstandardized food may, also, be misbranded if it has excessive headspace or may be judged adulterated if it contains an excess quantity of packing medium. This charge imposes a greater burden of proof upon the Government than is the case in showing that the specific terms of a standard of fill have not been met. A greater penalty falls upon the claimant since there is no provision in the law for relabeling these goods found to be so adulterated.

In closing let me say that we are encouraged by the steps that have been taken by the National Bureau of Standards to convert from the English system of weights and measures to the metric system. The Food and Drug Administration, while requiring the quantity of contents to be declared in terms of the English system, permits supplementing this with a statement in the metric system. The change would eliminate much confusion in our scientific and enforcement activities.

DISCUSSION OF FOREGOING ITEM

M. Greenspan: In your first statement on food and drugs in package form, you mention that there is a permitted average of short weight caused by ordinary and customary exposure to conditions occurring in good distribution practice. Who is to be the judge of what is good practice and what is ordinary and customary exposure?

Mr. Blomquist: We just recently conducted some surveys on several types of foods where we actually went out to the factories where the food was packaged. The food was packaged under commercial con-

ditions, and was stored along with large shipments of the same food, properly identified in the shipment and shipped by various means to various parts of the country, and weighed at predetermined intervals over a period extending somewhat beyond the expected shelf life of the product. This is the type of data on which we would base our definitions of the terms "good practice" and "customary exposure."

Mr. Greenspan: You mention testing that FDA has done. Are the data from this testing available, specifically, to us weights and measures officials?

Mr. Blomquist: I will speak for the Federal-State Relations Office of the FDA and state that we are preparing to make some of these data available to the State and local enforcement people as they are developed. Much of our data is very old and would not serve a very useful purpose at this time, but we are now getting back into the economic field, which was largely curtailed in the early 1950's, and it is not very easy to start up quickly again. More and more of this information will be made available to officials in the United States.

G. L. Johnson: On labeling, would you consider a quantity statement of "32 ounces" as being a proper statement of quantity?

Mr. Blomquist: No.

J. F. Lyles: Does the Food and Drug Administration require the word "liquid" to appear in the net quantity statements for quarts and pints? For example, on a quart jar of mayonnaise do you require the word "liquid" to appear in the quantity statement?

Mr. Blomquist: No, I don't believe that we have required that. As a matter of fact, if it is in fluid ounces the statement itself defines the terminology, so that in the case of mayonnaise if it is a pint, it is 16 fluid ounces, and that is liquid measure.

To answer your question a little bit more extensively, we have said here that if it is a mixture of a liquid and a solid then it must be declared in terms of weight.

L. W. Vezina: Isn't mayonnaise a semi-solid? How can we measure that as liquid?

Mr. Blomquist: There is a regulation that permits declaration according to customary usage. For terminology that has been used through the years, we make exceptions. The regulations permit this, as in the case of cottage cheese. Here you have a product that in the eastern part of the country is sold by weight and in the western part of the United States is sold by volume. This is a result of customary usage.

(2) Federal Trade Commission

by C. R. Moore, *Assistant Director, Bureau of Field Operations, Federal Trade Commission*

It is an honor and a pleasure to again respond to your invitation to address you briefly concerning activities of the Federal Trade Commission that relate, in a general way, to weights and measures.

The Federal Trade Commission responsibilities under the laws it administers fall into two major categories which, for convenience, are designated (1) deceptive practices and (2) restraint of trade. It is in the first category that our duties come closest to your work as weights and measures officials. My comments will relate to some of those deceptive practices that I thought would be of most interest to you.

For the benefit of those who are not acquainted with the FTC and the laws it administers I shall begin by briefly commenting on those subjects.

The FTC was created by the Federal Trade Commission Act of 1914. It consists of five Commissioners and is presided over by a Chairman who, in addition to the regular duties of a Commissioner, has primary responsibility for administering operations of the agency. The Commissioners are appointed for a period of seven years and those appointments are staggered in such a way that, normally, the majority of the body has substantial experience in execution of the laws entrusted to the Commission. Experience is important for, in performing its statutory duties to business and the consuming public, the Commission has very wide jurisdiction and discretion and its holdings profoundly affect the economy of the Nation and consumer welfare. The Commission is a quasi-judicial administrative body. Its formal remedies, with few exceptions, are civil rather than criminal. However, in those instances where it appears that the public interest will be adequately served, and the alleged violator is cooperative, the agency also employs various informal, more economical and expeditious procedures to effect the discontinuance of practices that appear to be illegal.

The statutes administered by the FTC are the Federal Trade Commission Act, a broad statute declaring "unfair methods of competition . . . and unfair or deceptive acts or practices in commerce" to be illegal; the amended Clayton Act, which prohibits certain business practices that substantially lessen competition or tend to create a monopoly; the Webb-Pomerene Act, which exempts export trade associations from some aspects of the Sherman Act; and the so-called "Truth in Fabrics and Furs Statutes," which relates to the labeling and advertising of textiles and furs; the Flammable Fabrics Act, which prohibits introduction of articles or wearing apparel and fabrics into commerce that do not meet specified standards of safety as to flammability; and there are some statutes of lesser significance.

These laws have as their basic purposes the preservation and promotion of our free enterprise system of economy (1) by keeping it open to all who wish to enter, and competitively fair and (2) by the

protection of the consuming public from unethical business practices.

Moving to areas of FTC activity that have a relationship to subjects of this meeting, I call attention to the fact that Section 5 of the FTC Act, referred to above, is the weapon utilized by the Commission to prohibit a vast multitude of acts and practices which are connected with trade in interstate commerce. As you will notice from the above quotation from Section 5, it does not delineate specific illegal acts but broadly prohibits "unfair methods of competition and unfair or deceptive acts or practices," and the Commission has the responsibility of defining and prohibiting business practices that arise from time to time which fit into those categories. In the fifty years of its existence the Commission has built up a large volume of precedents under this statute that are of inestimable value as guides to the business community and as protection to the consuming public.

Among the practices that have been condemned under the provisions of this statute are not only a large number of restraints of trade but a multitude of unfair methods of competition and deceptive practices, including such practices as false disparagement of competitors and their merchandise; deceptive pricing practices, misrepresentation of or failure to observe the terms of guarantees; passing off the products of one as those of another; use of deceptive trade or commodity names; promotions of fake land and housing development schemes; skip-tracer schemes; failure to disclose foreign origin of certain products; misrepresentation as to relationship with the Federal Government; misrepresentation of value and recognition given to correspondence school courses; trying to enforce payment for unordered merchandise; failure to deliver merchandise that has been advertised; bait advertising; misrepresenting therapeutic value of drugs, devices and cosmetics and the nutritional properties of foods; slack fillings, short measurements and other forms of deceptive packaging.

For many years the Commission has dealt with the question of slack filling. Products that have been considered in this connection have a wide range and include fertilizer, foods, crayons, Christmas snow, envelopes, soaps and other cleansing agents, shaving cream, dental cream, suntan cream, shoe polish, cans of gasoline, etc.

Related matters include misrepresentations as to dimensions of rugs, tents, awnings and sleeping bags; the length or total number of inches of wrapping paper, rolls of tape and yarns; packing toilet water so as to create the impression they are perfumes; misrepresenting precious metal contents of jewelry and watch cases.

There is also a large body of corrective action involving deception as to composition or true identity of products. Some of those are dealt with under the above-mentioned provisions of Section 5 of the FTC Act and others by application of the textile and fur statutes. Examples in this category include use of the word leather or terminology suggesting leather to identify imitation leather; use of term "rubber" or its phonetic equivalent to identify plastic products; use of term "diamondite" to identify clear or white sapphires; identifying products made of hardboard as "mahogany" and "walnut" wood; passing off veneer as solid wood and shellacked paper or plastic photographed to look like wood veneer or leather as wood veneer and leather; passing off "Philippine Mahogany" as genuine mahogany; describing tinted pictures as oil paintings; misrepresenting feather and down contents of pillows and down content of arctic wearing apparel; labeling cultured pearls

as natural pearls; unqualified designation of a product as solder when it contains no metals; selling rebuilt TV tubes as new and second and reject TV tubes as first grade.

Years ago a line of garments made of fabrics which very closely resembled genuine furs was being offered under names indicating they were made from furs. Fur garments made from hundreds of scraps of fur were sold without disclosure of this fact. Less desirable furs were being sold under names connoting the more expensive furs. These and other deceptive practices gave rise to the Fur Products Labeling Act, which rather strictly controls labeling and advertising of furs.

The practice of misrepresenting less desirable fabrics as wool and other higher quality fabrics gave rise to the Wool Products Labeling and Textile Fiber Identification Acts.

We yet have a substantial volume of cases under these fur and textile laws where composition is misrepresented. These "truth in textiles and furs laws" not only prohibit certain practices but require affirmative disclosures of composition of the products to which they apply. They cover furs and practically all fabrics.

These applications of the Federal Trade Commission and the other Acts just discussed are, in many respects, like your administration of weights and measures laws. The Commission's laws are broader in their coverage.

Not infrequently State authorities call our attention to violations that cannot be handled under State laws. Such cooperation is appreciated. For your information, should you wish to call such matters to the attention of the Commission, I will state briefly the conditions that must obtain for the Commission to initiate corrective action. First, the act or practice involved must be condemned by a statute administered by the Commission; second, the act or practice must generally be in interstate commerce; and third, the act or practice must not be *de minimus* in nature, i.e., it must possess sufficient public interest to justify use of public funds in giving it attention.

During the many years I have been associated with the enforcement of that part of FTC's work that is broadly designated as deceptive practices, it has been my pleasant duty to work closely with officials of many agencies of the Federal and State Governments. Many other members of the Commission's staff have had similar experiences. We of the Commission's staff wish to express our appreciation for valuable assistance given us by all government agencies, at all levels, and to assure you that we are always willing to collaborate with other Federal and State Government agencies, wherever possible, especially in areas of common responsibility in law enforcement.

DISCUSSION OF FOREGOING ITEM

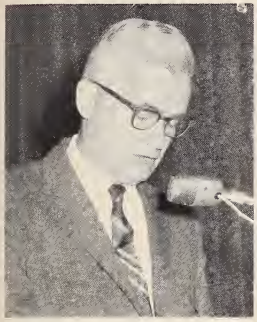
I. Reich: I have a question to ask about aerosol products. To what extent does the Federal Trade Commission concern itself with net weight labeling, and to what extent is this handled by the States, and what degree of overlap exists?

Mr. Moore: The responsibility of the Federal Trade Commission would rest upon this principle: If there is any deception associated with that label, it would be FTC's responsibility to stop it. It probably overlaps, in a large measure, the States' responsibilities in that area. The only difficulty with aerosol products is determining just what does constitute a full and meaningful disclosure to the purchaser. So far as

the law is concerned, it is clear. Our responsibility is to eliminate any possible deception that is associated with statements made on the label or any advertisement. The factual test is, what does the prospective customer expect to receive? That is, what are his impressions as to what he will get when he reads an advertisement for the product or sees the product on a shelf? If he receives less, he is deceived.

(3) Internal Revenue Service

by R. O. Jolin, *Chief, Basic Permit and Trade Practice Branch, Alcohol and Tobacco Tax Division, Internal Revenue Service.*



I have been asked to appear on your program to discuss certain Internal Revenue Service activities in the field of labeling controls dealing with net contents which may be of interest to State weights and measures officials.

I think it safe to say that the Federal Government exercises a greater degree of control not only over the taxation of liquor, but over the packaging of liquor as it relates to consumer deception than that which is applied to any other commodity.

In the field of packaging and labeling, the Alcohol and Tobacco Tax Division's statutory authority derives from two sources: first, from the Internal Revenue Code which, as the title indicates, is concerned with the collection of the revenue and its protection; and second, from the Federal Alcohol Administration Act which is primarily a consumer and trade regulation statute. The first depends upon, and is issued under, the taxing power conveyed to the Federal Government by the Constitution. The second, on the other hand, depends primarily upon the Federal power to regulate interstate commerce.

Regulations issued under authority of the revenue statute require statements of contents on labels of alcoholic beverages, articles made from specially denatured alcohol, and tobacco products (in terms of volume, weight, or count, as the case may be), to facilitate verification, by Internal Revenue audit, of the quantities produced, packaged, and removed from the place of manufacture or packaging. These requirements, under the internal revenue laws, are designed to assure proper collection of the revenue and to prevent fraud on the revenue through the removal of nontax-paid products.

In contrast, the regulations issued under authority of the Federal Alcohol Administration Act require statements of net contents on labels of distilled spirits, wines, and malt beverages imported into the United States or bottled therein for introduction into interstate commerce; and the regulations specify the manner and form of stating such contents on labels.

Thus, the alcoholic beverage labeling controls were designed by Congress to insure that the purchaser will get what he thinks he is getting, and that representations on labels will be honest, straightforward, and truthful. They are not confined to prohibitions of falsity, but they also provide for informing the consumer of what is in the

bottle, and all of the important factors which are of interest to him about what is in the bottle.

Perhaps a word as to the background of this statute will serve to explain the reasons for the detailed consideration given to consumer protection in liquor labeling and advertising. In his proclamation declaring the repeal of Prohibition, President Roosevelt announced that it would be the policy of the Federal Government to see to it that the social and political evils that existed in the liquor field prior to the Prohibition era should not be revived or permitted again to exist. Among the legislative measures designed to effectuate this policy is the Federal Alcohol Administration Act. Adulteration, misbranding and deceptive advertising had been recognized among the evils which had existed in the liquor industry. The Act is based on congressional findings that protection of the consumer in the alcoholic beverage field is imperative because the tradition of past practice in the industry, the ease with which its product can be adulterated, sophisticated, misbranded, and the relatively high value, provide extraordinary incentives to ignore legal requirements. The Congress also found that the public could not be protected from unscrupulous advertising and from deceptive labeling practices without the imposition of appropriate Federal controls, including the imposition of such relatively drastic enforcement measures as a Federal permit system.

The labeling requirements under the Federal Alcohol Administration Act are enforced at the source by means of certificates of label approval issued by the Internal Revenue Service and required to be exhibited by the bottler or importer to the Government officer concerned to effect the release of the goods from the bottling premises or Customs custody, as the case may be. The regulations, with respect to standards of fill and labeling of net contents on packages, have undergone very little change since they were first issued in 1935 and 1936.

The regulations impose substantially similar labeling requirements with respect to distilled spirits, wine, and malt beverages; all are aimed at preventing deception of the consumer with respect to the net contents of the package, as well as the origin and identity of the product, the kind of product in the package, and the identity of the producer, bottler, or importer responsible for the product.

As to net contents, the regulations provide that statements of net contents need not appear on labels if permanently marked on the container itself.

As to products not required to be bottled in standard size containers, the regulations require the net contents to be stated:

(a) In the case of wine, in terms of gallons, quarts, and pints, with fractional quantities stated in fluid ounces, except for containers, of 1½, 1, and ½ liter capacities; and

(b) in the case of distilled spirits and malt beverages, the same rule applies except that no recognition is given the metric system, and net contents may, if desired, be stated in fractions of gallons, quarts, or pints, instead of in fluid ounces.

In all cases, fractions are required to be reduced to the lowest common denominator.

The following standard size containers have been prescribed for domestically bottled wines:

2 ounces	⅘ quart
3 ounces	1 quart
4 ounces	½ gallon
⅖ pint	⅘ gallon
½ pint	1 gallon
⅘ pint	3 gallons
1 pint	4.9 gallons.

Aperitif wines (such as Vermouth) may also be packaged in containers of $^{15}/_{16}$ quart.

For distilled spirits (whether imported in bottles or bottled in this country), other than cordials, liqueurs, and prepared specialties:

$^1/_{10}$ pint	⅘ quart
⅛ pint	1 quart
½ pint	½ gallon
⅘ pint	1 gallon.
1 pint	

Brandy may also be packaged in $^1/_{16}$-pint bottles. Standard bottles are required to bear a net contents statement conforming to the standard. As to permissible tolerances in the accuracy of the required net contents statement, the regulations recognize discrepancies in fill occurring in filling in accordance with good commercial practice; discrepancies unavoidably resulting from the difficulty in manufacturing bottles of uniform capacity; and discrepancies due to differences in atmospheric conditions unavoidably resulting from the exposure of alcoholic beverages to evaporation.

However, the regulations specifically provide that containers shall be considered misleading if their actual capacity is substantially less than their apparent capacity, or if packaged in cartons so formed as to mislead the consumer as to the size of the bottle.

Some comment may perhaps be helpful as to why all alcoholic beverages are not required to be packaged in bottles of standard sizes.

As I understand it, after Repeal when these regulations were issued, standard bottles were not prescribed for wine imported in the bottle for the reason that any such requirement would have imposed a considerable hardship upon importers. In the wine-producing areas of Europe, the metric system is employed exclusively. Since European wines are commonly stored in the bottle for a year or more prior to shipment, the ultimate destination of a particular wine is unknown when it is bottled. If this country were to impose standards of fill for such wines, they would have to be placed in special bottles for export to the United States, or be rebottled prior to sale in the United States with possible damage resulting from such rebottling.

In answer to the question as to why cordials and specialty products have been exempted from the standard size bottle requirements, this may have resulted from a recognition that such products have traditionally been packaged in bottles of nonconventional shapes and sizes associated with a particular brand or type of product. Perhaps most typical are the ceramic containers customary for the packaging of Curacao; the 2, 3, and 5 compartment bottles, in which a different type of liqueur is contained in each compartment; and the delicate venetian glass flasks, pottery vases, and figurines associated with particular old-world liqueurs and cordials.

Standard sizes have not been prescribed for beer. At the time the malt beverage labeling regulations were promulgated by the Federal Alcohol Administration in 1936, no effort was made to prescribe standards of fill for such products. At that time, the beer can had not yet made its appearance and beer was either available on draught or bottled, for the most part, in 12-ounce glass containers and, in the Far West, in 11-ounce glass containers. Imported bottled beers were packaged in containers of capacities corresponding to British or metric measure.

In the late 1930's, 12-ounce cans became popular for the packaging of beer. In the years following, particularly after World War II, additional sizes of cans and bottles were introduced in certain markets, and it was represented that unless beer containers were standardized, consumer deception would result. Hearings were held in 1955 to consider the merits of proposals to amend the malt beverage labeling regulations for the purpose of establishing standards of fill to limit the variety of malt beverage container sizes.

The evidence of consumer deception was inconclusive in light of the long-established and widespread consumer acceptance of many of the odd sizes (the 6, 8, and 11-ounce containers) in various markets throughout the country; a fact which tended to negate any inference that such sizes were deceptive in those markets. There were indications that certain sizes were accepted as standard in some areas while other sizes were regarded as standard in other areas. Therefore, no standard sizes were imposed. It was, however, concluded that possible abuses in the marketing of so-called odd-size containers could be avoided by stringent enforcement of the labeling provisions of the malt beverage regulations which require conspicuous net content statements.

In recent years there has been considerable discussion of "slack-fill". You may, therefore, be interested in our controls over "headspace" in the packaging of alcoholic beverages. Under our wine labeling regulations, headspace cannot exceed 6 percent of the capacity of the bottle, except in the case of very small containers (2/5 pint), where 10 percent or roughly 6/10 ounce is permitted. As to distilled spirits, a maximum headspace of 8 percent is permitted for containers of ½ pint or larger. These provisions have been in effect since 1936 and there is no indication that any consumer deception has occurred in this area. In the case of beer, no specific maximum headspace has been prescribed, but we have followed, as conforming to good commercial practice, the recommendations of the Glass Container Association, relating to tolerances in fill.

DISCUSSION OF FOREGOING ITEM

R. K. Slough: I note that the Federal Alcohol Administration Act has been in force for about 30 years, and I am questioning somewhat the number of sizes permitted. One that I have always quarreled with is the one labeled ⅘ of a quart. I don't know, but I doubt if anybody here ever went to a store and asked for a ⅘ quart of whiskey or wine. They ask for fifths. Why isn't it labeled a fifth gallon?

Mr. Jolin: I believe it was thought, at the time this requirement was adopted back in 1935, that the ⅘ terminology would be more intelligible to the consumer as indicating the relative size of that package to the quart. I believe also that there are a number of people through-

out the country that have questioned the propriety of this particular size of container, but I think this reflects a relationship to the British system of measure. The 1/5 U.S. gallon is approximately 1/6 Imperial gallon which is extensively used in distilled spirits. I think this is why it was recognized in the United States, particularly in relation to Scotch whiskey and Canadian whiskey, and it later became more or less standard for the domestic product because of competitive practices.

MR. SLOUGH: I am also questioning the desirability of containers like the 15/16 quart and 2/5 pint, and so on.

MR. JOLIN: I think such sizes were desired by American wine industry in order to compete with some of the foreign brands that were not subject to the standards of fill.

MR. SLOUGH: We are probably one of their greatest customers. Now maybe we should say what sizes they should be.

MR. JOLIN: Perhaps so, but I think in the case of wine you have a little different problem than you have in the case of distilled spirits. Do you think it would be proper for a country to require all wines to be rebottled before they enter the country, with possible damage to the wine?

MR. SLOUGH: Couldn't they make bottles for the United States trade and other bottles for their own trade?

MR. JOLIN: Not easily. The wines are bottled and then bottle-aged for a period of a couple of years before they are marketed. At the time of bottling, there is often no knowledge of the destination of the wine.

G. L. JOHNSON: Do you require the name of the packer and the address on all packages of tobacco?

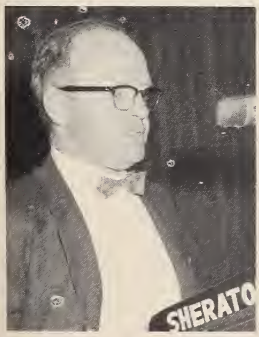
MR. JOLIN: The identity of the packager must be disclosed on the label; that is, the tobacco factory number.

MR. JOHNSON: But not in all cases the name of the packer?

MR. JOLIN: No. Tobacco is not subject to the same details of regulation as alcoholic beverages. We don't have the same statutory authority for it.

(4) USDA—Packers and Stockyards Division

by R. D. THOMPSON, *Chief, Scales and Weighing Branch, Packers and Stockyards Division, Agricultural Marketing Service, U.S. Department of Agriculture*



It is again my pleasure to appear before this National Conference on Weights and Measures. Though I may be a stranger to some of you, I do not feel that I am a stranger to these Conferences, for I attended my first Conference in 1941 as a representative of the State of Virginia.

I have had the opportunity to attend each Conference held since that time, and, while there are always many changes in the personnel who attend, there has been no change in its basic objective. That is, to bring together weights and measures officials from across the nation to exchange ideas, improve our understanding of

each others' problems, and to explore the technical and legal aspects of administering weights and measures laws and regulations.

Within this context, I would like to discuss with you the Packers and Stockyards Act—its scope, objectives, and relationship to the field of weights and measures.

The Packers and Stockyards Act is a Federal fair-trade practice statute enacted in 1921. Since then, it has been amended on several occasions, and most recently in 1958. It is administered by our Packers and Stockyards Division of the U.S. Department of Agriculture's Agricultural Marketing Service. Its basic purpose is to regulate the business practices of those engaged in interstate and foreign commerce in the livestock, poultry, and meat packing industries.

The 1958 amendment to the Act achieved two things. First, it greatly expanded the Act's jurisdiction over livestock marketing to include virtually all stockyards and a greatly increased number of market agencies and dealers operating in the country. Second, the amendment established lines of responsibility between the Department of Agriculture and the Federal Trade Commission covering each agency's supervision over the business practices associated with livestock, poultry, and meat marketing.

The amendment transferred to FTC jurisdiction over all products manufactured or prepared by packers—except meat, meat food products, livestock products in unmanufactured form, and poultry or poultry products. It also gave the Commission primary jurisdiction over the retail sales of these products. In addition, FTC was granted jurisdiction over the marketing of eggs.

The Department of Agriculture, in turn, was given exclusive jurisdiction in the livestock and live poultry marketing fields. USDA also received primary jurisdiction over business practices associated with the marketing of meat, meat food products, and poultry products on the wholesale level by those subject to the Act.

This latter provision includes jurisdiction over the procurement of meat and poultry by food chains subject to the Act as meat packers, but does not extend to their retail sales operations.

Congress did provide that, when either FTC or USDA needs to extend an investigation into the other agency's field, it may do so by advising the other agency of its intentions. This "hot pursuit" clause, as it is termed, is an important tool in the effective administration of the Packers and Stockyards Act.

In general, the Packers and Stockyards Act prohibits any public stockyard, market agency, livestock or live poultry dealer, or any meat or poultry packer subject to the Act, from engaging in any unfair, unjustly discriminatory, or deceptive practice. Through regulations issued under the Act, the rules are set forth which govern fair business practices and maintain free and open competition.

Now, let us be more specific as to the activities of the Packers and Stockyards Division as they relate to weights and measures.

False weights are, of course, an unfair and deceptive practice under the Act. We have, therefore, established certain regulations regarding the testing of livestock scales and the weighing of livestock. For instance, those subject to the Act are required to have scales which they own or operate tested semi-annually according to prescribed procedures. Copies of test reports must be filed with the Packers and Stockyards Division.

In this connection, we are receiving excellent cooperation from many of you in carrying out this semi-annual testing requirement. In some States, one test is made by the State, and one by a private agency—usually a scale company or independent scale service agency. The testing procedures prescribed are essentially those recommended by the National Bureau of Standards. The specifications, tolerances, and performance requirements we prescribe for livestock scales correspond closely to the scale code in the National Bureau of Standards Handbook 44. In fact, they are cross-referenced to that publication.

Our Division has made a concerted effort to make our scale requirements reflect, as nearly as possible, those adopted by the majority of States. We also try to keep you advised of any change in our regulations relative to weights and measures.

As an example, during the past year we called your attention to a proposed amendment to our regulations, which was later adopted. This amendment requires that all livestock scales owned by those subject to the Act be equipped, by January 1, 1965, with either a type-registering weigh-beam or a dial with a mechanical ticket printer. It further requires that scale tickets be issued on which the weight values are mechanically stamped or printed.

While this, of itself, will not prevent fraudulent weights, it should eliminate numerous errors and make the altering of scale tickets more difficult. A large percentage of livestock scales have been equipped to issue such stamped scale tickets for many years. Those scale owners whose equipment is not presently in compliance have been advised of this amendment to the regulations.

In addition to issuing scale testing requirements and instruction, our Division also issues instructions for weighing livestock and conducts weighing investigations. In 1963, investigations were conducted at over 200 markets. Thirty-three of these markets were notified by certified mail to correct their weighing practices.

Formal legal action was undertaken and completed in three cases, resulting in the issuance of cease and desist orders by USDA's Judicial Officer, and suspension of their registrations—up to 90 days in one instance.

Consideration is now being given to requiring regular testing of monorail scales on the kill floor in meat packing plants, which are used for purchasing livestock on a dressed weight basis. We believe that many states are now testing such scales, but others do not consider them to be commercial scales.

Our Division also has two additional responsibilities under the Act—one in the field of live poultry weights, and the other dealing with weights of meat, meat products, and poultry, and poultry products sold on the wholesale level. Frankly, we have heretofore done little in these fields due to a lack of personnel—a problem familiar to many of you State officials. However, we are cognizant of our responsibilities in these fields and are willing to cooperate with you to the extent our facilities permit. We hope, in time, to devote more attention to this area of work and will do so as the need arises.

In closing, I wish to express my appreciation for the opportunity to again discuss with you the Packers and Stockyards Act and the activities of our Division. I also wish to again express our appreciation for the excellent cooperation we have received, and hope to continue to receive from State and local weights and measures officials.

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J. F. True: I notice that you are requiring a type-registering beam or a dial with a printer on livestock scales under your jurisdiction. You notified the trade of this, and I wonder if you could give us some figures on percent of scales that did not already meet this requirement and thus would have to be changed?

Mr. Thompson: We think that approximately 15 percent of the scales in the country are not so equipped. There will be something over a thousand scales that will have to be equipped with printers.

Mr. True: Do I understand correctly that the effective date is January 1, 1965?

Mr. Thompson: That is correct.

Mr. Greenspan: We receive many shipments of fresh frozen poultry, packed in ice, from other States. Have you established any definite procedures as to the methods of draining the ice and weighing the poultry—anything such as a specified period of drain time and temperature?

Mr. Thompson: No, frankly we have done very little in this field. We recognize that there is a responsibility here, but we have not had the staff to initiate this program.

(5) USDA—Meat Inspection Division

by C. H. Pals, *Director, Meat Inspection Division, Agricultural Research Service, U.S. Department of Agriculture*

The Meat Inspection Division of the United States Department of Agriculture derives its authority over label statements on federally inspected or imported meat and meat food products from Paragraph 5 of the Meat Inspection Act of 1906, as amended.

Paragraph 5 of this Act provides that information on labels shall not be false or misleading. This principle as applied to statements of contents is set forth in the *Regulations Governing the Meat Inspection of the United States Department of Agriculture* in Paragraph 17.8(d). This paragraph specifies that statements of content shall not be false or deceptive and also sets forth other requirements for labels.

One such requirement is that the statement of contents must represent, in terms of avoirdupois weight or liquid measure, the quantity of product in the package, exclusive of packing material.

If a label statement expresses a minimum weight, no variation below the minimum is permitted under Meat Inspection regulations. Statements without such qualifications represent the actual quantity. In this case, variations incident to packaging in accordance with good commercial practices are permitted. The permitted variations have been set out in the Manual of Inspection Procedures used by our inspectors. In any case, the average shall at least equal the stated net weight.

The inspection program of the Meat Inspection Division has two unique features that assure accuracy of labeling, including, of course, the net contents statements. First, labels for use in identifying federally inspected or imported meat and meat food products must be approved *before* their use and, in the case of imported products, labels must be approved before these are offered for importation. The label-approval function is administered by our Labels and Standards Office and is a centralized function. Last year over 50,000 new labels were approved. Because they did not fully comply with requirements, approval was denied nearly 3,000 labels and sketches.

Second, approved labels are applied to products only under the direct and continuous inspection and supervision of inspectors of the Meat Inspection Division. The inspectors therefore assume a definite responsibility of knowing that labels apply to the specific product and that the consumer can rely on all features of the label being correct.

The label review and approval program provides the Meat Inspection Division the opportunity of assuring that net contents statements are plainly shown on labels and so located as not to be false or misleading. In general, the statement must be located on the principal display panel, it must properly show net weight or net contents in type of sufficient size and clarity as to effect prominence and the quantity must be stated in the largest applicable weight unit. Requirements on type size in relation to label size have not been spelled out because careful review by trained personnel before label approval offers the best control regarding prominence, clarity, location and appropriateness of statements. The label should be capable of being read by persons with normal vision and under average light.

The contents statement on meat products consisting entirely of ingredients that are nutritious and suitable for food must represent the total contents of all ingredients. For example, the net contents of a product labeled, "Beef and Gravy," must include the total weight of all ingredients. If, however, the product is prepared with a packing substance not customarily used for food, such as water, brine, or agar, the stated content must represent the quantity of meat or meat food product, exclusive of the packing material. For example, the net weight of product labeled, "Vienna Sausage, Packed in Water," represents the weight of the vienna sausage, exclusive of the packing water.

Catch weights are permitted on many products. Certain products have traditionally sold at even weights and on such products catch weights have not been accepted. For example, sliced bacon may be packed in one-pound or 8-ounce packages but not in a 15-ounce or 7-ounce package, unless the statement of the quantity of content is featured with the same degree of prominence as the other required features, including the name of the product. The same is true of frankfurters and pork sausage which the customer is accustomed to purchasing at even weights. Another example would be the well known 4-ounce can of vienna sausage packed in water. We found that a 3½-ounce fill in the conventional can used for 4 ounces of sausage was a deceptive practice. Such practice also frequently resulted in the product picking up additional water thus causing it to be in violation for having more than 10 percent added water.

The inspection authority over the application of labels and statements of contents is an important control. No container may be filled,

in whole or in part, and no labels or marks, including statements of contents, may be applied, except under the supervision of a Meat Inspection Division employee. The inspector makes sure that the label is descriptive of the product, and he determines that the contents are in compliance with Department regulations, and accurately shown on the label.

DISCUSSION OF FOREGOING ITEM

J. R. Bird: On some packages of TV dinners, there will be a picture of quite a few slices of meat. Inside there will be only one slice. How do you people deal with this?

Dr. Pals: Certainly the illustration on the label must portray the product that is contained. During the past year we have had to require some corrections in this area.

W. A. Scheurer: How many States have intrastate inspection programs? Is anything being done to increase intrastate inspection efficiency?

Dr. Pals: Thirty-four States of the Nation do have inspection programs of some type. Some have only a licensing program, which requires packers to pay an annual fee for a license.

A lot of attention has been given to this. We were asked to report to Congress last year and did make a report on our findings and survey of the entire country. In the House, Congressman Neal Smith of Iowa, and in the Senate, Senator Neuberger of Oregon, Senator Ellender of Louisiana, and a few others have sponsored bills concerned with this.

K. Allen: We make a scale that is used in a number of packing plants and it is practically identical except for the name of the manufacturer. My question is this: If one label has been approved, and we are printing another identical label except with a different manufacturer's name, Swift instead of Armour, would that label also be approved?

Dr. Pals: Each inspector must keep a complete file of approved labels for any given plant. Now, once you have established a certain way of printing a label, you can feel quite sure it would be acceptable for other packers. We do not approve each different weight range, of course.

One of the questions that I hoped to have someone ask this morning of our friend in the Food and Drug Administration was whether or not the decision had been made with respect to the decimal system used on weights. It is being used rather widely in the retail level, but I do not think there has been any wide usage in the interstate or wholesale level.

Mr. Allen: We pioneered the use of the decimals—and permission for this was set forth in the Food and Drug Act at the time; this was back in 1956. Where decimals are used (and it specifically mentions decimal fractions), it does say they shall be limited to two places.

(6) USDA—Poultry Division

by H. C. Kennett, Jr., *Assistant Chief, Standardization and Marketing Practices Branch, Poultry Division, Agricultural Marketing Service, U. S. Department of Agriculture*

I am pleased that the Poultry Division, Agricultural Marketing Service, United States Department of Agriculture was asked to participate in the 49th National Conference on Weights and Measures, for your organization is held in the highest esteem by consumers and regulatory agencies as well as the various regulated industries.

The Agricultural Marketing Service has provided a variety of services to producers, processors, and consumers for the past 50 years, with the object of helping to improve the benefits and efficiency of our private marketing system for farm products. Besides inspection and grading of various products, and providing market news reports on a great many commodities, Agricultural Marketing Service regulates marketing practices, helps expand markets, conducts research, and carries on many other special services.

Since our agency administers the Poultry Products Inspection Act, there are certain areas of responsibility in which we share a mutual interest—indeed, even more than a mutual interest, for it is an area in which we must augment each other's functions if the consumer is to be truly protected.

There are four basic areas of responsibility that are assigned to us under the Poultry Products Inspection Act. One is to assure that only wholesome poultry and poultry products prepared from healthy flocks are shipped from an official plant. Two, we must make sure that such poultry is processed in a sanitary manner in approved plants having adequate facilities. Three, we must prevent the movement in interstate or foreign commerce of products which might be adulterated. And four, we must make sure the labeling of these products is truthful and informative to the consumer.

Included in this last area of responsibility is the requirement that each immediate container must bear the correct net weight of the product. This, of course, is the area which I just mentioned where our services, yours and ours, must augment each other and where we must cooperate and communicate in every way possible if we are to realize our common goal. You may wonder why I emphasize this. It is because *we* in USDA must make sure the net weight is correct when the product leaves the official plant, and enters commerce. *You* must make sure the net weight is correct when the product is no longer considered to be in commerce—in other words, at the retail store when it is sold to the consumer.

Immediately, some might say there is a duplication of responsibility. Not at all; the weights of some products are not stable and, therefore, they are in a constant state of flux, the degree of which depends upon many uncontrollable factors. These include such matters as method of transportation, time between first weighing and subsequent check

weighing, conditions under which the product was held, such as temperature and humidity—and we could list other factors.

In addition, this type of product is not normally individually packaged; therefore, only the shipping container is marked with the total net weight when it leaves the plant. The store then packages this product for sale to the consumer. Another reason is that some items are fabricated from inspected products in a given State for sale in that State. Since interstate commerce is not involved, we have no jurisdiction; certainly consumers of these products are entitled to protection.

I would like to break poultry products into three distinct categories for the purpose of discussing net weight because each has its own problems. One category would be poultry products, the weights of which are not stabilized. Chilled poultry, commonly known as ice-packed poultry, is an example of this category. The second category would be that product, the weight of which is stable, such as frozen poultry. The third category, one which is becoming increasingly important, is prepared poultry products such as chicken pies, stuffed turkeys, etc.

Let us discuss chilled poultry. I will purposely keep the discussion brief in the interest of time. We consider the weight of ice-packed poultry to be correct if the weight marked on the label is equal to or less than the actual weight of the product when it leaves the official plant. Chilled or ice-packed poultry, of course, weeps or loses weight continuously from the time it is processed until it is consumed. We make sure the weight is correct when the product leaves the plant and enters commerce. This is all we can do. We do not know where the product is going, when it will arrive, or any of the other factors which affect weepage. The final responsibility for correct net weight is yours.

For frozen poultry, the situation is somewhat different because the weight is stabilized. We consider the net weight of frozen products to be correct if the marked weight corresponds to the total frozen weight of the product minus the packaging material. Some of you may ask why we do not thaw the bird and deduct this weight along with the packaging material. There are sound reasons for not doing this. First, we limit the amount of moisture absorption to that which is unavoidably absorbed in the essential processing operations of washing and chilling. Second, we know that there is no correlation between moisture absorption and loss in thawing. One cannot distinguish between loss of absorbed moisture and natural body fluids. It is possible to thaw birds which have not been washed or chilled and still get a 2 to 3 percent loss of body fluids. I wish we had more time to discuss this topic because there is more that can be said that would benefit all of us.

The third category is prepared poultry products which are products containing poultry and one or more other ingredients. The net weight of poultry includes the weight of the poultry as well as any ingredient that might be combined with such poultry. For example, labels reading "Stuffed Turkey—10 pounds," or "Chicken Pie—8 ounces," are correct and not misleading because the name of the product accurately and informatively describes the product, the weight is accurate for the product so described and the label lists the ingredients in order of diminishing proportions.

It is no easy matter even now for an inspector to assure himself that

the markings are correct under the present system. Can you visualize the weighing operation if the exact weight of the poultry, the peas, the potatoes, the gravy, etc., had to be listed on a chicken pie or the difficulty in administering such a program? The cost in all probability would be prohibitive and such a move would not serve the best interest of the consuming public. We should continue to offer the consumer an ample supply of safe, wholesome, truthfully labeled food of the highest possible quality at the lowest possible cost.

We can also foresee other difficulties which might arise if the weight of each ingredient in a product had to be accurately indicated. You, as regulatory officials, would face similar problems. I am not referring only to the mechanics of weighing each ingredient. Using frozen "Stuffed Turkey," as an example again, it would be necessary to thaw the product completely in order to accomplish the difficult task of removing all of the stuffing. During thawing, the stuffing would absorb some of the weepage from the bird with a resulting change in not only the original weight of the turkey itself but also the original weight of the stuffing. Consequently, this weight would always be different from the weight at time of fabrication. Which is correct? In addition, this would either require destructive sampling, or in the event the product were sold, could lead to disastrous results due to the danger of bacterial contamination.

In closing, I want to again thank you for the opportunity of participating on your program. We in the Poultry Division of the Agricultural Marketing Service are vitally interested in working in close cooperation with regulatory officials like yourselves and would welcome any information about weight problems you have encountered with respect to Federally inspected poultry.

While we make every effort to strictly enforce all of the provisions of the Poultry Products Inspection Act and regulations, we realize there is always room for improvement so any "leads" from you which we could pass on to our field supervisory staff would be of great assistance. This interchange of information would be most helpful to the Department in discharging its responsibility in this field and would be beneficial in achieving our common goal of assuring the consuming public of accurate weights on the poultry products they purchase.

DISCUSSION OF FOREGOING ITEM

M. Greenspan: Recently, New York City instituted action against packers of turkeys with stuffing. In the State law we require that meat be sold by net weight, and we do not consider stuffing to be part of the net weight of the turkey. Last Friday, in the Federal Court, our contention was upheld.

During the course of this action we had been in touch with the Meat Inspection Division concerning the labeling. We said we would be satisfied with a label that stated the net weight of the turkey and, separately, the weight of the stuffing. The Meat Inspection Division said that that could not be done. In view of this recent decision by the Federal Court, do you contemplate any change in that ruling?

Mr. Kennett: I am sure when the final litigation of this problem is over that we would comply with whatever is decided.

H. E. Howard: I would like to comment on a situation we have in Florida, where chickens are named instead of graded. When this sys-

tem was initiated a couple of years ago, a name like "Canton's Choice, Grade A Chicken," was registered with the State. Today, Canton's Choice is Grade C. No one knows any more what these names mean or what quality they indicate.

MR. KENNETT: Does not most of this labeling take place in the State of Florida?

MR. HOWARD: No, most of this labeling takes place in another State at the plant source. To me, it is a big gimmick. I think there is much Grade B chicken being unloaded in Florida.

MR. KENNETT: We will look into that. I would like more details on this problem.

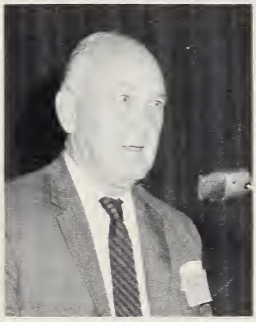
F. G. YARBROUGH: In our area we have had considerable trouble this year on Grade A fresh dressed fryers processed at various plants, some originating in Mississippi, some in Arkansas, some in Oklahoma, and many of them in Texas. The weights are determined at the plant where the chickens are packed in ice and delivered within the City of Dallas. We have found very sizable shortages, often of as much as 4 to 5 pounds per box of 24 chickens, and we have instituted prosecutions in quite a few cases and obtained convictions in some of them, but the processors tell us that the USDA allows the original weight determinations.

We have a very difficult problem here. What is the position of your Department in this situation where on Wednesday or Thursday of one week the chickens are weighed and then delivered in our area perhaps the following Monday or Tuesday with considerable weight loss having occurred?

MR. KENNETT: Of course, this is a continuing problem. Every State has this problem, for the simple fact that the weight of this type of product is not stable. When you weigh a product on Friday that was packed on Thursday, the weight is going to be less. However, we don't know how long each box will be in shipment, so this is a case where all you can do is to make sure it is right when it leaves the plant.

(7) USDA—Milk Marketing Orders Division

by H. C. FEDDERSEN, *Deputy Director, Milk Marketing Orders Division, Agricultural Marketing Service. U.S. Department of Agriculture*



Federal milk marketing orders are part of a broad program of commodity agreements and orders authorized by the Agricultural Adjustment Act of 1933 and the Agricultural Marketing Agreement Act of 1937. Marketing agreements and orders are in effect also for various fruits, vegetables, and tree nuts.

The milk marketing orders make available to producers the means for achieving the orderly marketing of their products. This is accomplished through the use of terms specified in the Agricultural Marketing Agreement Act, as further developed by public rulemaking.

The core of a Federal milk order is its provision and enforcement

of a classified price plan. A classified plan provides for the pricing of milk based on the way the milk is used by the milk plant. A price is established for Class I milk—milk used mainly for bottling purposes. This price must be sufficient to induce the production and delivery to market of the quantity of milk needed to fill bottles and provide the reserves the market requires. A lower price is established for Class II milk. This price applies to the reserves and that other portion of the supply which must go into manufacturing uses, because the seasonal pattern of production and daily patterns of distribution do not agree closely. This so-called Class II price is established at levels competitive with milk of manufacturing quality.

The employment of a class price plan means that all handlers pay the same price for milk which goes into the same use. A class price plan limits the possibility of a milk dealer gaining an advantage simply because of the way he may use the milk.

The orders also provide for pooling plans which average out the returns to producers. Thus, each producer receives the same average price regardless of how his particular lot of milk is used.

In 1963, about one-half of all milk sold wholesale was regulated under Federal orders. Under regulation were approximately 2,200 milk handlers receiving milk from almost 180,000 producers, and serving about 110 million consumers.

The terms of each order are carried out in the locally regulated market by a Federal milk market administrator appointed by the Secretary of Agriculture. The administrator may be responsible for more than one order and marketing area. The costs of operating these offices, including salaries, are borne by the local industry rather than by the Federal government.

Regulated milk handlers are required to file monthly reports of their receipts and disposition of milk in each class of use. Since the producers' returns are determined by the class prices and the amounts of milk used in each class, the effectiveness and benefits of the milk marketing order depend directly upon the accuracy of these handler reports. Verifying the accuracy of these reports, therefore, is one of the primary responsibilities of market administrators. Verification requires an audit of handlers' books and records and a physical check on the total volume and content of product quantities received and disposed of by the regulated plant.

The market administrator is also responsible, and generally is provided with separate funds, for checking the accuracy of weights and butterfat tests of producers' milk where this service is not being provided by a cooperative association approved by the Secretary to perform this service. Accurate weights and tests are of concern also to handlers because of their interest that the pricing of milk among all handlers be uniform.

The accuracy of farm tank calibrations is one of the factors which are useful to us in the development of checks to insure that honest and accurate prices are being paid. Since producers are paid generally on the basis of dipstick measurements at the farm, several market administrators' offices are engaged in checking the calibration of farm tanks. These calibration checks indicate that substantial percentages of farm tanks are not measuring within the basic tolerance values adopted by this National Conference at its 1962 meeting.

Wherever calibrations are found which indicate inaccurate measure-

ment of milk, the common practice is for the market administrator to notify the producer, the milk handler, and the weights and measures agency involved. Arrangements for recalibration are left to these interested parties. We know that there are a few instances in which weights and measures officials are not being notified. It is our desire, however, to achieve *complete* compatibility in the effectuation of our responsibilities with those of the local weights and measures officials. We believe our market administrators in the few markets where information is not now being supplied to your agency are very willing to cooperate but for one reason or another the information has not been requested or desired.

In some markets, the market administrators' technicians assist in recalibrating tanks. In no case, however, does the market administrator do the recalibrating if the weights and measures agency is in a position to do so. Even in these instances, market administrators would prefer that these recalibrations be considered as temporary corrections for purposes of order administration, and that official recalibration be carried out by the weights and measures agency.

We believe our check-calibration programs have been worthwhile, and have contributed to improved administration of the orders. Substantial calibration errors have been detected and adjustments have been made to eliminate errors which would involve substantial sums of money. In addition, in one region we have noted a sharp decrease in the last few years in the percentage of inaccurate farm tanks indicated by our calibration checks. We believe this decrease is largely attributable to the attention focused on the problem by the market administrator's earlier check-calibration survey.

There are other milk measurement areas of potential joint interest to both our programs. We have been keeping in close touch with the Office of Weights and Measures regarding the status of milk meters. An acceptable milk meter could change significantly current practices of accounting for milk receipts and disposition and change our verification techniques under the orders.

Incidentally, our Division recently completed a study of weight conversion factors for milk and milk products. This study will help fill a gap that has existed in basic research on differences in weight of a given volume of milk and milk products associated with differences in temperature, fat, and solids-not-fat content. We hope the findings of this study will be helpful to the National Bureau of Standards in evaluating and perhaps modifying and expanding its official table of weight factors.

We have maintained contact with the Office of Weights and Measures on various milk measuring problems for a number of years. In the last several months, we have developed a close working relationship with Mr. Jensen and his staff. Members of his staff have visited market administrators' offices in Boston and Indianapolis to observe the metering units used in checking tank calibrations.

We believe that with close cooperation our verification functions in the field of milk measurement can add to the efficiency of your operations. It is our hope, therefore, that our relationship with the Office of Weights and Measures will be matched by improved communication between your agencies and the Federal milk market administrator in your area.

J. Marshall: Mr. Feddersen, during your talk you made mention of the checking of farm-tank calibrations using a tank truck with a meter. Is that correct?

Mr. Feddersen: We have been doing this experimentally.

Mr. Marshall: This has caused a great deal of confusion, since no meter has been approved for measuring milk. How can you use such a means to check the calibration of a farm milk tank?

Mr. Feddersen: I do not think you suggest, or handlers generally would suggest, that we must wait upon approved devices before we develop means for doing as much as we can in the field of accuracy in measurement of milk.

Mr. Marshall: That is correct. What I would like to suggest is that instead of using an unapproved device, you use the devices that are approved. In the first place, the farm tank has been calibrated at the factory by the manufacturer, or at the installation by the manufacturer or an employee or a calibration firm. If there is any question regarding such calibration, would it not be more proper to call in the appropriate State weights and measures official to do the checking of the original calibration?

Mr. Feddersen: That is our practice; the meter operation is merely a check.

Mr. Marshall: But when the farmer is told that the check shows that the chart is not correct, you have caused a great deal of confusion, and the tendency has been to blame the farm-tank manufacturer. That is the point I wanted to make.

Mr. Feddersen: I do not think we have engendered any confusion or any difficulty for the manufacturers of these products. I think we have contributed a great deal, as a matter of fact, to the accurate use of these devices.

Mr. Marshall: I hope so, but I can assure you if you would check in the field in certain areas, you will find there is some confusion among the producers, who have been told after a check with the meter device that the tank is out of calibration. This has caused lawsuits and untold questions.

Mr. Feddersen: You know, we really appreciate having these facts brought to our attention. This is completely a surprise to me. I had not heard of it before at all.

V. D. Campbell: I might add that there are at least three of these tank-meter units in Ohio. We have refused to seal them as standards for measuring milk. Nonetheless, we have been told that the men in the field do inform the farmers that this is official so far as measuring and checking the tanks is concerned. We think this should not occur.

Mr. Feddersen: Such is not our purpose.

K. Gulledge: In the preparation of packaged milk in cartons, the checking at the plant is done on the basis of weight, and I understand the Milk Market Administrators use a series of conversion figures based on temperature. We have found that the milk is prepared at a temperature around 40-degrees. It is held at that temperature approximately until the time of retail sale to the consumer. There is some confusion as to the weight-to-volume relationship. Could you comment on this?

Mr. Feddersen: Our purpose in checking at this point is, of course, to assure the accuracy of the volume of milk or the weight of the milk,

using appropriate conversion factors, so we can establish how the milk has been used, and in what volumes. We have done a considerable amount of work, and we have just been through a considerable research project in which we have developed new information that will shortly be published with respect to the appropriate tables and the conversion factors to be used for milk at various fat content and at various temperatures.

(8) USDA—Fruit and Vegetable Division

by F. F. Hedlund, *Director, Fruit and Vegetable Division, Agricultural Marketing Service, U.S. Department of Agriculture*

A number of States have laws that standardize containers. To complement the efforts of the States, the U.S. Department of Agriculture administers two Acts which prescribe a limited number of certain types of containers used in the shipment of fresh fruits and vegetables. These are the U.S. Standard Container Acts of 1916 and 1928 which establish standard sizes and capacities for certain types of baskets and hampers. The basic objective of these Acts is to limit the containers of these types that may be manufactured and used to a specified number and to prevent deception by prescribing the cubic capacity or dimensions of those permitted. It may be noted that these Acts apply to containers which are used for marketing fruits and vegetables by cubic measure, whereas many or most of the nonregulated containers are used for commodities sold by weight.

These two Acts were sponsored originally and have been supported consistently by container manufacturers. For years prior to the enactment of these laws, so many different sizes of containers were being manufactured that both the users and the manufacturers were confused. Moreover, manufacturers found it very expensive to maintain large inventories of these many different types and sizes. Because of these conditions, as well as the ever-present possibility of deception created by the compounding of sizes, Federal legislation was sought to limit the number of different capacity containers permitted.

Act of 1916

The Act of August 31, 1916, as amended [1]—known as the U.S. Standard Container Act of 1916—establishes standard sizes for Climax baskets and certain other containers, principally till baskets and berry boxes, for small fruits, berries, and vegetables. This Act applies only to containers moving in interstate commerce.

The Act provides for the examination of containers subject to regulation to determine their compliance with the law. The Secretary of Agriculture is authorized to issue rules and regulations to enforce the Act such as the establishment of tolerances to allow for reasonable variations occurring in the normal manufacture of such containers.

[1] 15 U.S.C., Section 251–256.

It is a violation of the Act to manufacture for shipment, or to sell for shipment, or to ship from any State or territory of the United States any of the containers covered by this law, filled or unfilled, which do not conform to the provisions of the Act. A fine of not to exceed $25 is provided for willful violation of the Act.

Act of 1928

The Act of May 21, 1928, as amended [2]—known as the U.S. Standard Container Act of 1928—establishes standard sizes for hampers, round stave baskets, and splint baskets used for fresh fruits and vegetables. The law was enacted under the weights and measures clause of the Constitution and, hence, applies to intrastate, as well as interstate transactions.

The Act provides that it shall be unlawful to manufacture for sale or shipment, to offer for sale or shipment, or to ship any of the specified containers, either filled or unfilled, in violation of the law.

Authorization is provided in the Act for the seizure of any containers that fail to comply with the law's requirements. The violations of this law need not be willful, as in the Act of 1916, and penalties up to $500 are provided for violation.

Since the enactment of the Standard Container Act of 1928, only one new container size has been added—a ⅜ bushel round stave basket or hamper—added by an amendment in 1954. At present, the Act of 1928 establishes 10 standard sizes for hampers or round stave baskets beginning with a ⅛-bushel size and running through a 2-bushel size; it also provides for six standard sizes of splint baskets, beginning with a 4-quart size and running through a 32-quart size.

The Act provides that the specifications of containers covered by this law shall be approved by the Secretary of Agriculture if such containers are of the prescribed capacity and not deceptive in appearance. This approval is given in the form of a Certificate of Approval which bears a factory identification number which may be used by the manufacturer to identify the containers. The use of these factory identification numbers, however, is not compulsory. Nevertheless, many manufacturers stamp each container produced with this identification number to show that sample containers have been submitted to and approved by the U.S. Department of Agriculture.

Administration

Because there always has been widespread support from the manufacturers of the containers covered by the Standard Container Acts, compliance does not constitute a major problem. Primarily, compliance has been achieved by working with manufacturers to prevent the production of nonstandard containers. Container manufacturing plants are visited from time to time. In addition, manufacturers are requested to submit samples of containers periodically for testing. These are sent to a special laboratory in Washington where their dimensions and capacity are measured. Similar tests are run whenever a report is received of a possible violation.

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[2] 15 U.S.C., Section 257–257–i.

As a result of these efforts, it has not been necessary to bring a formal complaint under these Acts against any manufacturer since 1939. Since the Acts were passed, we have had only 10 formal actions under the Act of 1928 and two formal actions under the Act of 1916.

At the close of the last fiscal year, there were 129 factories producing or equipped to produce containers covered by these Acts. These plants were producing 584 different types and sizes of containers. During the year, 342 sample lots were submitted for checking by the Department. Of these, 86 required correction. Certificates of Approval requested by manufacturers were issued for 25 sample lots during the year.

Changed Packaging Practices

In recent months a great deal of attention has been focused on packages and packaging practices, particularly as they impinge upon consumers at the retail level. The packages covered by the Standard Container Acts of 1916 and 1928 are primarily shipping containers, and with the exception of the smaller containers, such as berry boxes and till baskets, are not used as retail packages. This legislation was enacted at a time when baskets and hampers were used for a large part of the fresh fruits and vegetables shipped in containers. Since then, packaging of fresh fruits and vegetables has changed considerably.

It is estimated that at the present time less than 10 percent of the fresh fruits and vegetables shipped in interstate commerce are packed in the hampers, round stave baskets, and splint baskets covered by the Standard Container Acts.

Of particular significance is the fact that many new containers not in existence at that time have been developed and have become important factors in the handling of fresh produce. Now, the most widely used containers are numerous different types and sizes of boxes, lugs, crates, cartons, and bags, none of which is subject to regulation under these Acts.

Pending Amendment to Act of 1928

In view of the growing competition from types of containers not subject to regulation as to size or capacity under Federal law, manufacturers of the containers regulated under the Standard Container Act of 1928 have requested that the Act be amended to authorize three new sizes of hampers and round stave baskets and two new sizes of splint baskets. A bill, H.R. 9334, incorporating these changes already has passed the House of Representatives this session and is now before the Senate. Also incorporated in this bill, at the suggestion of the Department of Agriculture, is a requirement that every container manufactured subject to this Act must be clearly stamped or marked to show the capacity of the container in bushels or quarts. With the increase in the number of sizes of containers which would be permitted if the Act is amended, we believe that the differentiation of one size of container from another through the suggested marking is both necessary and desirable.

Because of the marked changes in packaging practices for fresh fruits and vegetables which have occurred since these laws were enacted, particularly the development of the many new, widely used types of containers not subject to regulation, serious questions have

been raised about the need for and desirability of retaining the Standard Container Acts of 1916 and 1928.

DISCUSSION OF FOREGOING ITEM

M. GREENSPAN: Has the Department contemplated trying to require mandatory quantity markings on nonstandard baskets?

MR. HEDLUND: No; however, we have recommended that the markings be included in the amendment which applies to the Act of 1928. Actually, I think we have had more questions raised as to why we need the Acts at all. H.R. 9334 is aimed at trying to see that the consumer gets what he pays for; a lot of produce goes to market in these packages.

A year or two ago we had a particular case concerning berry baskets made in a foreign country and imported here. We could not proceed against the manufacturer, because we cannot proceed against somebody outside the United States. We did make a point of notifying people in this country that the Container Act of 1916 applied to the users of those baskets. The containers then were not placed into service. However, this Act does not apply to shipments in only intrastate commerce. Also, the point should be made that the Act does not stipulate the fill of the container. We have had questions come up, "Well, what is the use of a standard container if it is just half full?" The law says nothing about how full it must be. The Food and Drug Administration may have jurisdiction here.

(9) USDA—Grain Division

by C. W. JACKSON, *Deputy Director, Grain Division, Agricultural Marketing Service, U.S. Department of Agriculture*

I am happy to have this opportunity to meet with you to discuss some of the marketing programs of the Grain Division, with particular emphasis on the concern we have with weights and measures.

The Grain Division is only one of the many units of the Agricultural Marketing Service which are concerned with weights and measures. This Service, through its many activities, helps the entire marketing process to flow quickly, efficiently, and with the least waste. It provides standards, inspection and grading services, market news, and research to improve marketing. It helps to remove temporary surpluses and increase consumption of foods in plentiful supply.

It helps preserve fair play in marketing through the enforcement of such Federal laws as the Packers and Stockyards Act, the U.S. Warehouse Act, the U.S. Grain Standards Act, and the Federal Seed Act.

The Grain Division is responsible for four major marketing programs for grain and related commodities. These include two of the laws I have mentioned—the U.S. Grain Standards Act and the Federal Seed Act. Also, a grain market news service and the Agricultural Marketing Act of 1946, as it applies to certain commodities related to grains, are included.

The work under each of these four programs involves use of weights

and measures, either in analytical tests used, reporting units, or packaged and trading units.

U.S. Grain Standards Act

Administration of the U.S. Grain Standards Act involves an impartial inspection service for grain in interstate and foreign commerce; official standards for grain; improvement and timely revision of the standards, methods, and procedures for the inspection, grading, and certification of grain; and enforcement of the regulatory provisions of the Act. The regulatory provisions are designed to prevent fraud and misrepresentation in the merchandising and inspection of grain. The kinds of grain covered by the Act are barley, corn, flaxseed, grain sorghum, oats, rye, soybeans, wheat, and mixed grain. This program is supported at the Federal level almost entirely from appropriated funds. The number of inspections performed under the Act are about 3½ million each year. These inspections are performed by about 700 licensed grain inspectors at more than 350 inspection points. Licensed inspectors may be employees of States, boards of trade, grain exchanges, or chambers of commerce. A few of them operate independently on a fee basis.

At the present time there are 24 States that perform grain inspections regularly.

Agricultural Marketing Act of 1946

Another of these marketing programs is the permissive inspection work under authority of the Agricultural Marketing Act of 1946. The purpose of this program is to provide an impartial inspection service for rice, hay, beans, peas, hops, seeds, grain products, and many other items, including the inspection of cargo wheat for protein content and United States grain in Canada; official standards and specifications or quality measurement factors for these commodities; and the improvement and timely revision of the standards, specifications, quality measurement factors, and inspection methods and procedures.

A large part of the service is performed under cooperative agreements with States. Under the terms of most of the cooperative agreements, USDA supervises the work, and the other cooperator performs the inspections, collects the fees, and remits a specified portion of the fees to USDA to cover the cost of supervision. The program is entirely self-sustaining from fees collected for the services rendered.

Market News Service

Another one of these marketing programs is the market news service. The purpose of this service is to provide farmers and tradesmen with reliable and timely information on supplies, prices, and other market conditions for grain, hay, rice, beans, hops, molasses, feedstuffs, and related products, for their guidance in planning their production and marketing programs and to assist in orderly marketing. It also provides livestock producers, dairymen, and poultrymen with data which will help them locate sources of feed supplies to determine when and where prices are most advantageous.

The program is carried out through a number of field offices, the majority of which are Federal-State offices. Over 2½ million market

news reports are distributed each year. The program is supported at the Federal level by appropriated funds.

Federal Seed Act

Another of these marketing programs is the enforcement of the Federal Seed Act. This act applies to agricultural and vegetable seed. It requires truthful labeling, prevents false advertising, restricts the dissemination of noxious-weed seeds, and establishes germination standards for vegetable seeds in interstate commerce. Seed offered for importation is required to meet certain minimum standards of quality before being admitted into the commerce of the United States for planting purposes.

Since enactment of the Federal Seed Act in 1939, there have been in effect, between all the State inspection agencies and the U.S. Department of Agriculture, memoranda of understanding setting forth what each agency should do in cooperating to enforce the interstate provisions of the Federal Seed Act. These memoranda of understanding set forth the responsibility of each cooperator. No remuneration is made by the Federal Government to the States or by the States to the Federal Government under these cooperative agreements. The Federal work is supported by appropriated funds.

Other Functions

The Grain Division also performs other functions in connection with carrying out programs on expansion of market outlets for food commodities under Section 32 of Public Law 320 on marketing agreements and orders, and on national defense activities.

Use of Weights and Measures

The programs of the Division involve to some extent the use of weights and measures. This is largely the use of given quantities of a commodity that are tested or analyzed for specific quality characteristics, such as test weight per bushel, foreign material, protein or moisture content, purity, noxious-weed seeds, and many other factors. The different commercial trading units for many commodities are of importance in the Division's programs, particularly those involving procurement and market news reporting.

Trading Unit

The use of the hundredweight as a trading unit for many agricultural commodities including grain has been under consideration from time to time by the U.S. Department of Agriculture and by other organizations. As early as 1941, the National Conference on Weights and Measures established a special committee to study the advantages and disadvantages of the use of the hundredweight as a trading unit. In February 1956, the Grain Research and Marketing Advisory Committee and the Feed and Forage Research and Marketing Advisory Committee of the Department of Agriculture recommended "that a study be initiated at an early date to evaluate the merits of the problems involved in shifting trade in grain from bushels to 100-pound units." Many organizations supported the recommendation, including the Grain and Feed Dealers National Association, National Grain

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Trade Council, American Feed Manufacturers Association, American Farm Bureau Federation, National Grange, and other national and State groups. The study was made by the Marketing Research Division of the Agricultural Marketing Service, and Marketing Research Report No. 168, "Hundredweight or Bushel as a Trading Unit for Grain," was issued in April 1957.

In September 1957, the Department held a meeting in Washington, D.C., for representatives of interested groups to discuss a suggested shift from the bushel to the hundredweight measure in handling Commodity Credit Corporation grain under the 1958 programs. Following this meeting, the matter was also considered at a national conference of State Commissioners, Directors, and Secretaries of Agriculture. The discussions at these two meetings, and letters received, showed strong opposition from producers and the trade to making any change at that time. The Department, therefore, decided not to shift from the bushel to the hundredweight measure in handling the 1958 Commodity Credit Corporation grain operations. Furthermore, it was decided that additional determinations should be made regarding both the advantages and the difficulties in the proposed change before making the shift.

Basic Measuring System

In December 1958, in Washington, D.C., a paper entitled "Needs for Standardization in Agricultural Measurements," prepared by Harry C. Trelogan and Kenneth J. McCallister of the Agricultural Marketing Service, was presented at a meeting of Section M (Engineering) of the American Association for the Advancement of Science. The paper was published in 1959 as Publication No. 57 of the American Association for the Advancement of Science under the title "Systems and Units, National and International Aspects." The authors of this paper pointed out many of the variations, inconsistencies, and confusion regarding the systems of weights and measures used in the United States for agricultural commodities including grain and suggested the universal adoption of a basic measuring system.

The question of shifting from the bushel to the hundredweight as a trading unit for grain, or shifting to the metric system, has been brought to public attention many times in recent years. Among the latest published information on this are two syndicated articles by Sylvia Porter. A two-article series, "How Metric System Would Affect Us," and "Metric System—Costly Change," was published on December 24 and 26, 1963. The author appraised the advantages and disadvantages of adopting the metric system. She stated that the change would be very costly, but that the advantages in time would far outweigh the cost, effort, and other disadvantages involved in making the change.

An editorial, "Metric Merits," was published in *The Evening Star*, Washington, D.C., on February 8 of this year. This editorial strongly urged that the United States adopt the metric system of weights and measures as a means of becoming more competitive with other countries for future world markets.

A bill was introduced in the Senate this year to pave the way for the adoption of the metric system in the United States. On February 25 of this year, H.R. 10089 was introduced in the House of Representatives to provide that the National Bureau of Standards conduct

a program of investigation, research, and survey to determine the practicability of the adoption by the United States of the metric system of weights and measures.

Present Practices

Most farmers and grain handlers from the Rocky Mountains eastward consider the bushel as the universal unit for measuring grain. However, different units of measurement are used in other parts of the country, particularly on the west coast. The bushel originally was used as a measure of volume. It still is used generally by grain elevator operators to express storage capacity, and to differentiate between storage rates for light and heavy grain. In grain parlance, a bushel now almost universally represents a specific number of pounds. Most States have established standards that specify the number of pounds in a bushel for different kinds of grain. These vary from 32 pounds for oats to 60 pounds for wheat.

Although most grain dealers and handlers measure grain in pounds, they think and trade in terms of bushels. Grain is usually weighed in pounds as it is received in elevators and again as it is loaded out of elevators, but, in both instances, the total weight of the grain is converted into bushels for warehousing and merchandising purposes. The U.S. Department of Agriculture reports production and yields for all kinds of grain in the bushel unit.

There are many exceptions to using the bushel as a trading unit for grain. Farmers and grain dealers in Texas, Oklahoma, and Kansas generally buy and sell grain sorghum on a hundredweight basis. Cash and futures prices; CCC price support operations, sales, and inventories; and CCC-owned stocks of grain sorghum are also usually reported in hundredweight. On the other hand, USDA reports production, yield, commercial stocks, and exports of grain sorghum in bushels.

In certain areas of Virginia, corn is traded in barrels, and each barrel is equivalent to five bushels.

The bushel unit is not generally used for grain on the west coast. The hundredweight unit is generally used for grain in California. However, grain is frequently traded in California on a ton basis. Farmers in California usually express the size of their crops and their yields in hundredweights or tons, but the California Department of Agriculture reports production and yields in bushels. Farmers and grain dealers in the Pacific Northwest trade in wheat on a bushel basis and feed grains on a short ton basis.

In exporting grain from the United States, offers and contracts are made on a ton basis. The metric ton (2,204.6 pounds) is the most common unit of measure used, but some contracts with foreign buyers specify short tons (2,000 pounds) and others long tons (2,240 pounds).

Before World War II, several different trading units were used in handling rough rice. After the war, the rice industry in cooperation with the U.S. Department of Agriculture, agreed to shift to the hundredweight in rice trading and reporting. Although the hundredweight basis is now used by most of the rice trade, some farmers and dealers still use the barrel or bushel unit.

Production and prices of dry edible beans were reported by USDA on a bushel basis until 1932. Since that time the hundredweight has been almost the universal unit of measurement in the bean trade.

Test weight per bushel is a quality factor in all the grain standards under the U.S. Grain Standards Act. It has been in these standards

since they were first promulgated. It is a measure in pounds of a specific volume (Winchester bushel equal to 2150.42 cubic inches) of grain. Test weight per bushel varies over a rather wide range for each kind of grain—for example, from about 50 to about 65 pounds for wheat, and from about 25 to about 44 pounds for oats. The bushel measure as a trading unit is constant for each kind of grain—that is, 60 pounds for wheat and soybeans; 56 pounds for corn, flaxseed, grain sorghum, and rye; 48 pounds for barley; and 32 pounds for oats. There is no direct relationship between the test weight per bushel and the bushel measure as a trading unit for grain. If a buyer purchased 1,000 bushels of wheat with a test weight per bushel of 50 pounds, and another buyer purchased 1,000 bushels with a test weight per bushel of 65 pounds, each buyer would have delivered to him the same total weight of 60,000 pounds (1,000×by 60, or bushels×trading unit), but not the same volume of wheat.

The following table shows a comparison between the test weight per bushel and the trading unit for certain kinds of grain and other commodities:

Test weight per bushel for grade and trading unit for certain commodities

Commodity	Minimum test weight per bushel for grade in U.S. standards					Usual trading unit	
	No. 1	No. 2	No. 3	No. 4	No. 5	Unit	Weight
	lb	*lb*	*lb*	*lb*	*lb*		*lb*
Barley [1]	47	45	43	40	36	bushel	48
Corn	56	54	52	49	46	bushel	56
Flaxseed	49	47	------	------	------	bushel	56
Grain sorghum	57	55	53	51	------	cwt	100
Oats	34	32	30	27	------	bushel	32
Rye	56	54	52	49	------	bushel	56
Soybeans	56	54	52	49	------	bushel	60
Wheat							
Hard Red Spring	58	57	55	53	50	bushel	60
All other classes	60	58	56	54	51	bushel	60
Rough rice [2]	------	------	------	------	------	cwt	100
Brown rice	------	------	------	------	------	cwt	100
Milled rice	------	------	------	------	------	cwt	100
Dry edible beans	------	------	------	------	------	cwt	100
Dry peas	------	------	------	------	------	cwt	100
Lentils	------	------	------	------	------	cwt	100

[1] Test weight per bushel is not a factor for grade in the class Western Barley.
[2] Rough rice is also traded in units of bushel (45 lb) and barrel (162 lb).

The metric system has been in use to some extent in some phases of agriculture in the United States for many years. Agricultural scientists regularly use the metric system in their daily work when they measure materials in grams, liters, and meters. The gram as a measure of weight is used in grading grain under the official standards of the United States.

Conclusion

There is no reason to believe that the reaction of the grain trade in this country to a proposed shift from the bushel to the hundredweight for CCC grain operations, or for the grain industry as a whole, would be much different today than the significant opposition that was expressed in 1957.

It now appears that the metric system of weights and measures may be adopted in the United States within the foreseeable future. Based upon this prospect, it seems inadvisable at this time to press for a shift from the bushel to the hundredweight as a trading unit for all grain.

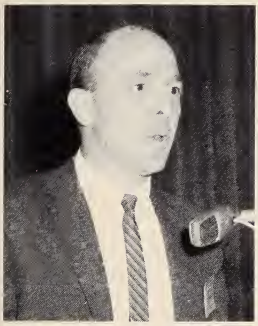
The metric system is currently in use in 88 countries that comprise about 90 percent of the world's population. The adoption of the system by the United States would influence its adoption by the other few nations and would result in a weights and measures system that would be truly world wide in scope.

Time and experience will change the thinking of people in this regard from pounds, bushels, barrels, short tons, and long tons, to grams, kilograms, and metric tons as quantitative measures for grain and other agricultural commodities.

(10) U.S. Department of Interior—Bureau of Commercial Fisheries

by J. R. Brooker, *Chief, Fishery Products Inspection and Certification Service, Bureau of Commercial Fisheries*

Introduction



The vast complexities of today's processing and distribution of food demand that there be some acceptable document between buyer and seller to facilitate orderly marketing. Standards are a yardstick to measure the quality of a product. They thus constitute the needed common measuring device upon which buyer and seller can base their contracts.

These standards are composed of two or more levels of product quality designated by grades and are also composed of other related factors—such as class, style, or condition—that may affect the economical use and the desirability of the product. Accordingly, national quality standards tend to improve the overall quality and uniformity of the products being standardized. The consumer thus gains by getting better quality, and the industry in turn gains by creating greater demand for its products.

U.S. Standards for Grades of Quality for Fish and Fishery Products help to define the level of quality of this specific food-product category. These standards are voluntary in application and reflect the desire of the fishing industry to improve its product quality. The Bureau of Commercial Fisheries of the U.S. Department of the Interior has developed and promulgated U.S. Standards for Grades of 14 fishery products in the past 6 years. The standards listed below were developed with the aid of the fishing industry.

1. Frozen fried fish sticks
2. Raw breaded shrimp
3. Fish blocks
4. Haddock fillets
5. Halibut steaks
6. Cod fillets
7. Salmon steaks
8. Raw headless shrimp
9. Raw breaded fish portions
10. Ocean perch fillets
11. Fried scallops
12. Fried fish portions
13. Breaded fish sticks
14. Flounder and sole fillets

The standards, of course, would have no value as acceptable documents between buyer and seller unless the grading of the products according to the standards were done by a neutral party. Since 1958 the Bureau of Commercial Fisheries has therefore operated a Voluntary Inspection Service for fishery products. This service has grown steadily. During the past year, for example, over 215 million pounds of fishery products were inspected and certified. This quantity of inspected products represents approximately one-third of all the domestically produced fishery products for human consumption, exclusive of canned fish.

Proper labeling of packaged fishery products not only is required by law but also is essential in marketing them. As part of the inspection program, the USDI accordingly reviews labels for fishery products that are to bear the USDI shield.

To show the role of weights and measures activities in the USDI Fishery Products Standards and Voluntary Inspection programs, we shall therefore in the remainder of this paper consider the following three main subjects:

1. Relation of weights and measures to the development of the Quality Standards.
2. Relation of weights and measures to the Voluntary Inspection Service.
3. Relation of weights and measures to label approval.

Relation of Weights and Measures to Quality Standards Development

The Bureau's program of standards development goes beyond product standardization of such aspects as quality and wholesomeness because two additional important aspects are also considered. These are (a) the packaged product with regard to size, volume, net weight, amount delivered, or the number of units per measure and (b) the amount of seafood ingredients contained in certain fabricated or processed products. In our consideration of these two aspects, we encountered problems relating to glaze and to breading.

Problem of Glaze. Four fishery products for which U.S. standards were developed presented a problem of ice glaze. These products were halibut steaks, salmon steaks, sole and flounder fillets, and raw headless shrimp.

In the usual market form, these products are protected by a surface glaze of ice in addition to the packaging materials in which they are contained. To determine how much product is actually present, we had to develop and incorporate into the standards a specific procedure for determining the net weight. A slightly different procedure was required for each of the four products because of its inherent differences.

In the standard for frozen halibut steaks, the consideration of glaze is unique in that excessive glaze is treated as a factor of quality. The maximum allowable amount of glaze to protect the product was established at 6 percent of the net weight. Beyond this amount, it is considered to be excessive glaze, and the product is down-graded for quality.

Problem of Breading. Another fishery-products category that required special consideration was breaded and precooked products. This group includes breaded fish sticks, breaded shrimp, breaded fish

portions, fried fish sticks, and fried fish portions. A problem of the "utility" of the packaged contents was encountered in developing these standards. This problem involved two factors: loose breading and excessive breading.

Loose breading.—During the processing of breaded and precooked products, any loosely adhering breading is usually removed by passing the products over a vibrating large-mesh stainless-steel wire gelt. When, however, samples of these products were obtained at the distribution level for evaluation during the early stages of developing these standards, substantial amounts of loose breading were, in some instances, found in the package. This indicated either that good commercial practices had not been exercised in the processing of the product by eliminating the loose breading or that loose breading was being added to meet the net-weight requirements when the weight of the contents were slightly under the declared net weight.

This problem was resolved in the Standards for Breaded and Precooked Products by categorizing large amounts of loose breading as a factor of quality. These standards deduct points, depending upon the amount of loose breading remaining in the package. The unit of measure used for determining excessive breading is the teaspoon. Less than ½ teaspoon of loose breading is considered to be a "small amount"; and over ½ teaspoon, a "large amount."

Excessive breading.—USDI Standards of Quality establish levels for the amount of fish flesh required in breaded and precooked fishery products. The Bureau believes that it has a responsibility to the consumer to see that he gets a proportionately large amount of seafood ingredient in the breaded-type products.

In establishing the level of seafood content for a given product, we take a number of factors into consideration. The factors most frequently evaluated are flavor, appearance in both the raw and cooked states, texture, and the industry's capability, evidenced by what has been marketed in the past.

When standards are developed for breaded products, a technique is also developed for determining the amount of the seafood ingredient that is present. This method, incorporated into the standard, involves the removal of the breading and a determination of the percent of seafood ingredient by weight. The levels of seafood ingredient established in USDI Standards are given in table 1.

TABLE 1. *Amounts of flesh required in breaded products by USDI Standards*

Breaded product	Relative amount of flesh required
	Percent
Fish portions	75
Fish sticks	72
Fried fish portions	65
Fried fish sticks	60
Fried scallops	60
Shrimp	50

Continuous inspection of processing operations is the major type of inspection services performed by the United States Department of the Interior. Under this type of service, the principal duties of the USDI inspector include (a) inspecting for plant sanitation, (b) examining the raw material for quality, (c) checking the processing technique, (d) determining the quality of the end product, and (e) certifying the product.

In the execution of all but the first of these duties, the USDI inspector is concerned with some aspect of weight or measurement. A review of the pertinent duties (b through e) will illustrate the degree of involvement of the inspector in weighing or measuring.

Examining the Raw Material. If we visit the breaded shrimp industry for a specific example of how the inspector examines incoming raw material, we find that the raw material usually comes to the plant in the form of 5-pound cartons of block-frozen raw headless shrimp. When these shipments arrive at the processing plant and before a settlement is made, the firm is interested in the quality of the shrimp and whether or not each 5-pound carton will actually deliver 5 pounds. The USDI inspector samples the shipment, examines the product, and determines the net weights of the selected packages, using the official method defined in the Quality Standard. The information he thus obtains is then provided to the firm and is used as a basis for a decision by the firm to accept or reject the shipment.

Checking the Processing Technique. During production of products such as fish sticks and fish portions, the inspector frequently conducts line checks of the weight of a specific number of raw sticks or portions. This information is used as a guide to continuous product control in determining whether the amount of fish flesh is adequate. To produce, for example, a 1-pound package of fish portions containing four 4-ounce pieces, the four unbreaded pieces of fish must weigh a minimum of 12 ounces in order for the final product to conform to the requirement of 75 percent of fish flesh. Frequent weighing of four random pieces provides the information that the input weight of raw material is adequate and that the net weight will probably be adequate, since the batter and breading can be controlled very closely.

Determining the Quality of the End Product. End-product examination for quality by the inspector includes a determination of the amount of the product in the package. Samples for examination are drawn randomly during production in accordance with a sampling plan so as to be representative of the lot. The net contents of each package is determined using the method defined in the U.S. Standard for the product being examined. The net content of each package is recorded on the inspector's work sheet along with the other pertinent information found during the examination. An average calculated from the net weight of the individual packages indicates whether or not the lot complies with the net weight declared on the label.

Certifying the Product. In the certification procedure for fishery products, the pertinent information about the examined lot is recorded on an official inspection certificate. These certificates of findings are admissible in all courts of the country as *prima facie* evidence. Two types of information about the contents of the packaged product are always given when fishery products are certified. These are (a) the

net content as declared on the label, and (b) the determined average net content of the examined packages as observed by the inspector. When the net contents of one or more packages are found to deviate beyond the range of good commercial practice, such deviations are noted on the certificate for the benefit of the processor or buyer of the lot.

Relation of Weights and Measures to Label Approval

Fishery product labels that are to bear inspection marks of the USDI must be reviewed and approved by the Bureau prior to use.

The primary reason for reviewing the labels is to ensure that whatever reference is made to USDI inspection—either through a grade shield, inspection shield, or statement of inspection—is accurate and in accordance with USDI regulations.

The secondary reason for reviewing these labels is to ensure that USDI inspection marks will not be affixed to a label that is in violation of the mandatory requirements of the Food, Drug, and Cosmetic Act. The presence of a statement of net contents is one of several items that we ensure is on the label. You should, however, not construe that the USDI is determining that labels comply with the FDA Act. Rather, you should consider that this thorough label review is a service to the industry.

Although the USDI review program includes verification that the label bears a quantity statement, we have not developed guidelines as to the prominence and placement of it. This is a regulatory matter and is beyond our authority. We believe, however, that this question of prominence and placement should be nationally coordinated with the various industry groups having an interest in it and that a single set of guidelines or regulations should be developed and adopted at all levels of government that regulate this activity.

In the past, the Bureau of Commercial Fisheries has cooperated fully with other governmental agencies and with industrial organizations where these common interests exist. We plan to continue this policy of cooperation in the future. When difficulties or inconsistencies of any nature are encountered with fishery products, we suggest that you bring the matter to our attention. We may have the answers to your problems, and we will do our best to help you.

AFTERNOON OF WEDNESDAY, JUNE 17, 1964

No Business Session

CONFERENCE LUNCHEON—WEDNESDAY, JUNE 17, 1964

(B. S. Cichowicz, Vice Chairman, Presiding)

ADDRESS

by Mrs. Esther Peterson, *Special Assistant to the President for Consumer Affairs*

Today, it is my privilege to address one of the most meaningful and honorable organizations in the United States—an organization whose work has not received the public recognition it deserves. The National Conference on Weights and Measures has guarded the consumer's traditional rights, evolved over centuries, to compare products, compare prices, and get what he pays for.

Belatedly, I think the consumer is becoming aware that some planning has to be done about weights and measures laws and their enforcement. You people in enforcement know the problems that have arisen. Consumers, until the last few years, have been content to go about their family affairs confident that the laws our forefathers had written were, in your good hands, giving us the police protection we needed when buying goods by weight, measure or count.

Few knew and even fewer now remember that as long ago as 1939 the National Conference on Weights and Measures blew the whistle of alarm about the threat which prepackaging represents.

In a resolution, they called upon the Congress to take action to preserve the buyer's right to comparison shopping by establishing some orderly approach to determining the quantities in which basic products might be purchased.

If your warning had been heeded then, the erosion of this basic right which has taken place over the intervening years would never have happened.

As Special Assistant to the President for Consumer Affairs, and as Chairman of the President's Committee on Consumer Interests, I express appreciation on behalf of the American consumer for the service you have rendered, and ask your cooperation in working with the Committee to carry out our Presidential mandate: "To assure that the *best* practices of the great American marketplace—where free men and women buy, sell, and produce—becomes the *common* practice."

Both you and I know that the period ahead is going to be lively—possibly even historic. These are times of trial for weights and measures people—with plenty of challenges and decisions to come. These are times of change and overdue adjustments in weights and measures laws and their enforcement.

As county and State sealers of weights and measures, you are peace officers. You enforce a set of laws just as a sheriff or a city police

officer enforces a set of laws. Like the highway patrol or the FBI, you have a responsibility to enforce the laws within your jurisdiction—however and to whomever they may apply.

These laws apply at all levels of commercial exchange. They apply when goods are exchanged between farmers and processor, manufacturer and distributor, wholesaler and retailer, retailer and consumer. The processor, wholesaler, and retailer all expect full weight and measure when they buy. In fact, they have very elaborate setups—with purchasing offices, receiving clerks, and little armies of calculator operators—to insure their getting the full measure of what they contract for.

Why, then, should any processor or wholesaler or retailer expect consumers to be satisfied with less?

Whatever gives them the idea that consumers ARE satisfied with less! I suggest it is more likely that consumers in their trusting bewilderment have not known—and would not have believed—that they may be getting less.

Now the situation is this, it seems to me: Changes in our economy and the public's scant understanding—and bewilderment—have thrust upon you the major responsibility of formulating new laws and regulations at the consumer level. Now you must not only enforce the law—but you also have the unexpected and unasked-for job of formulating new and revised laws to meet new circumstances—of formulating new and revised regulations by which old established principles can be applied to new situations.

Do you know of any other law enforcement officers who are required to carry this double burden?

I feel I should apologize to you on behalf of consumers for heaping on your shoulders this undue responsibility for our weights and measures laws.

Yet, you have it, and as a spokesman for consumers I want to put before you some considerations which consumers need to have you bear in mind when you must serve as law formulators and take positions on proposals made by others and when you make proposals in your own organization.

President George Washington, in one of his messages to the Congress, emphasized the importance of establishing uniformity in weights and measures. He stated: "A standard . . . must be no less honorable to the public councils than conducive to the public convenience."

Conducive to the public convenience. . . . I believe that the American housewife of today—she who shops almost daily in the Nation's supermarkets and grocery stores—would like to see this advice of her Nation's first President implemented. I can remember the days when almost everything was measured or weighed before the consumer's eyes on scales that were checked by you. I can remember the days when gaudy packages and bottles of various shapes and hues were not dreamed up by the psychologists and motivational experts to distract the consumer from comparative and discriminating shopping. I can remember the days when the consumer, not the manufacturer, dictated the quantity of a purchase.

Recently, one of my staff members was visiting a friend in New York. At the breakfast table, while he was discussing the consumer program, he decided to check the breakfast food packages that were on the table.

There was one large package that sold for 29¢ and one small package that sold for 32¢. Both contained the same net weight. One of his breakfast companions, a 10-year-old boy, was fascinated by this.

"You mean," the boy said, "the big package costs less than the small package!"

"That's right," he was assured.

The boy was incredulous. "Isn't there a law against that!" he said.

"Nope," there was no law, he was told.

"Shouldn't someone tell the Government about this!" he said.

Well, the boy just couldn't believe it. How could a big package cost less than a small package? As he went out the door for school, he advised his mother to get more of the BIG package.

Change has been wrought in the marketplace by the growth of prepackaged foods, and by the thousands of products which the efficiency of our productive system has placed in today's markets. As a result, during recent years—especially since World War II—the confusion which characterized the commercial interests during the 19th century, now applies somewhat to the individual consumer.

Little boys are not the only ones fooled by today's packaging and labeling practices. I am sure many of you are acquainted with the test conducted by California Governor Brown's extremely capable Consumer Counsel, Mrs. Helen Nelson. Mrs. Nelson recruited anonymously five housewives, all with 2 years or more of college training. Each was given $10 and sent to a Sacramento supermarket to pick 14 common items—things like soap, rice, peanut butter and pancake mix—from the shelves. Their only instructions were to record the time they went into the store and the time they reached the check stand; and make their selections solely on the basis of the *largest quantity at the lowest cost.*

How did they make out? They spent on the average twice as long as the average shopper spends selecting the same items, and flunked badly in attempting to pick the 14 cheapest items from a staggering total of 246 brand offerings. With only one of the 14 products did all five shoppers succeed in comparing prices. That product was cheddar cheese. With two of the products—rice and toilet soap—every one of the women was baffled.

Altogether, they bought 70 items among them. Looking for the lowest price, they succeeded 36 times and failed 34.

If this can happen to housewives with college training—and three of the women were college graduates—how can we expect less educated women to succeed, even with a slide rule, in finding the best buys?

Mrs. Nelson's experiment is illustrative of the frustrations faced by many housewives in today's marketplace. And, don't think the ladies are not aware of the problem. Several weeks ago I addressed a State women's organization, and when I approached the subject of packaging and labeling, I began to hear the kind of comment former President Truman used to hear when he spoke: "Give 'em h——, Esther!"

Of the many subjects covered in the thousands of letters I have received since being appointed to my present position, no subject has been mentioned more than packaging and labeling.

So, the sleeping consumer is beginning to stir. Lulled by pretty colors, odd shapes and sizes, flattering advertising (which makes the housewife out to be some sort of earth-Goddess), and a whole gamut of arguments as to why she should prefer products packaged and

labeled the way the manufacturers dictate, she is now beginning to snap out of her lethargy and look around.

And, she isn't particularly impressed with what she sees.

Of course, she is aware of the abundance of goods available to her, and is appreciative of the attractiveness, and, in many instances, convenience of present-day packaging. She does not want to turn back the clock to the cracker barrel grocery store. But—and this is a big but—she is also aware that it is becoming increasingly more difficult for her to shop comparatively. Her letters have a touch of anger in their tone.

For example, a lady from Oregon writes:

> It takes a slide rule, common sense, some education (to know how to divide ounces into pennies), pencil, paper, and a lot of time and patience to keep from getting hooked, and in a way, being made a fool of, by the manufacturers.

And from Pennsylvania comes this letter:

> My chief concern is trying to buy good meats—not camouflaged in the packaging. So often, there is a "cover up" such as placing the price tag over the extra large bone or some other such defect. Sometimes there is an extra piece of fat tucked under the meat, just adding weight . . .

I am informed that 20 States have adopted a provision of the Model State Law on Weights and Measures approved by the National Conference. This provision states:

> . . . any commodity in random package form . . . shall bear on the outside of the package a plain and conspicuous declaration of the price per single unit of weight, measure, or count.

If all 50 States had such a declaration my mail would be sharply curtailed. The time has come when the voice of the housewife had better be heeded. It is an angry voice and it is becoming more and more forceful. If it is ignored, the housewife's only legitimate recourse will be to turn to the Federal Government for protection. The housewife who says "There ought to be a law" is only expressing her right as a citizen to such protection.

In solving the problems presented by prepackaging, we must work together. Here are some practices of the modern market that demand a good deal of attention by both State and local officials:

1. *The use of odd package sizes:* Too often, the "larger" package contains less than the "smaller" package.
2. *Hide-and-seek:* Perhaps, we could put up with the odd size containers if the net weight or quantity was displayed prominently on all packages. The fact is, however, that the consumer often must play "hide-and-seek" with the manufacturer in order to find the statement of quantity.
3. *Fractional weights:* In some cases, fractional weights may be necessary, for example, in cake mixes which are designed to fit standard size pans. Nevertheless, there are many legitimate complaints. For example, macaroni has been found in 45 different sizes—ALL LESS THAN ONE POUND!
4. *Luring labels:* The appeal of a picture cannot be denied. But sometimes, the picture leads you to believe—erroneously—that the stew is laden with beef, the nuts are mainly huge cashews, or the pie is filed with cherries. If we are going to use pictures, let us make certain that the pictures are a faithful representation of the product.

5. *Cents off:* Cents off what? If manufacturers are going to advertise "cents off" on their labels, then let them make clear exactly the comparison.
6. *Slack fill:* Everyone realizes that many products settle in handling and storage. On the other hand, it doesn't take much searching to find examples of the hollow bottom jar, misleading shapes in cardboard cartons and liners, and excessive slack in products where settling isn't a major problem.

To correct these deficiencies in modern packaging the Administration has urged passage of Truth-in-Packaging legislation along the lines of the bill introduced by Senator Hart. I consider the Hart Bill a mid-20th century version of truth in weights and measures—long overdue—designed ultimately for the consumer. It is inevitable that this bill become the law of the land.

The consumer can no longer AFFORD to be deceived in the marketplace, and even if he could afford deception, he is not about to be "used," or become a "patsy," for everybody out to make a buck in the modern marketplace. Consumers are demanding that our economy be not just *consumption* oriented, but *consumer* oriented as well.

The provisions of the Hart Bill are relatively simple. They merely provide that the ingredients of food and other products be labeled *clearly;* that the contents be expressed in terms which will facilitate efficient buying; and that some kind of understanding of terms be arrived at so that a customer may KNOW what constitutes, for example, a "serving," or so that the customer is not deceived by the arbitrary use of fractional weights and odd size containers.

I have noted that your Committee on Laws and Regulations, in its report to this Conference, is recommending certain principles on quantity declaration. It seems, however, that during the process of deliberation, there has been some "retreat" on readability and size. No minimum has been recommended for certain size packages and the height has been lowered for others. I agree that the size of type used in quantity statements is not the only determining factor in readability and welcome the recommendations with regard to color contrast and the amount of clear space surrounding the quantity declaration.

Speaking to you as a representative of American consumers, however, I believe that the original recommendations made by your Committee on Laws and Regulations in 1963 should be adopted as part of the Model Law.

I think it is appalling that industry claims it to be too expensive to provide for American consumers, the same service they are required by law to provide for Canadian consumers. Let's take, for example, these two packages—one produced for the Canadian market; one for the U.S. market. On the Canadian package, the net weight is displayed prominently on the main display panel. On the U.S. package, the net weight is hidden on top of the package.

It seems to me that we in the United States should, at least, be provided with the same services our Canadian neighbors enjoy.

In closing, let me state that consumers have a real responsibility to help law enforcement officers make rules for solving enforcement problems. Without such cooperation, I know that it is difficult for you to operate efficiently. For that reason, I want to assure you that the facilities of the President's Committee—and my office—will be always

open to you for whatever services along this line we may be able to render.

Let us keep in mind, as we join forces to protect the consumer's right to compare products and prices—a right that is fundamental to a free, competitive economy—the Old Testament injunction:

> You shall do no wrong in judgment, in measures of length or weight or quantity.
>
> You shall have just balances, just weights . . . (Lev. 19 v. 35–37).

Or, the more direct warning:

> A deceptive scale disgusts the Lord,
> But he delights in an honest weight.

MORNING SESSION—THURSDAY, JUNE 18, 1964

(B. S. Cichowicz, Vice Chairman, Presiding)

WEIGHTS AND MEASURES ADVISORY COMMITTEES

(1) *The Weights and Measures Advisory Committee to the National Bureau of Standards*

presented by C. G. Gehringer, *Sales Manager, Hobart Manufacturing Company, Troy, Ohio*

The Weights and Measures Advisory Committee to the National Bureau of Standards is one of a number of such committees established in 1954 to provide liaison between the Director of the Bureau of Standards and those segments of scientific, engineering, educational, industrial, and local government communities that are served by the National Bureau of Standards.

The Committee has directed its efforts to the role of the Bureau in commercial weights and measures. Presently, the Committee is made up of Mrs. Genevieve Blatt, Secretary, Department of Internal Affairs, State of Pennsylvania; Mr. R. E. Meek, Director, Division of Weights and Measures, State of Indiana; Mr. D. M. Turnbull, Director, Division of Licenses and Standards, Seattle, Washington; Mr. J. H. Chaloud, Associate Director, Procter and Gamble Company, Cincinnati, Ohio; Professor A. W. Troelstrup, Consumer Education Department, Stephens College, Columbia, Missouri; and myself, representing the Hobart Manufacturing Company. Mr. M. W. Jensen serves as Chairman of the Committee, and Mr. G. E. Auman of the National Bureau of Standards staff as Secretary of the Committee.

The Advisory Committee normally meets in Washington during the winter and again just prior to the National Conference. Because of extenuating circumstances, no winter meeting was held this year. This was unfortunate, because the very limited time thus available for Committee deliberations was inadequate for proper discharge of its duties.

While in session on Sunday, June 15, the Committee heard reports on NBS Advisory Committees by Mr. Auman, a discussion of the Institute of Applied Technology by Dr. Schon, and a presentation of the weights and measures program and plans by Mr. Jensen.

The total role of advisory committees presently is being studied by the National Bureau of Standards, with the probability of the reconstitution or elimination of one or more existing committees. The Weights and Measures Advisory Committee feels that there is a great advantage in the intercommunication afforded by these committees and strongly recommends that the Weights and Measures Advisory Committee be continued.

Other matters considered by the Committee are represented by our recommendations and comments as follows:

1. The Weights and Measures Advisory Committee recommends that every effort be expended to bring about a study by the National

Bureau of Standards as to the practicability and advisability of the adoption of the metric system of measurements by the United States.

2. The Weights and Measures Advisory Committee recommends that the Government of the United States go forward without delay in the furnishing of new State standards and associated apparatus to the States, according to need.
3. The Committee has been informed that considerable delays are being encountered in the calibration of State standards by the National Bureau of Standards. The Committee recommends that necessary steps be taken to eliminate such delays.
4. Because of the greatly increased demands on the time of the weights and measures officials and the improbability that field inspection forces will be substantially increased, the Weights and Measures Advisory Committee recommends that the Office of Weights and Measures continue its plan of guiding the several jurisdictions in the sample testing of packages.
5. The Committee finds highly encouraging the acceptance by the National Bureau of Standards of its recommendation of 1963 that a laboratory metrologist be employed and trained to travel to the State weights and measures laboratories for the purposes of standards and apparatus examination and laboratory training.

The Weights and Measures Advisory Committee wishes to commend the National Bureau of Standards and its Office of Weights and Measures for the excellence of the technical program and staff. This is a unique operation in Federal Government and one that well could serve as an example to many others.

Gentlemen, this constitutes our report. However, I would like to add a few things. I want to urge all of you to do everything possible through your State governments and your representatives to the National Government to help bring about the study by the Bureau of the use of the metric system in the United States, and I also urge you to contact them on the furnishing of the new standards and apparatus by the Bureau to the States. The Bureau has been given the authority to do this by Congress. Many years ago this was given. They do not, however, have the money to do it with. If our representatives are aware of the importance of these standards to the administration of good weights and measures enforcement, I am sure they will heed our request for help in obtaining these.

DISCUSSION OF FOREGOING ITEM

Mr. Sanders: I had the opportunity and the privilege of endorsing the establishment of this Committee at the beginning. I believe it probably has been the most effective advisory committee to the Director of the National Bureau of Standards, and has been of great service to this Conference. I suggest that somebody take some action to endorse officially the continuation of the Weights and Measures Advisory Committee.

Mr. Gehringer: As you know, the Advisory Committee is appointed by the Bureau. As I understand it, we are only on a temporary basis. The authority for this Committee expires as of June 30. This is all I know about it.

Mr. Sanders: It certainly could do no harm for this Conference to endorse the continuation on a permanent basis. I think the Advisory

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Committee is one of the most effective means of operation of this Conference.

Mr. Jensen: Very briefly, this is the situation: The existence of advisory committees to agencies of the National Government has been established by administrative order from the White House. These orders expire every two years, and the expiration of the present order is June 30, 1964.

(2) An Advisory Committee to a State Weights and Measures Agency Made Up of Representatives of Business and Industry

by J. F. Lyles, *Supervisor of Weights and Measures Section, Department of Agriculture, State of Virginia*

The Virginia Department of Agriculture has found advisory committees to be excellent means for implementing helpful exchanges of information between the regulatory agencies of the Department and the businesses and industries regulated. Such advisory committees serve the Department in bringing to it the needs and desires of the industry, and serve the industry representatives by informing them of existing or proposed laws, regulations, and enforcement practices.

These advisory committees resulted from a sincere desire on the part of Department management to establish a flexible and informative relationship between the Department and the industries concerned.

The Department Policy Manual defines the objectives of advisory committees as follows:

1. Determining needs in regulatory and service programs.
2. Considering problems related to Department activity in the industry of agriculture.
3. Gaining industry support of Department activities in service to the Commonwealth and to the industry of agriculture.

In less formal language, the advisory committees have shown that they can provide a mutually helpful flow of information, can create an atmosphere where honest differences can be discussed, and, perhaps most important, can result in the enactment of laws that are fair to all concerned. Advisory committees accomplish this by providing a much-needed liaison between industry, the public, and the Department.

The actual formulation of an advisory committee begins in the office of the Commissioner of Agriculture when he recognizes that a need exists in a particular section. The section supervisor is requested to suggest to his division head individuals for membership. The division head, in turn, requests the Commissioner to formalize the appointments.

A committee will usually be composed of not less than seven nor more than nine members, and due care is exercised to assure that all segments of the industry concerned are represented. At least one division head serves on each committee.

A committee must meet at least once each year, and may be convened as often as necessary. About one-third of the members of a committee are appointed annually, to serve for a term that will last three years.

The membership of our own Weights and Measures Advisory Committee consists of one home economist, who is also a member of the press, the executive directors of retail grocers and food dealers' organizations, plus representatives from the major food store chains and independent grocers. From time to time, the membership is reevaluated and, if necessary, revised.

In addition to the Weights and Measures Advisory Committee, the Department also has advisory committees with other segments of industry. Some of these committees are with the canning, baking, feed, fertilizer, and seed industries. I also meet with these committees to discuss weights and measures problems.

The Weights and Measures Committee, as well as others, has shown that it can play a particularly vital role in gaining voluntary compliance from business and industry. By being able to sit down with their representatives, we can discover what their problems are, and they can gain a complete understanding of the spirit and letter of pertinent laws and regulations.

It may already be clear at this point, but I should like to emphasize that these advisory committees are just that: They are advisory. When committees are created, there is complete understanding that the Department has its responsibilities and the obligation to implement them. The setting up of any particular advisory committee is simply an attempt to insure that these responsibilities will be carried out with as complete an understanding as possible of all the problems involved. For instance, in the forming of new laws, the committee discussions often develop into objective views that can guide the Department in its attempt to reach a fair and effective legislative proposal.

In the Weights and Measures Section in Virginia, we have ironed out numerous problems as a result of meetings with our advisory committee. Problems seem to have shrunk once they were discussed and industry could understand our approach and how the law would have to be administered.

To cite an example, several years ago our package-weighing program was increasing in momentum and new and varied problems were developing. New methods and procedures had to be quickly devised and adopted, and many of them were misunderstood by industry. Through our Advisory Committee, these new procedures were introduced and explained, and benefits accrued to both industry and the Department.

For industry, the discussions resulted in their being able to do a better job of weighing prepackaged commodities, because they were informed as to our method of checking such items.

For us, it was felt that our position was stronger because, through communication and resultant understanding, our position was backed by industry.

When Handbook 67, *Checking Prepackaged Commodities*, was published, it was presented to our Weights and Measures Advisory Committee and upon their recommendation, was adopted by the Board of Agriculture as our procedure to follow in checkweighing prepackaged items.

One of our more recent contacts with our Advisory Committee was related to our new and comprehensive Weights and Measures Law and Regulations. Many months before our proposed bill was introduced into the 1962 General Assembly we found ourselves discussing

and explaining the proposed weights and measures bill with our Advisory Committee. These discussions proved most valuable when our bill was introduced into the General Assembly. The bill was passed by both houses without a single dissenting vote.

This, to us, was rather dramatic proof of the usefulness of a weights and measures advisory committee in developing active and helpful communications between us and the people we serve.

(3) A Weights and Measures Advisory Committee to a State Department of Agriculture Made Up of Local Officials

by E. H. Black, *County Sealer of Weights and Measures, Ventura County, California*

So you will better understand some of the problems we will discuss later, I think it would be well for me to take just a minute to explain the following charts to you.

First, you will note on the organization chart (Fig. 1) that, at the State level, the total weights and measures program is under the Department of Agriculture; the Bureau of Weights and Measures is responsible to the Division of Compliance, which is responsible to the Director of the Department of Agriculture. By State law, it is the individual county's legal and financial responsibility to adequately enforce the State weights and measures laws so at the county level the work is carried on under the direction of the individual county sealer. All county sealers and their deputies are certified through State examination, and their jurisdiction is within the individual county's boundaries.

Immediately below the State organization is the new organization chart of the California Association of Weights and Measures Officials (Fig. 2), a voluntary association recognized by State law, in which sealers, their deputies, and State department personnel take an active part. The Association's officers, committees, area chairmen, and secretaries are all county sealers. The general purpose of the Association is to work with the Bureau on studies of local or statewide problems that have to do with enforcement.

The Association may also work as a separate organization, for example, on legislation that the State department could not sponsor because of infringement on local rights.

Figure 2 is simply a map of the State showing how the 58 counties are grouped into six geographical areas.

With this brief explanation, we will proceed.

I like to remember, when I first started in weights and measures, the "Old Country Store." In some areas there are still a few, I feel sure. Every customer, salesman, and local official was known personally by the store owner and his wife. When you stopped for your annual inspection, your car loaded down with tools, extra parts, and standards, it was a big local event. There were no problems and no rush. If the visible pump's glass bowl was so dirty you couldn't see the markers—simply routine. A bottle of vinegar, a short stepladder, your kit of tools, and about 2 hours' labor on your part, and everything was in shape for testing (if you were lucky). When that job was finished,

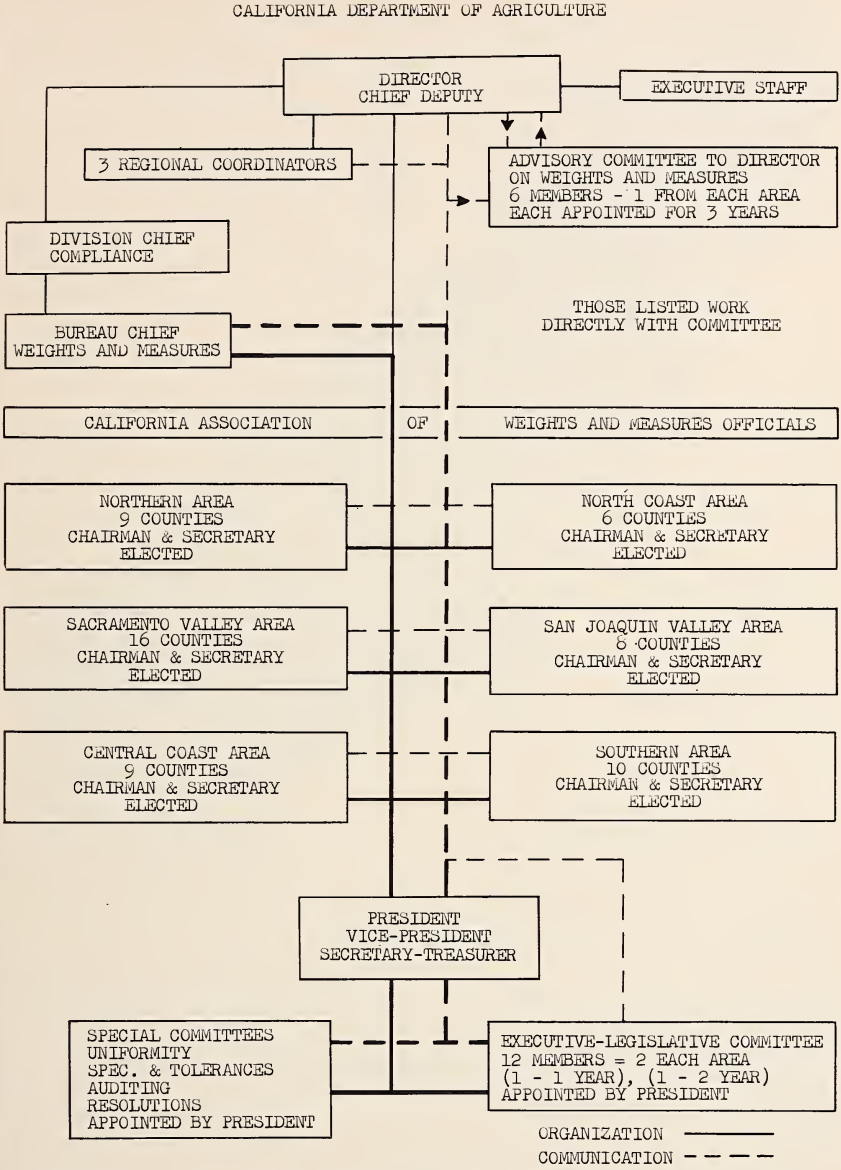

Figure 1. *Organization chart, California Department of Agriculture.*

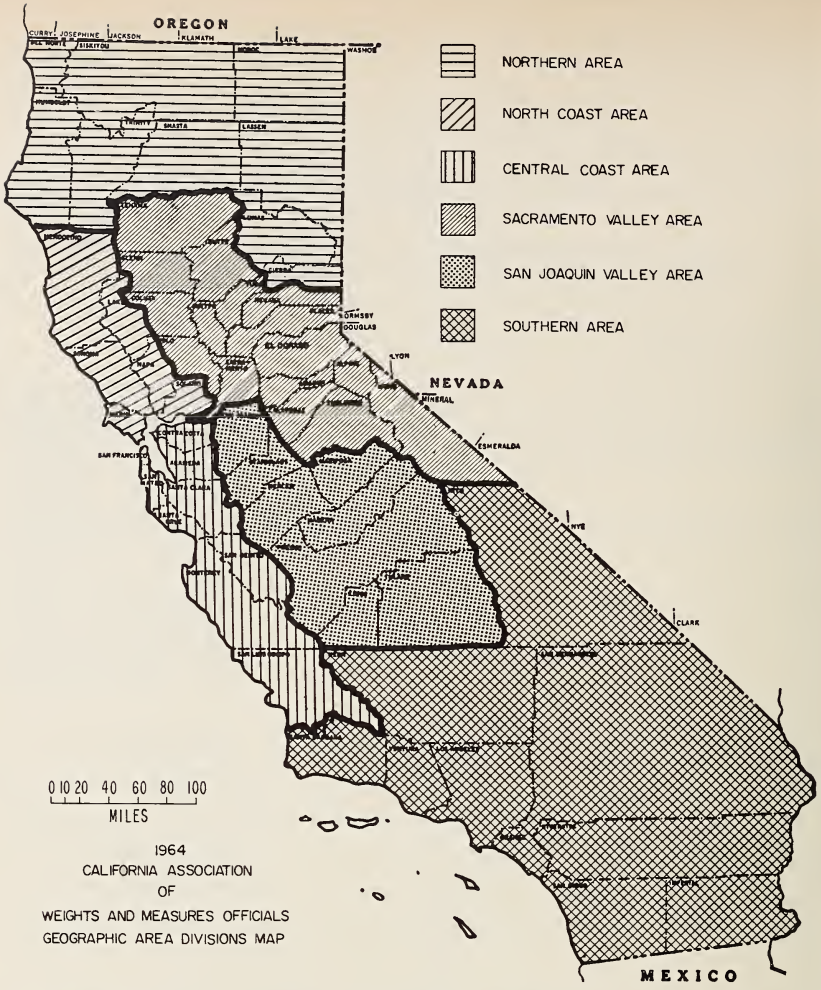

FIGURE 2. *Map of California, showing grouping of 58 counties into six geographical areas.*

the owner complained a little if you hadn't remembered to do the meat department first, because the odor of mixed vinegar and lead on your hands and clothes didn't do too much for his meat display.

When you finished the repair and testing of all devices, both the owner and his wife bid you goodby for another year, or would it be two?

During that period, the State Department of Agriculture, of which we are a small part, had its own special problems—an expanding agriculture program, a rapid increase in imported pests and resultant new developments in pest control methods and materials, and, as an added problem, the hoof and mouth disease in cattle that was so bad about that time. These were all urgent problems that could give the department trouble, not only in the field but in the legislature, if something wasn't done immediately.

During that same period, when the Chief of the State Bureau of Weights and Measures made a personnel and budget request, he was either refused or else cut to the bone, principally, I feel, because there were no spectacular problems and the Bureau was considered as just another of the smaller offices that would get along anyway. They must have been getting along, because the department seldom heard from the sealers as a group, and only on rare occasions as individuals.

The Association of Weights and Measures Officials met once a year at the Annual Conference, had a real fine time, conducted a little business, and carried over what was left until the following convention. During the year, some areas had occasional meetings and rehashed old problems and discussed new ones that had often been discussed in another area with the Bureau months, and sometimes years, before. The only communication sent was the occasional "California Sealers' News" for which we were all very grateful.

In that atmosphere, I feel most of our present weights and measures problems were beginning to develop.

All branches of industry were not only increasing at a very rapid rate, but making terrific advancements in every phase of production and marketing procedures. This progress made demands on the local county sealers that, in most counties, could not be adequately handled, simply because they had neither the equipment nor technical knowledge; and there was no sign of help from a budget- and personnel-depleted Bureau.

To add to the problem, there were no well-developed working lines of communication. This helped to bring about a general, statewide feeling of frustration which led to intercounty and county-State bickering. There were many misinterpretations and misunderstandings that developed from secondhand information.

Approximately five years ago, the Director of Agriculture and the Chief of the Bureau, both very fine men with many years of dedicated service behind them, arrived at retirement age at about the same time. Soon after their retirements, a new Director and Bureau Chief were appointed.

One of the first actions of the new Bureau Chief was to request that an "Advisory Committee," composed of county sealers, be appointed. I had the honor of being appointed as a member of that first committee. In looking back it is extremely pleasing to see how far we have come in the overall upgrading of the statewide weights and measures program: and all in a relatively short 4-year period.

The Sealers' Advisory Committee to the Director is composed of one sealer from each of the six geographical areas of the State. Each is appointed by the Director for a 3-year term. Two replacements are appointed each year by the Director, thus leaving four experienced members on the Committee at all times. A chairman and secretary are elected by the Committee.

The Committee advises the Department of Agriculture and Bureau of Weights and Measures on:

1. New trends that may be evident to those at the enforcement level and that may require legislation.
2. New problems in enforcement requiring increased departmental or Bureau assistance.
3. Requests for development of new programs.

4. Requests for new or additional services.
5. Any other related problems or suggestions.

Committee meetings are called by the Director (generally when a request is made to the Director by the Committee Chairman). Originally, it was planned to have one 2-day meeting a year, with interim communications by letter correspondence, but, very early, it was found that two and sometimes three meetings a year were necessary.

Expenses for Committee members' travel and subsistence are paid by the Department. The meetings are always held at the State Capitol, principally because the Director's staff, Division and Bureau Headquarters, and technical advice that may be needed, are readily available there.

Meetings start at 10:30 in the morning on the first day, continue after dinner in the evening, and usually end in the early afternoon of the second day. This arrangement allows time for travel to and from meetings on the day of the meeting, resulting in less time lost in the local jurisdiction.

All recommendations by the Committee are sent directly to the Director by the Committee Chairman. The Director personally takes action on each recommendation and all releases on recommendations are made by the Director. Under no condition is there any discussion outside of meetings by either the State or county personnel in attendance, unless first approved by the Director.

I would like to emphasize that, when the Committee was first appointed, there was a feeling by many, and not just the sealers, that this was just another prestige committee. But after the first immediate problems tackled by the Committee had been given immediate approval and put into effect, with the personal backing of the Director, and others were put into effect by the Bureau with the Director's approval, the sealers as individuals and as an Association saw that hard work was expected of this Committee and that, through the Committee, they had the "ear" of the Director in a direct line of communication.

Gradually, a change could be seen taking place throughout the State. Constructive reorganization efforts took the place of disorganized resentment, distrust, and insecurity. Sure, we had problems as a Committee, and we made some false starts, until there was definite understanding as to where we fit into the overall organization picture of Director to Division to Bureau to County Sealers and Sealers' Association.

One of the biggest problems the Committee faced, especially with the older sealers, was distrust and fear of new ideas, or any changes that might upset the *status quo*. We had started programs under direction before, and had them fall flat, because of no followthrough at the proper level. We didn't want to be left again with no one to fall back on. We wanted to be shown.

There was also a feeling by some that this might be a step toward a totally State-operated weights and measures program with resulting loss of local control and enforcement. To reassure those sealers, the Director of Agriculture, on several occasions, made public statements to the effect that the Bureau was not going to operate at the local level and that, according to State law, it was the individual county's legal and financial responsibiliy to adequately enforce the State weights and measures laws at the local level.

I am sure you realize that many of the items I have talked about were discussed in the first meetings of the Committee.

Some other items on the agenda are:

1. The development of an overall statewide "upgrading" of weights and measures activity—this to be accomplished by placing more emphasis on uniformity and cooperation—county to State and State to Nation—in our Laws, Rules, and Regulations, and in the various fields of training at both the State and county level.

   In regard to training, a rather extensive program has been developed through the cooperative efforts of the Department of Agriculture, the State Bureau of Weights and Measures, and the Office of Weights and Measures, National Bureau of Standards.

   First, Mr. Kerlin, Chief of the State Bureau of Weights and Measures, and Mr. Jensen, Chief of the Office of Weights and Measures, National Bureau of Standards, made arrangements that made it possible for Mr. Jensen to conduct an introductory type of school in Sacramento at the Annual Business Meeting of County Sealers and most State Bureau personnel.

   At a later date, Mr. Wollin, Engineer, Office of Weights and Measures, National Bureau of Standards, conducted training sessions for the State Bureau personnel at Sacramento and again at Los Angeles.

   Next, key personnel from the State Bureau were given a number of courses in training by specialists of the State Department of Agriculture.

   The following very fine classes are presently conducted by the Bureau personnel in which *Handbook 44* and the *Examination Procedure Outlines* are used as guides:

   Train the Trainer.
   Weighing Devices.
   Measuring Devices.
   Public Weighmaster.
   Rules of Evidence and Court Procedure.
   Petroleum General.
   Electric Meter.
   Liquid and Vapor (LPG) Meters.

   These classes are from one-half day to three and one-half days each, and are set up as a continuing program. I understand others are in the process of development. The procedure for presentation is as follows:

   a. At an area meeting, the sealers are given, in four hours, the recommended procedures and other information that will be covered in the classes with their supervisors and field inspectors.
   b. Supervisors are given the "Train the Trainer" class.
   c. Field inspectors and immediate supervisors are given the classes on a scheduled basis.

   Whenever it is possible, arrangements are made with neighboring counties to hold joint classes.
2. The upgrading of the requirements for all weights and measures personnel at the county level. (These new requirements, I have been told, should go into effect by July of this year.)

3. The study of the weights and measures laws and procedures of the State of Wisconsin.
4. Revision, updating, and standardization of some of the forms that are used statewide. (Under our present organization, this item would be handled by a committee of the Association.)

Now, with Association committees handling problems that rightfully come within their field, the Advisory Committee will be able to study other questions such as: What does the future have in store for weights and measures 5, 10, 20, or 50 years from now, and what groundwork can we lay now in preparation for that future?

In summary, I would personally attribute the success of the Director's Advisory Committee to the following:

1. The sincere interest and participation by the Director, Deputy Director, Staff, Regional Coordinators, Division and Bureau Chiefs.
2. A communications line reorganized through the cooperation of the State Bureau and Sealers' Association, *actively* and *accurately* used by all agencies, but especially so used by the Sealers' Association and the State Bureau. (The agenda for all area meetings is sent to the Bureau by the area secretary. The Bureau then sends the appropriate State personnel to the area meetings. The area minutes are then sent by the area secretary to the Bureau. The Bureau reproduces the minutes as received and sends a copy to each sealer in the next weekly mail envelope.)
3. The straightforward and aboveboard approach by all agencies involved in recognizing a problem, and then meeting across the conference table and arriving at possible solutions.
4. A revitalized, reorganized, and working association of weights and measures officials.
5. Generally, to be able to keep our problems and possible solutions within our own weights and measures structure.

THE ORGANIZATION AND FUNCTIONS OF THE WEIGHTS AND MEASURES DIVISION, NATIONAL ASSOCIATION OF STATE DEPARTMENTS OF AGRICULTURE

by J. Fred True, *State Sealer, Kansas Division of Weights and Measures, and Secretary, Weights and Measures Division, National Association of State Departments of Agriculture*

During the National Conference on Weights and Measures in 1962, George McIntyre, Director of Agriculture of the State of Michigan and President of the National Association of State Departments of Agriculture, called a meeting of heads of State weights and measures activities that organizationally are in State Deparements of Agriculture. Twenty-four officials attended.

After considerable discussion, it was unanimously agreed by the group that steps should be taken to form a Weights and Measures Division of the National Association of State Departments of Agriculture and to name as temporary officers of this Di-

vision, Claire Jackson of Wisconsin, President, Lyle Littlefield of Michigan, Vice President, and J. Fred True of Kansas, Secretary-Treasurer. The officers were directed to draw up preliminary plans for the organization.

These officers met in August of 1962 and developed a plan for presentation to the Weights and Measures Committee of NASDA during their annual meeting at Grand Rapids, Michigan, in 1962. Subsequently, at that same meeting, this plan was adopted by the parent organization.

The second meeting of State weights and measures heads was called at the time of the National Conference on Weights and Measures in June 1963. At this meeting, the temporary officers were elected for another year, and a committee was appointed to study the requirements for membership in the association.

The United States was divided into four areas: The Western Area to meet with the Western Weights and Measures Association in August, the Southern Area to meet at the time of the Southern Conference in October, and the North Central Area to meet in Wisconsin in October. A Northeastern Area was formed, but no specific meeting arrangements were completed.

At the 1963 meeting of the National Association of State Departments of Agriculture, a resolution was submitted by the Weights and Measures Committee and agreed to by the Association. The resolution approved the following plan for the organization of the Weights and Measures Division:

PROPOSED PLAN
for
ORGANIZATION OF A WEIGHTS AND MEASURES DIVISION
of the
NATIONAL ASSOCIATION OF STATE DEPARTMENTS OF AGRICULTURE

1. *Name.*—The name of this organization shall be the Weights and Measures Division of the National Association of State Departments of Agriculture.

2. *Purposes and Objectives.*—The principal purpose of this organization shall be to improve the efficiency, effectiveness, and uniformity of administration of weights and measures laws and regulation in the United States.

3. *Membership.*—All State departments having responsibility for enforcement of weights and measures laws shall be eligible for membership.

The Department shall be represented by the person or persons directly responsible for State weights and measures programs or such other person or persons appointed by the head of the State Department of Agriculture or other State agency having weights and measures enforcement responsibility.

Each State shall have one vote.

4. *Officers.*—The officers of this organization shall be President, Vice President, Secretary-Treasurer. Only those persons representing State Departments of Agriculture membership shall be eligible to serve as officers. The officers shall be elected annually.

5. *Annual Meeting.*—The membership of this Division shall meet annually at the time and place of the meeting of the National Conference on Weights and Measures.

It is to be noted that item two of the proposed plan sets forth the purposes and objectives in a very brief statement. It is our plan to be of service to all State weights and measures agencies, whether they are in the State Department of Agriculture or in some other department of State government. We feel that all can improve in service and grow in stature in their own States. All State departments should cooperate 100 percent in the National Conference on Weights and Measures. This will bring about uniformity among States in all of the phases of

weights and measures laws and enforcement.

We feel that we can be of service to our parent organization, the National Association of State Departments of Agriculture, by keeping them informed of new demands, up-to-date procedures, and new and better services that can be offered to the general public and to business and industry.

The National Bureau of Standards and the Office of Weights and Measures look to the State offices for their continuing cooperation, and we recommend that all States cooperate fully and utilize the services of the Office of Weights and Measures and the National Bureau of Standards.

A STUDY OF PACKAGED AEROSOL PRODUCTS

(1) *A Progress Report on Aerosol Packaged Products*

by H. F. Wollin and S. Hasko, *Engineers, Office of Weights and Measures, National Bureau of Standards*

The Office of Weights and Measures has devoted considerable time and effort during the past year to the measurement of packaged aerosol products. Increasingly, weights and measures officials, representatives of the aerosol industry, and others, have expressed the need for a solution to the problems that relate to the determination of net contents.

The aerosol industry has mushroomed from its beginning during World War II to the production of more than 1 billion containers in 1963, and with this growth have come several problems with respect to official control over the quantity of commodity of aerosols, namely, the need for (1) regulatory requirements and procedural guidelines, (2) standards of measurement and uniform test methods for regulatory officials and for the industry, and (3) coordination among the States.

At the present time, neither the Model Law on Weights and Measures nor State laws have provisions pertaining specifically to aerosol products. A number of States have promulgated the Model Package Regulation which specifies only that, if a commodity is packaged in an aerosol container, the quantity declaration shall be in terms of weight, including the propellant.

Many weights and measures jurisdictions have been reluctant to include aerosol products in their package control programs for lack of regulatory and procedural guidelines. In fact, in the interest of national uniformity, deliberate effort has been made by the States to await the development of sound and proven test methods. The jurisdictions that have followed a test program based on methods developed tentatively, have reported many cases of shortweight aerosol packages when checked on either the dry or wet tare basis.

The National Conference on Weights and Measures first gave attention to the aerosol situation when Mr. H. E. Peterson, representing the Chemical Specialties Manufacturers Association, was invited to appear on the Conference program in 1960. His informative presentation was focused on products, processes, propellants, and problems in packaging. Mr. Peterson emphasized that it was the practice of the industry

to label aerosol products by weight rather than by volume. Prior to this Conference, many enforcement officials were of the firm opinion that the net content statement should represent only the commodity delivered and should not include the weight of the propellant. The separation of the commodity from the propellant, once these have been dispensed is, of course, a unique technical problem.

As a result of the industry view, as expressed by Mr. Peterson, and discussion during the Conference that year, there developed a general agreement that (1) aerosols must be labeled to show average net weight, and (2) that labeled weight should include the propellant. This was provided for in the Model Package Regulation as adopted by the Conference the following year.

It appears that the major problem now facing both enforcement officials and aerosol packagers is "wet tare" versus "dry tare." Simply stated, the wet tare method recognizes the net quantity of product to be that which can be delivered by the aerosol container following the packagers labeled instructions. Dry tare means the net quantity of product contained in a dispenser.

The basic philosophy in support of the view of enforcement officials for wet tare is that, since the consumer purchases a system and not merely a commodity, he expects nothing less than the delivery of the labeled net weight. This viewpoint seems to be universal among the States, even though it is recognized that such requirements will differ from those of almost any other type of package.

The view of officials seems to have been strengthened by the statements on aerosol packages that warn against puncturing the container. Unfortunately, there apparently are segments of the aerosol packaging industry that were, and perhaps still are, reluctant to package according to the wet tare principle—their contention being that they are responsible only for the net quantity contained.

To help resolve some of the differences of opinion and technical problems associated with the enforcement and marketing of aerosol products, M. W. Jensen, Chief, Office of Weights and Measures, National Bureau of Standards, accepted an invitation to address the 50th Annual Meeting of the Chemical Specialties Manufacturers Association, Aerosol Division, last December. In his presentation before this large gathering of the Nation's leading aerosol packagers, and during informal discussion with CSMA officials, Mr. Jensen thoroughly explored the weights and measures situation, and from this meeting there developed a spirit of cooperation between the Office of Weights and Measures and the several committees of CSMA that were assigned to weights and measures matters. It was recommended that immediate action be taken to bring about an acceptable solution to the problems confronting both the industry and State regulatory officials.

Less than a month later, a meeting of the CSMA Aerosol Net Weight Committee and several members of the OWM staff was held in Washington, D.C. Discussion centered on test methods and data that had been compiled by various groups, and plans for future activity were developed. This was the beginning of the present study by the Office of Weights and Measures. The study is not yet complete, and it is expected to continue for some time.

The specific aim of this study was to find an acceptable means by which the average net delivered weight of a sample of aerosol packages

could be accurately and simply determined by weights and measures inspectors during routine field inspection. With this in mind, the study was based upon several important principles, among which were:

(1) The insistence of State weights and measures officials for the wet tare principle of measurement preclude the investigation of a dry tare method.

(2) The inspection procedures for aerosols, as with all packaged commodities, should be in conformance with the basic concepts and recommended guidelines for checking prepackaged commodities as set forth in National Bureau of Standards Handbook 67.

(3) Test methods should involve a minimum of time and test equipment.

(4) An aerosol test should reproduce as nearly as possible, and by practical means, results similar to actual consumer usage.

(5) Because of the possible variation in test procedures according to product characteristics, a general classification of aerosol products was necessary.

(6) Variation of test procedures should be held to a practical minimum.

(7) Standard test conditions, such as temperature, and the operation of dispensers were to be established and controlled, and

(8) The development of procedures and methods would be done cooperatively with representatives of the Chemical Specialties Manufacturers Association who were conducting similar studies.

At an early stage in our investigation, we accepted an invitation to visit the laboratory of a leading producer of aerosol propellants and the plant of a high-speed contract filler. Our visit to these firms was most informative and helped considerably to broaden our knowledge of aerosol products and production.

Shortly thereafter, the study became one of experimentation and testing. An agreement had been reached with CSMA that our studies would be devoted initially to foam-type products, primarily shaving creams. It was the feeling that foam products, which are easily identifiable, offered the most difficult problems and, when these special problems were solved, other products would fall nicely in line. At this time, it was decided tentatively to classify aerosol products into three brood categories: (1) Foams (shaving creams), (2) Space (room deodorants), and (3) Residual—of low (colognes), medium (paints), and high (ointments) viscosities.

Thanks to our associates in the industry we received a sizable quantity of foam products from many of the major manufacturers. The Office of Weights and Measures provided the necessary test equipment, the major purchase being a new temperature-humidity control chamber. Incidentally, it should be emphasized that the work involved in this study is not indicative of what lies ahead for each weights and measures jurisdiction. We hope that because of the studies being made, enforcement officials need only to be concerned with the implementation of the specific procedures and test methods to be developed.

The delivery methods that were known to be in use at the start of the investigation were the CSMA "Canadian" method and the so-called "Jensen" method. The later being so designated by the industry as it originated in the Office of Weights and Measures about a year ago as an experimental method. These methods and modifications

thereof were the methods on which most of our experimental work has been based.

The Canadian Method is believed to have been developed by the Canadian counterpart of CSMA and recommended to Canadian officials for use in their aerosol control program. No detailed description of this method is presented herewith. However, it would seem advisable to mention that the test of a single container covers a time interval of approximately 192 hours, or 8 days, from start to completion. Although data compiled by the industry indicate satisfactory results following the Canadian Method, such a prolonged test method could hardly be suitable for use in the field by enforcement officials in this country. It is not known what use Canadian officials have made of the method, if any.

Recognizing the need for a simplified test method, initial effort was devoted to the evaluation of the tentative OWM method and the design of new methods for experimentation. Three basic methods were developed and studied. Tests were performed by two persons, operating independently. Test temperatures were controlled at 75° F, plus or minus 5°. In addition, actual consumer use tests were established and evaluated. A brief summary of the various methods and tests follows:

1. The Continuous Delivery Method

A sample container was first accurately weighed (to the nearest 1/10 gram) to determine gross weight. If instructions on a container specified shaking, it was shaken vigorously with a wrist-twisting motion for 15 seconds. The container was then exhausted by holding the valve open by hand until the bulk of product had been expelled. The container was then placed in a test stand, with the valve clamped in an open position, and allowed to sit until no more product or propellant came out. The external surfaces of the completely exhausted container were then rinsed, air dried, and the can reweighed. By following these steps, the delivered weight of product from a container was determined. To test for the effect of propellant regeneration, and the settling of product to the bottom of the container, each aerosol was allowed to rest overnight (usually a period of 16 hours or more) then placed back in the test stand with the valve clamped down and held until it was completely exhausted. Again, the container was rinsed, dried, and weighed. The additional delivered weight due to regeneration and settling was thus determined.

2. The Vibrator Method

This method was similar in all respects to the one just described, with the exception that a barbershop-type vibrator was attached to the operator's hand and the container was vibrated while the product was being expelled.

3. The Accelerated Use Method

The step-by-step procedures of this method were also similar to those in the Continuous Delivery Method, the only difference being that the container was exhausted by depressing the valve intermittently to deliver a small amount of foam product (about the size of a golf ball) each time the valve was depressed. The container was given three quick shakes before each small delivery until it was exhausted.

4. The OWM Tentative Method

The three methods for rapid delivery just described were modifications of the OWM Tentative Method. The steps in this method were:

1. Weigh container for gross weight.
2. If instructions on can specify shaking, shake vigorously with wrist twisting motion for 20 seconds.
3. Exhaust container by:
   (a) Holding valve open for 3 seconds
   (b) Closing valve for 5 seconds
   (c) Shaking can for 10 seconds after every third cycle.
4. When container appears exhausted, apply clamp to hold valve in open position until nothing more comes out.
5. Remove clamp and allow container to rest overnight, then replace clamp to see if additional product can be expelled.
6. Rinse surface, air dry, and reweigh.
7. The delivered content is the difference between the gross weight and the weight of the completely expelled container.

5. The Consumer Use Test

Each of a number of selected individuals was given a can of aerosol shaving cream to use at home. Each container was first carefully weighed for gross weight and marked with an identification number. Instructions to each person were to use the product as he normally would, paying attention to instructions labeled on the container, and to return the container when he was satisfied that no more usable product was available. As the used containers were returned, they were cleaned and rinsed, air dried, and reweighed to determine the weight of product used by the consumer. These cans were also tested for regeneration in the laboratory.

6. The Consumer Retention Test

It seemed significant to try to determine the amount of product that would on the average, be retained in a container that was used and discarded by a large cross section of consumers. The first attempt to obtain such containers from the city refuse plants failed. Our next attempt was more successful. A request was put out to friends, neighbors, and the several thousand National Bureau of Standards employees in the Washington area to bring their empty aerosol containers to us. The response was excellent and at the rate they keep coming in, we may find it profitable to go into the used aerosol container business.

So far we have tested only foam-product containers. Any container that was obviously damaged or inoperative was omitted from the tests. Those tested were first cleaned and rinsed, air dried, and weighed. Since these containers had more than ample time to regenerate from the time they were collected, no additional regeneration period was considered necessary. The next step was to see if we could get more out of the containers by placing them in test stands and clamping the valve open. When we were satisfied all product had been expelled, the container was again rinsed, dried, and reweighed. Following this operation, the containers were opened by can opener, thoroughly cleaned and dried, inside and out, and then weighed for the third time. This procedure enabled us to determine (1) the

retention following average consumer usage and, (2) the retention of a consumer used package allowing for a final regeneration and exhaustion. The results obtained thus far show the retention of the former (1) to be 13.4 weight percent and of the latter (2) to be 3.5 weight percent.

TABLE 1. *Evaluation of experimental methods* [1]

Method [2]	Order of minimum retention	Order of reproducibility
Continuous delivery	2	1
Vibrator	1	2
Accelerated use	3	3
OWM tentative	4	

[1] The experimental methods were evaluated on the basis of one regeneration.
[2] The average retention based upon labeled weight ranged from a low of 2.1 weight percent for the vibrator method to 5.6 weight percent for the OWM tentative method.

Evaluation of the data from this preliminary experimental work (table 1) indicated that both the Continuous Delivery Method and the Vibrator Method were good methods. The Continuous Delivery Method was selected for additional testing because it was simpler, more reproducible, and the results more closely approximated data that were being obtained from the consumer retention tests.

A test run was prepared using 140 samples of aerosol foam products. Included were 10 samples each of a cosmetic foam, a foam shampoo, a foam hand cream, and 11 different kinds of shaving creams. Temperatures of 70, 75, and 80 °F plus or minus ½ °F were selected for the tests to determine how sensitive the method was to minor differences in temperature. The tests were conducted by two experienced operators to determine the effect of operational variations on the test method. A proportion of the samples was set aside after the initial tests for additional regeneration tests. A separate run was made at 75 °F on 26 samples of foam products using the CSMA-Canadian Method for comparison purposes. Included in the test were two samples each of all products previously mentioned (with the exception of one shaving cream, of which we lacked sufficient samples). The test was conducted by the same two operators.

Statistical analysis showed no significant difference in the amount expelled from the aerosol containers for the two operators. This is very important since a test method to be acceptable must yield reproducible results when properly conducted by regulatory officials and others. The analysis also showed no significant difference in the amount expelled at the temperatures of 70, 75, and 80 °F. This also is important since it is not expected that the inspector in the field will have precise control over sample temperature.

The retentions of aerosol foam products evaluated by the continuous delivery method are tabulated in table 2. Values are given for the method with no regeneration and with one regeneration. Also included are the standard deviations (expressed in weight percent).

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TABLE 2. *Retention of aerosol foam products* [1]

Product [2]	Retention (amount left in container) Continuous Delivery Method				Retention (amount left in container) CSMA-Canadian Method [5]	Overfill [3]
	No regeneration		One regeneration			
	Quantity [3]	Standard dev.[4]	Quantity [3]	Standard dev.[4]		
	Wt %	*Wt %*	*Wt %*	*Wt %*	*Wt %*	*Wt %*
A	4.6	0.84	3.8	0.69	2.4	3.0
B	4.0	0.93	2.2	0.70	1.7	4.6
C	3.7	0.82	2.7	0.32	4.5	1.1
D	5.2	0.80	3.7	0.51	6.4	3.7
E	5.0	0.69	4.5	0.46	2.9	5.4
F	5.9	1.08	4.3	0.50	2.4	5.3
G	4.0	0.81	3.4	1.16		3.0
H	2.4	0.47	1.6	0.54	2.2	1.6
I	1.2	0.21	1.0	0.23	1.4	0.3
J	4.1	0.75	3.4	0.69	2.7	1.2
K	2.3	0.52	1.6	0.31	1.5	0.7
L	1.3	0.41	1.3	0.39	1.8	−0.2
M	4.3	0.72	2.9	0.63	1.4	0.2
N	6.2	1.08	3.9	0.68	2.2	4.9
Average all foam products	3.9		2.9		2.6	2.5
Average all shave creams	3.9		2.9		2.8	2.7
Average other foam products	3.9		2.7		1.8	1.6
Average small containers (4, 6, 6¼ oz.)	4.2		3.1		3.0	2.8
Average large container (10, 11 oz.)	3.4		2.6		1.9	0.5

[1] Percent retention and overfill is based upon the labeled weight.
[2] Foam products other than shave creams (products L, M, and N). Small containers (products A, B, C, D, E, F, G, H, I, and N). Large containers (products J, K, L, and M).
[3] Average of 10 samples.
[4] Of an individual can within the sample of 10.
[5] Average of 2 samples.

The standard deviation is an estimate of the dispersion of the variables around the mean (i.e., the average variability of the results). Statistical theory indicated that about 65 percent of the values will fall within the limits of ± one standard deviation and that about 95 percent of the values will fall within the limits of ± two times the standard deviation. Other values of interest given in table 2 are the overfill and the retention and overfill averages for (a) all foam products, (b) all shave creams, (c) other foam products, (d) products in small containers (4, 6, and 6¼ oz.), and (e) products in large containers (10 and 11 oz.). It may be noted that the average differences between the one regeneration and no regeneration values will vary from 0.8 to 1.2 weight percent depending on container size and product (shave cream or other) with an overall average for all aerosols of 1.0 weight percent. The average retention of all foam products with the continuous delivery method and no regeneration was 3.9 weight percent. With one regeneration the average retention was 2.9 weight percent. Additional regenerations reduced the retention by 0.1 weight percent. The variation between these averages and the averages of all shave creams, other foam products, products in small containers, or products in large containers did not exceed 0.5 weight percent.

The retentions of aerosol foam products evaluated by the Chemical Specialties Manufacturers Association-Canadian method also are tabulated in table 2. The standard deviations for these packages are not included, since only two samples of each product were examined by this method. Other values given in column 6 of the table are the retention averages for the same classifications of products as listed in columns 2 and 4.

Another variable in addition to product consistency, namely, container design, and particularly the type of valve employed, appeared to have an effect upon the results (i.e., retentions and standard deviations). Since such are the packagers prerogatives no evaluations were made.

Serious consideration is presently being given to the establishment of a factor that will correct for the difference in the wet tare as determined by test and the wet tare that would be found following normal consumer use.

Several means and formulas for determining an acceptable correction factor for foam products have been discussed with CSMA representatives. However, no agreement has yet been reached due to lack of time to study the various proposals. How many factors will eventually be needed for all aerosols has not been established. We believe it is reasonable to expect that a single factor can be developed for an entire general class of products.

The factor development of one experimental test method employing a retention factor is outlined in the following manner:

$$\text{Net weight} = \text{Gross weight} - \text{Tare weight}$$

$$\text{Net delivered weight} = \text{Gross weight} - (\text{Dry tare} + [\text{Ret. Factor} \times \text{Label Weight}])$$

(Wet tare = Dry tare + [Ret. Factor × Label Weight]; Retention = Ret. Factor × Label Weight)

$$\text{Retention Factor} = \frac{\text{Amount retained in can after test by an accepted procedure}}{\text{Label weight}}$$

The retention factor is a factor that would be determined by the Office of Weights and Measures working in cooperation with the Chemical Specialties Manufacturers Association and would be supplied to weights and measures officials.

The factor devleopment of another experimental test method employing a regeneration factor is as follows:

$$\text{Net weight} = \text{Gross weight} - \text{Tare weight}$$

$$\text{Net Delivered weight} = \text{Gross weight} - (\text{Wet Tare} - [\text{Reg. Factor} \times \text{Label weight}])$$

(corrected wet tare = Wet Tare − [Reg. Factor × Label weight]; Regeneration allowance = Reg. Factor × Label weight)

$$\text{Regeneration Factor} = \frac{\text{Wet Tare} - \text{Wet Tare (after regeneration)}}{\text{Label weight}}$$

The regeneration factor is a factor that would be determined by OWM working in cooperation with CSMA and would be supplied to officials for use in the field. In this method it would not be necessary to open the containers. It should be stressed at this time that these

are still experimental methods and they are presented here merely as a progress report.

We are optimistic that an agreement will be reached with CSMA in the very near future on a simplified test procedure for foam products. Notification and details of the agreed upon procedure will be distributed to weights and measures officials through the Office of Weights and Measures Tech Memo. Procedures for other types of aerosol products will be distributed as they are developed.

It is our firm conviction that a most difficult problem can be solved by industry's cooperation in the development of a relatively simple and practical procedure—a procedure that both the enforcement official and the packager can adopt and easily perform. A procedure that is in conformance with the basic philosophy of regulatory officials and with the aim of the National Conference on Weights and Measures.

(2) Net Weight in Aerosol Packages

by F. T. Reed, *Chairman, Scientific Committee, Aerosol Division, Chemical Specialties Manufacturers Association*

The aerosol industry appreciates this opportunity to address the National Conference on Weights and Measures and discuss the net weight of aerosol packages. In speaking for our industry, I hope to convince you of our sincerity in working with your technical associates in trying to arrive at workable test procedures which will allow the States to set up intelligent regulations that will not be a burden to the marketers of aerosol packages.

Dealing with regulatory agencies is by no means new to our aerosol industry, even though we are relatively young in the field of consumer products. Some of our past dealings with these agencies have been difficult, but I want to take this opportunity to say that working with Mr. Jensen and his staff at the Bureau of Standards has been pleasant. We have experienced technical difficulties and differences of opinion but have been able to resolve these without serious harm to our ultimate objective. I am sure we can expect new problems to arise as our work proceeds due to the complexities of aerosol products, but I am confident that none will pose a serious block to continued cooperation.

Let me outline to you briefly what our industry has done to date in an effort to resolve the problem of how our aerosol package will be labeled as to net weight. As you know, some of the States have been using a procedure to verify the net contents of an aerosol container in terms of the amount of material which a consumer can obtain from the container by following the directions stated thereon rather than by determining the amount of material in the container. Because of a variety of difficulties in interpreting and applying these procedures, some aerosol packages have been picked up by inspectors here and there. This action made it quite apparent to us as an industry that some uniformity of application should be developed promptly in fairness to both the industry and State officials. Fortunately, you have also recognized this, and through Mr. Jensen's group at the National Bureau of Standards, initiated action to study the problem to see if

suitable procedures could be developed and recommended to the States. We in CSMA have been working on the problem for approximately a year. Close cooperation with Mr. Jensen started approximately six months ago when it was indicated that the industry's desire for a dry-tare method for calculating the net contents of an aerosol container might not be acceptable to State agencies. This, I believe, was unfortunate because there are many who sincerely believe that it will be quite difficult to develop an inspection procedure if the net contents is based on what consumers with varying habits of use can discharge from the container. However, as a responsible industry we recognize that evidence of good faith and cooperation should be demonstrated regardless of our convictions of the merits of the dry-tare method. Therefore, we have directed our technical committees to examine methods which are aimed at satisfying the so-called "wet-tare" requirement.

In cooperation with the Bureau of Standards we have now examined five methods of field testing aerosol products. Two of these methods are based on investigations by Mr. Jensen's group, two are based on procedures which our industry has developed, and one is based on a development by the Canadian Manufacturers of Chemical Specialties Association. Except for one, all of these methods have been an attempt to approximate consumer usage without being so literal as to duplicate the time the product might be in the consumer's hands.

Our studies to date have been confined to aerosol foam products, primarily shaving lather. Selection of this particular type of product was intentional because both groups recognized it as a difficult product to discharge completely. Equally pertinent was the fact that shaving lathers were the first products picked up by State inspectors for alleged short weight. As a result of our joint studies which include tests by many laboratories on hundreds of foam-type aerosols, we may be close to a method which will allow your inspectors to examine aerosol shaving lathers in a reasonably short period of time. Because of the nature of the product, one cannot remove the entire contents of an aerosol shave lather; however, when properly used, most aerosols can be discharged to the extent of 97 to 99 percent of the contents. Thus, the last few percent of the stated label weight which cannot be removed can be compensated for by overfilling.

Our aim is to demonstrate that an aerosol package such as shaving lather can be generalized for all brands and a given factor established for a particular product. This will permit an initial screening procedure and provide some indication as to whether the container is short weight. This factor will be some numerical percentage or fraction of overfill based on the stated label contents. By following a prescribed procedure for emptying the containers, it is hoped that a State inspector will be able to quickly empty the contents of an aerosol shaving lather, apply the stated factor to the difference in weight between the full and emptied container, and arrive at a figure which can be checked against the stated label contents.

In many ways it is discouraging to realize at this point that it has taken us at least six months of working in cooperation with the Bureau of Standards to even come close to a method for one single aerosol product. This would not be of great concern if it were not for the fact that the number of different types of aerosol products exceeds three hundred. Obviously, we cannot treat each of these products as we have shaving lathers. Fortunately, many aerosol products are suffici-

ently similar that one method will probably apply to a great number of them. For example, many of the spray products based on formulations of relatively low viscosity will probably all adapt themselves to the same procedure. Perhaps such large-volume products as hair sprays, room deodorants, colognes and insecticides will fit this category. The problem facing our industry, however, is that first we must develop a procedure which will be acceptable to the States and fair to the marketers of all these products. Each marketer will certainly wish to check his own product against any method, and I am almost certain that because of packaging or formulation uniqueness, some marketers are going to find that the particular method selected will exert an unusual hardship on them. This invariably seems to be the case, and here is where the Aerosol Division of CSMA, in attempting to serve the technical needs of its many members and their multitude of products, finds itself many times in an extremely difficult position. It is virtually impossible to find methods which will not be unfair to even a small segment of marketers. Even a compromise does not always solve the problem, but perhaps State regulations will be made flexible enough to permit a marketer with a unique package to comply or obtain an exemption without having recourse to the courts to prove that his package, when used as directed, will deliver the stated weight.

To cite another example of a difficulty I feel we are facing, let me say a few words about aerosol paints. Incidentally, you might be interested in knowing that 113 million cans of aerosol paint were produced in 1963. The total for all types of aerosol products was over a billion. Considerable technical effort goes into the formulation of a good aerosol paint. Many factors are involved which do not arise in conventional brush-on paints. The result is that each aerosol surface-coating product, be it paint, lacquer, or enamel, is likely to be a unique formulation. The amount which can be delivered from a specific container under prescribed conditions of use will not be the same as another formulation in exactly the same package. Without elaborating further, we believe that if some sort of overfill factor is to be used for paints, the factor at best might be limited only to a specific color within a given class of surface coatings. It is obvious that neither the States nor the aerosol industry could live with a set of factors for every color of lacquer, every color of enamel, and every color of paint.

Recognizing that aerosol paint may be a more difficult product for which to develop an equitable test procedure, we have a committee actively working on the problem. I believe the group at the Bureau has also initiated effort in this direction. Hopefully, our joint efforts will lead us to a satisfactory solution as I believe the study on shave lather is rapidly approaching. Much of the knowledge we gain in the study of one product can be applied to the next. Thus, as our studies progress, we should find the task increasingly less difficult.

Many members of our industry believe that it is a mistake not to base labeled contents on a dry-tare method. I am perfectly aware that this statement raises a red flag, but I believe it only fair that I be allowed to state the majority opinion of our industry members on this subject. Our conferences and discussions with many of you have convinced us, however, that we must seek a compromise. Mr. Jensen has been most helpful in explaining the States' position and problems to us. A cooperative effort is the only solution, and the leaders in our industry are behind this effort.

We recognize that we must live with problems which you have. Therefore, the Aerosol Division of CSMA is most anxious to be a part of the work which your technical people are doing to develop methods to be used by State inspectors and we are appreciative of the opportunity. As a responsible industry of many segments, we do not want procedures forced upon our members with no opportunity to offer our own recommendations. The cooperation we have had with the Bureau in the few months that this study has been in progress has indeed been refreshing and given us the opportunity to work out the answers to the problem. We want to make every effort to see that it continues, and I am convinced that ultimately we can develop test procedures which will be acceptable to both industry and Government for the billion or more aerosols produced in this country. It is suggested that whatever testing procedure is finally adopted for aerosol shave lather should be adopted on a tentative basis for one year. This would give both the States and the industry the chance to work out any "bugs" that may result from applying that testing method in the field. In the meantime, we and the Bureau can work along together on field testing methods for other products. Having been close to the problem, I am aware of the many difficulties that face us; and I plead for your patience in allowing us to carry this investigation through to an intelligent conclusion.

Gentlemen, this concludes the prepared paper which I have. However, I would like to make a few more pertinent remarks.

Only this morning we learned with considerable surprise and dismay that the Final Report of the Committee on Laws and Regulations provides a recommendation that Section 3.1. of the Model Regulation contain the following proviso: That the declaration of quantity of an aerosol package shall disclose the net quantity of the commodity, including propellant, that will be expelled when the instructions for use as shown on the container are followed.

To enact this proviso at this time when there are no acceptable test methods, as both the Bureau and our industry reports today have indicated, would be to create a condition of chaos. Each State could act on its own without uniformity, with the result that neither your State inspectors nor the industry would know what to do or how to do it.

We can only plead again that this proviso not be enacted at this session and held in abeyance until our cooperative work with Mr. Jensen's staff is concluded.

DISCUSSION OF FOREGOING ITEM

K. Gullege: How soon can we expect aerosol products to be uniformly labeled on the basis of weight? That includes so-called dairy products.

Dr. Reed: As far as I know, all products should now be uniformly marked on the basis of weight. Presumably those who are now marketing products and not marking them on the basis of weight simply are not complying with the existing regulations.

Mr. Gulledge: Do you have a suggestion as to what the local man should do when these packages are labeled by a liquid volume and the State law does not specify it?

Dr. Reed: All I can say is that, as Mr. Peterson pointed out here four years ago, the aerosol industry desires that products be marketed

on the basis of weight. We have so stated our position, and many States have accepted this position, and passed regulations to that effect and, frankly, it is hard for us as an association to be particularly sympathetic to those who do not want to go along with this. However, you must remember that, as an association, we have no legal arm of any sort that can force people to mark a container the way the majority of the association feels the container should be marked, but I feel that, as a regulatory agency, you have the privilege of doing whatever you see fit to make them comply with what existing regulations you have.

(Following the discussion of packaged aerosol products, the Report of the Committee on Specifications and Tolerances was presented by R. E. MEEK, *Chairman, Director, Division of Weights and Measures, Indianapolis, Indiana*, and can be found beginning on page 179.)

AFTERNOON SESSION—THURSDAY, JUNE 18, 1964

(D. M. Turnbull, Chairman, Presiding)

MODERN WEIGHTS AND MEASURES TECHNOLOGY

by W. C. Hughes, *Chief Administrative Assistant, Division of Standards, Department of Labor and Industries, State of Massachusetts*

Modern, accelerated technological advancement in all facets of human endeavor is reflected all about us. Even in the simplest accomplishment, the pattern of automation is present. In our own chosen field, the mechanical phase governing the manufacture and use of weighing and measuring devices has not benefited from technological advancement as rapidly as has other segments of industry. We who have been closely associated with weights and measures for a period of more than thirty years administered through a period when technological changes in the fabrication of weighing and measuring devices were virtually nonexistent.

The first notable advancement in this field was in volumetric measuring devices, where we witnessed the evolution from the 1- and 5-gallon bucket to the 1-gallon, 5-gallon, and 10-gallon piston pumps, thence the installation of the nutating disk-type meter with the visible register, the conversion of hand-operated pumps to operation by air and electric motor, thence the substitution of the meter and register as the measuring and recording mediums. These earlier automatic systems, indeed, left much to be desired in the permanency of accurate measurement. However, they did represent the initial movement in the progressive advancement to the present-day highly accurate volumetric-measuring devices used in dispensing petroleum products accurately at rates of flow ranging from 0.05 gallon to several thousand gallons per minute.

The present-day trend, particularly in the dispensing of petroleum products at wholesale, is toward complete automation, with the involvement of electronic technological principles as the basis for all determinations and recordings.

The dispensers of motor fuels at retail level do not reflect any mechanical revolutionary change in the past decade. However, the lack of visible indication of further progress in this regard cannot be interpreted as a static attitude on the part of industry. We who have attended annual conferences some years ago had the opportunity to see proposed methods of dispensing at retail for the future. We know that the petroleum industry does not regard present-day methods of dispensing gasoline in filling stations as either desirable or adequate. The cumbersome pumps and islands contribute to unnecessary delays and accidents. They appreciate the fact that there is room for considerable improvement; likewise, manufacturers of dispensing equipment unquestionably have had on their drawing boards and in their experimental laboratories technological possibilities which will revolutionize methods of dispensing motor fuels at retail.

The technological advancement in scale design and construction lagged considerably behind the advancements accomplished in the dis-

pensing of liquid products, and it is only now that the real surge in the application of modern technology in the fabrication of weighing devices becomes evident and to some degree exciting.

Automatic prepackaging scales involving electromagnetic, electronic tube, and transistor principles have come into use during the past decade.

We, too, are witnessing the employment of load cells to replace lever systems in scales. There is also the growing use of the lever and load cell combination.

Of course, our reference here relates only to the more conventional devices but represents a welcome step in progress. These devices have presented some problems. Certain weaknesses in the components used in the fabrication of the assembly have become evident in the field, resulting in serious errors and creating situations which might have resulted in the prosecution of innocent people.

We will not deal with names, for such would be unfair and contribute nothing to evaluation of the subject matter. However, I do believe that it is interesting to cite incidents to substantiate statements made in the course of this address.

There was an instance involving a large chain store where a particular meat item bore a total price considerably in excess of the correct price. It was evident that there had been a deficiency in the mechanics of the scale as the weight and price per pound were correct. Yet, upon test, we could not again get the same determinations by repeated tests. The scale continued in use and some two weeks later, the store manager contacted us to advise that the scale had again computed wrongly. Investigation provided information that the error was at only one price per pound and did not always occur but at certain periods would compute each and every package at that price per pound in excess of the correct price by a considerable amount. When a very cooperative manufacturer was contacted by a long-distance phone call, he just could not conceive of such a condition occurring and requested that we mail him for perusal some of the price tags. As a result, an expert from the factory was dispatched to the store where it was discovered that there was a failure of one of the components in the assembly which resulted in the intermittent inaccuracy.

We had another case where an inspector submitted a report where a great many instances of serious errors were present. This was a different situation. Computations were right at the price per pound for the weights indicated, but represented overpricing because the weight was inaccurate. This situation was, indeed, disturbing.

The inspector, in addition to filing his written report, phoned to state that he had checked this particular outlet many times, and it was difficult for him to believe that they were operating; in other words, that it was intentional. In reviewing the report we could not reconcile our feelings with his. We, therefore, scheduled a hearing to determine reasons for the errors. Bear in mind, our inspector had spent considerable time testing this scale at all points and found it accurate within prescribed tolerance. The hearing was held, the store manager appeared and could give no plausible excuse for conditions found by our inspector. He stated that the scale mechanic made tests and that there was no evidence of mechanical difficulty which would account for the errors. In conversation with the manager, he impressed us by his candor, yet we had a record of gross errors before

us to adjudicate. Before the hearing was concluded, we called the scale company in question and talked to the service manager who frankly stated that there was nothing that could go wrong with the scale which would cause such a condition; that rather, had it been a failure or a weakness in one of the electronic tubes, the inclination would be underregistration as the impulses would be fewer. The manager was apprised of our phone conversation and we suggested that he contact the utility company and have them check the voltage in his store. He called back the next day stating that this had been accomplished and that the voltage was adequate and constant.

Our inspector went back and made further inspections and found things in good condition and the assembly apparently performing accurately. In the meantime, the matter of prosecution was held in abeyance, for which we are now most thankful.

Some ten days later the manager called our office to state that the scale was again wrong and that he had discontinued use immediately so that observation could be made by scale mechanics. This time they did find the trouble, and from top echelon of the company we were advised that this condition had never evidenced itself before and that they just could not conceive of such resulting in overregistration rather than underregistration.

More recently, we have had another condition where, again by a considerable lesser amount, we found disturbing variances where a package on successive weighings would vary by as much as 0.03 pound plus or minus from the true weight on successive weighings. Again servicemen said that they could find no trouble with this scale but replaced it because of our findings. Later we were notified that they did find the trouble and again it was failure of one of the assembly's components.

We had another instance in relation to a large-capacity scale employing load cells. The scale had been purchased by a municipality and installed in the yard at their electric generating plant for the purpose of checkweighing fuels. We were called upon to make accuracy tests of this scale and these tests were continued periodically over a period of three years before the scale could be sealed. Adjustment would be made to the load cells and to the recorder but would not hold for more than a 24 hour period. The scale mechanic was a good mechanic but not an electrical engineer, nor had he too much experience in the field of electronics. He was given a handful of resistors and a soldering iron to replace the hammer and wrench. I do not wish to be critical of the company that made the installation as they were most cooperative, and I am sure that they must have lost a considerable sum of money before the scale could be finally accepted and paid for.

Various theories were advanced by different engineers who were called from various sections of the country. Some contended that sharing a common ground with an aluminum company resulted in fluctuating errors. Others attributed the condition to the proximity of the installation to the generating plant. Finally one engineer apparently found the trouble which was diagnosed as intermittent voltage fluctuation in the cables. It was alleged that the cables themselves were faulty.

We experienced a somewhat similar situation in the installation of another manufacturer using similar electronic principles. Tests of this particular installation were over a period of many months, and

I am told the fluctuations were the result of damage which occurred by flooding as the result of an unusual high tide. Whether or not this was the cause, we do not know. We do know that after many hours of work by the company's mechanics and at great cost in man-hours to the city involved and the Commonwealth, correction was accomplished.

These instances cited do not represent the involvement of the many unusual weighing and measuring devices used in industry.

We recently received a call from a manufacturer in this Commonwealth who manufactures automatic pneumatic weighing and measuring devices. He was concerned because his products were so specialized that few, if any, of the principles in the conventional weighing and measuring devices were involved and therefore H44, by way of specifications, etc., could not offer much of a guide; and yet, he expected to be confronted with type-approval requests in several jurisdictions. We were unable to assist this manufacturer so referred him to Mr. Jensen at the Bureau for advice and possible relief.

Unquestionably, many of you present have experienced similar situations which might well raise the question as to whether or not the present method of providing a code for weighing and measuring devices is sufficient to keep abreast of the rapid technological changes we are witnessing. It would appear that there is need for revision of present methods of providing specifications, regulations, etc., governing the manufacture, sale, testing, and use of weighing and measuring apparatus. Present requirements do not provide for standards of quality for components which constitute many assemblies.

Likewise, there is need for greater study and facilities to perform adequate inspection and tests of the various components used in the fabrication of a device. These determinations should be made only on the basis of sound engineering principles with recommendations for correcting inadequacies.

It is probable that segments of industry as well as governmental agencies would benefit greatly by a revision of the present methods of establishing codes, as there would be fewer delays in providing added requirements when necessary.

We are of the opinion that the present technological advancement in the fabrication of weighing and measuring devices is to be accelerated, and are frank to admit that presently we are not equipped to evaluate the merits of some of the devices which will be submitted to us for consideration, nor are there adequate codes established to guide us in making such decisions. We recognize the fact that the demands of industry for trained technologists are such that we cannot compete for their services either on full- or part-time basis as they can demand and receive remuneration more attractive than provided for in municipal or State budgets. There too is a question as to whether or not it would be sound economics for States and municipalities to spend moneys for duplication of effort, in providing for needed facilities and personnel, to properly cope with the challenge of progress in this technical field.

Could we not place with the National Bureau of Standards the task of establishing codes after consultation with the technologists of the particular industry engaged in the manufacture of the devices under consideration? Would not such a procedure add strength to the

administration of weights and measures at State and municipal levels, rather than detract from present status?

It probably will be argued that such would be the initial step toward national pattern approval. I think that it might well be and, as a representative of an approval State, feel that such might be acceptable if it provided for constructive progress rather than a mere substitution of authority.

None of us is so naive that we cannot foresee a distinct advantage in accepting a weighing or measuring device for accuracy determination on the basis of its having been evaluated and approved by the National Bureau of Standards; or conversely, in refusing to accept a device which has been rejected by the Bureau.

Unquestionably, many of us have felt that it was our duty jealously to guard and keep all the prerogatives of the States in the administration of weights and measures. This is the natural instinct of intelligent men. However, if by acquiescence to a change, our position is strengthened, that too is an intelligent act, not retreat.

I vividly recall a speech made by the great statesman, Winston Churchill, in 1942 in which he said: "I have not become the King's First Minister in order to preside over the liquidation of the British Empire." I am sure that at that time Mr. Churchill had no inclination that His Majesty's Empire would be so soon and completely liquidated and that, had he been of that mind, the Old Master would have exercised his usual intelligent and fearless approach to the problem which would have savored more of compromise and diplomacy rather than defiance.

With the opening of the Bureau's complex at Gaithersburg in 1965, would this not be the time to consider progressive changes in formulating the weights and measures code and to provide for the elimination of undue delays and the establishment of regulations entirely on the basis of good engineering procedure and practicability?

The thoughts as expressed here do not represent an unequivocal endorsement of any specific change in the administrative weights and measures setup but rather a sincere belief that if we are to progress, we must recognize the need for changes to keep abreast of the times.

ADDRESS

by R. H. Holton, *Assistant Secretary of Commerce for Economic Affairs*

I would like, if I may, to take a few minutes to discuss with you the President's Consumer Affairs Program and how it affects the business community and how the business community might possibly respond to this increased concern about consumer problems. It is a concern with which the people across the country who are involved in the general area of weights and measures obviously need to be deeply interested.

Someone suggested that it might be worthwhile for me to spend just a few minutes indicating what sort of a role I play in the Department of Commerce, and why it is that the Department of Commerce has anyone involved in the Consumer

Affairs Program in the first place. So let me say very briefly what my role is in the Department.

In 1962, when I first talked with Secretary Hodges about the role of economic affairs in the Department of Commerce, it was pointed out to me that when he came in with the Kennedy Administration in January of 1961 he was quite impressed with the fact that the Bureau of the Census and the Office of Business Economics in the Department of Commerce generate a very high proportion of the economic data used by the Council of Economic Advisers and others in the Administration concerned with the formulation of economic policy. He found, nevertheless, that in the past, for some reason or other, the Department of Commerce had never really been a full-fledged participant in many major policy discussions.

The Secretary thought that it was important for the Department to have a professional economist at a high level so that he would have a better liaison between the Department of Commerce and the Council of Economic Advisers, and economic policy staffs in other agencies.

We hope now that we do have a means of making the Department of Commerce more effective in the discussions of general economic policy problems in the Administration. I am the Secretary's backup man, so to speak, on such things as the Cabinet Committee on Balance of Payments, which consists of a number of the Cabinet officers. In addition, we are working on such things as the economic impact of defense and disarmament, on the Labor-Management Advisory Committee, and in many areas of general economic policy in which the Department of Commerce can now be, I hope, more effectively represented than was the case in the past.

When President Johnson appointed Esther Peterson as his Special Assistant for Consumer Affairs, he also set up his Committee on Consumer Interests, with Mrs. Peterson as chairman. He asked Secretary Hodges for an appointee to this committee at the Assistant Secretary level, and the Secretary asked me to serve in this capacity.

I found this assignment to be particularly interesting as well as time-consuming, I hasten to add. There is clearly a wide variety of problems that we have to face in the consumer area, and I must confess that it is not yet clear how we can best cope with some of the major difficulties that now face consumers in the United States.

One of our basic principles has always been that we are obviously best off operating our economy under the free enterprise system. However, when one asks just what is meant by "freedom," a number of problems arise. Clearly, freedom for one man can mean a restriction of freedom for another man. For example, a traffic light restricts the freedom of the motorist, but it gives the pedestrian a freedom from undue danger as he tries to get across the street. In other areas as well one finds that governmental restrictions of various sorts, when examined carefully, are, by and large, restrictions on freedom instituted in order to provide a greater degree of freedom or to assure freedom for others in the market place.

I am thinking, for example, of the antitrust laws. There, the freedom of the businessman to collude on price fixing or to establish a monopoly is restricted. Why? Because we want to have freedom for all businessmen to enter the market. We want to maintain this kind of freedom, so that we can continue to have a dynamic economy.

Competition, which is our basic guideline in the United States, certainly needs a fair number of rules of the game. Rules concerned with weights and measures are some of the basic and perhaps oldest of these rules of the game. These rules of the game are established not only at the Federal level but at the State and local levels as well. Perhaps in any complete compendium of legislation that affects business, one would find that State and local laws may be at least as important as Federal laws.

Businessmen, economists and political scientists, and others interested in public regulation of business generally seem to emphasize one or the other of two points of view. By "public regulation" here I mean to include the antitrust laws, labeling laws, the proposed requirement that the annual interest rate be indicated in all installment credit buying, and legislation regarding weights and measures. The one point of view is concerned about the efficiency with which the market works at any one point in time. The other group is fearful that regulation will inhibit initiative and the development of new products and processes over time.

The presumption on the part of the people who promulgate additional regulation is that the additional regulation is necessary to improve the efficiency of the marketplace. For example, the Douglas Bill, referred to as the "truth in lending" bill, calls for a clear indication of the annual rate of interest on installment contracts. The people who favor this bill feel that in order to maintain competition in the market for money you must have some indication of the cost of borrowing the money. The people who back the Douglas Bill believe that a person buying an automobile on credit, for example, ought to be able to see what the annual rate of interest is if he finances the installment contract with the automobile dealer. He needs this information so that he can see whether it is costing him more to borrow money from the dealer than it would cost to borrow money from the bank and then pay cash to the dealer. Of course, there are other lending organizations as well with whom the buyer might want to check—the credit union, a finance company, etc.

The people who would argue that the "truth in lending" bill is an important bill, needed for improved efficiency of the economy, would argue that if you are going to have full-fledged competition in the credit market you need to have something like the Douglas Bill, which would insist that borrowers know what the alternative interest rates are, what the price of money is, so to speak, from the various firms that are competing to lend the consumer money.

The opposing point of view is held by those who argue that Douglas "truth in lending" bill and other measures for the regulation of business are generally likely to discourage some of the technological change or changes in marketing and distribution practices which have been responsible for continuously raising the standard of living of the American people—especially if the regulations would lead to standardization.

It is quite impressive that just since 1929, which after all wasn't so long ago, personal income per capita in the United States, after correcting for price changes, has doubled. Along about January of this year, personal income per capita reached this mark. We are now just twice as well off as we were in 1929.

We don't want to do anything to disturb the kinds of changes that have made it possible to bring the people of the United States to the point where we are today.

There are these questions then about whether or not additional regulation of business in the United States would kill off or retard this rate of technological change.

One of the difficulties we all face as citizens in trying to assess the true impact of regulation is in trying to evaluate the arguments offered by businessmen when they question certain proposals for additional regulation. I heard just today of a wonderful quotation involving Harold Ickes. During the war he was faced with substantial opposition from the oil and gas industry to some regulations he wished to establish, which were intended to assure the armed forces of getting enough gasoline. Ickes in testifying said to the industry, "You are draped in the cloak of righteousness, but you are clothed in the undergarments of self interest. The Army's tanks and trucks cannot run on your crocodile tears."

One must always consider in public debate to what extent the arguments that are offered by the interested parties—and which are always offered, of course, as being arguments why the public interest would be damaged if the alternative route were taken—one always has to look behind this curtain to ascertain just what the impact of self-interest is here.

This general question, the extent to which regulation—and I am talking about regulation in virtually any field one can think of—would improve the efficiency of the marketplace more than it would inhibit technological change and the improvement of business methods generally is a very difficult one. As we consider any extension of regulation we have to do a particularly careful job of determining just where the public interest lies.

In the Consumer Affairs Program, I feel that the business community has a very, very deep interest. They should not be concerned, I feel, about any extension of Federal regulation involving consumer affairs. It seems to me, after participating now in two regional conferences on consumer affairs, that the principal problems involving consumers are not necessarily problems which can be handled very well by further extension of Federal regulation.

It is rather impressive, it seems to me, that the most common complaints which consumers now have fall in three or four areas: First of all, in the area of home repair and improvement services, where they feel that the firms that come in and offer to put on a new roof or put in a new driveway too many times are quite unreliable.

The second most common kind of consumer complaint, I am told, has to do with appliance repairs. I am sure you are all familiar with this problem.

A third common kind of problem has to do with insurance—medical insurance, life insurance, etc.

I think it is rather curious that these are really services. They are not packaged products where weights and measures are necessarily a problem, but rather fields in which it may be very difficult indeed for even State and local governments, to say nothing of the Federal Government, to exercise any kind of policing to solve these problems.

Some communities, I am told, have instituted plans under which appliance repairmen are licensed by the community. Perhaps this is

one way to solve this particular problem. But what do you do about the case—and I heard this in a small midwestern town I visited ten days or so ago—where a salesman hits town with a new life insurance contract, a misleading one, written by a company no one has heard of. He sweeps through town and sells I don't know how many policies. Obviously he has bilked the consumers. How do we get on top of that particular problem? This is a very real challenge, it seems to me.

Even when we go back to physical commodities, as distinct from the services, I think we have a problem.

I have been asking myself what might be the distinguishing features of the goods for which the consumer can be an intelligent buyer, and what are the distinguishing features of the goods for which intelligent buying is most difficult. I think that, in general, it may be accurate to say that for those items which the consumer buys frequently and for which the quality characteristics are quite apparent to him, he can be a reasonably intelligent buyer because he can do a reasonable job of testing for himself over a fairly short period of time. At the other end of the spectrum, however, are commodities which are bought infrequently, which have quality characteristics that are not apparent to the buyer, and for these commodities the consumer may have a great deal of trouble being an intelligent buyer.

At that end of the spectrum, I am thinking of automobile tires as being a case in point. Suppose you want to be a really intelligent buyer of automobile tires. How do you go about it? You can't tell whether the tire is good or bad by looking at it. It is all wrapped up in that paper anyway, and even if you could get a good look at it what could you tell about it? The fact that you can't tell much about it, I think, is indicated by the testing that was done a few years ago by one of the consumer magazines. They found that the cost per 10,000 miles of tread wear—and they bought these tires not just at list price but at the lowest price at which dealers could offer them—ran from about $7.70 to $19.80. Here is an area where the consumer may be in a real jungle.

I wish I had some nice pat solution to offer as to what we might do in this particular area where we may well need additional standards. I think it is rather interesting that the National Tire Dealers and Retreaders Association has presented before Congress a bill which would call for Federal standards in the automobile tire field, in recognition of the fact that it is so very difficult in this particular area to educate the consumer in understanding the quality of the goods he might buy.

With appliances as well, one can ask just how much can the consumer know about the quality of the goods which he might buy. Certainly he has advertisements, but the advertisements, after all, tell him presumably only about the more attractive features of the product. They don't tell him about some of the less attractive features of the product *vis-a-vis* the competition. The advertisements, furthermore, don't give any indication as to the durability of the item relative to the competition. Here again the consumer knows relatively little about these products.

I think what we need here is to have manufacturers and retailers re-examine everything they are doing in the way of making consumers into intelligent buyers. As I have indicated, I am not sure that the remaining consumer problems in the United States can

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necessarily be solved very satisfactorily by Federal regulation beyond that already proposed in Congress. Instead, I think it is more a matter for the trade associations, for the better business bureaus, for improved enforcement of State and local regulation, and for improved enforcement of Federal regulation. But this whole array of efforts, I think, is needed in order to ascertain precisely how we might proceed with this general problem of improving the efficiency of the market. This really calls for improving the information and increasing the amount of information which consumers have when they go about making their purchasing decisions. If we can improve that information—and certainly the kinds of refinements that are suggested in the "truth in packaging" bill, for example, the Hart Bill, with which many of you are familiar—this kind of thing I think may be necessary if we are to have the market for consumer goods operate with the kind of efficiency which assures the people of the United States a continually rising standard of living.

(The Report of the Committee on Nominations was presented by C. H. STENDER, *Chairman, Assistant to the Commissioner, Department of Agriculture, Columbia, South Carolina,* and can be found beginning on page 203.)

(The Report of the Committee on Resolutions was presented by L. BARKER, *Chairman, Commissioner, Department of Labor, Charleston, West Virginia,* and can be found beginning on page 204.)

(The Report of the Committee on Laws and Regulations was presented by J. H. LEWIS, *Acting Chairman, Chief, Weights and Measures Section, Department of Agriculture, Olympia, Washington,* and can be found beginning on page 192.)

MORNING SESSION—FRIDAY, JUNE 19, 1964

(D. M. Turnbull, Chairman, Presiding)

PROBLEMS, PROCESSES, AND PROCEDURES

(1) Aerosol Package Demonstration

presented by H. F. Wollin and S. Hasko, *Engineers, Office of Weights and Measures, National Bureau of Standards*

(Mr. Wollin and Mr. Hasko explained and illustrated two experimental procedures that have been developed for the checking of foam-type aerosol products. Both procedures were developed on the basis of package-checking methods described in NBS Handbook 67, *Checking Prepackaged Commodities*, and were reported to the Conference as a progress report in the development of aerosol package-checking methods.)

(2) Mechanical Displacement Meter Prover Systems

by J. C. Halpine, *President, Halmor Industries, Inc., Tulsa, Oklahoma.*

Each day, throughout our Nation, millions upon millions of gallons of gasoline and oil are moved through an invisible system of pipelines that is as intricate as our national and State highway systems.

Men force elusive raw oil from the ground at great expense, collect it, store it, process it, only to put it back in the ground in hidden pipelines which may carry the oil to the next county or across the entire continent.

At its destination the oil is again brought from the ground, stored, and processed. The refined oil is then sold to an ultimate consumer, John Q. Citizen, who buys a few gallons of gasoline, a quart of lubricating oil, or a pint of hydraulic fluid for his automobile, tractor, or boat. Or the consumer may be a large industrial concern buying thousands of gallons of gasolines and fuel oils for powering fleets of aircraft, trucks, or ocean-going vessels.

Wherever transfers of custody of the gasolines or oils occur, some means of measurement is employed to determine what quantity of the fluid is being received by the buyer and delivered by the seller. Some of these measurements are included in the scope of this Conference, and therefore it is my purpose briefly to describe the history, operation, and application of a recent development by the petroleum industry for making test checks on liquid-measuring devices utilized by the petroleum and other industries.

This development, the high-speed positive displacement meter prover, provides a rapid, economical, and practical means of determining accuracy and performance characteristics of liquid-flow meters now commonplace in the petroleum industry, the milk industry, the brewery industry, the liquid fertilizer industry, and the chemical industries.

Only a few decades ago, when a farmer could strike oil while digging fence post holes, and when oil storage tanks looked like the

country store cracker barrel, fluid measurements were made with a notched dipstick. Today the raw crude oil is not as readily accessible and markets are more competitive. Therefore, all concerned keep a close watch on the volumes of gasoline and oil during transfers of custody. After the notched-stick method of measurement came the gage line, which resembled a plumb line with graduated increments. Before a shipment of gasoline or oil was made from a tank, a gage line was lowered into the tank manually, then pulled out, and the level on the gage line was read. This procedure was repeated after the shipment was made. Thus, was it determined how much fluid had been transferred from the tank.

This method was more satisfactory but also introduced a source of human error into the measurement and, as petroleum operations grew to vast proportions, the number of field personnel required to perform all the gaging operations became uneconomically large.

The most satisfactory means yet devised, for both accuracy and economy, has been the introduction of the liquid-flow meter.

The flow meter is designed to provide, by mechanical means, a cumulative reading of the amount of fluid passing through it. These meters are commonplace in service stations, bulk loading terminals, and on truck transports across the country. They are also widely used in refinery and pipeline operations.

A flow meter is installed in a piping arrangement so it becomes a part of the pipe or tubing and, if any liquid flows, it will be forced through the meter and registered. Flow meters provide reasonably accurate measurement and also eliminate the necessity of repeated, time-consuming hand measurements.

Most flow meters are simple, efficient, and reliable, but they are nevertheless manmade devices and therefore not 100 percent accurate. The most frequent cause of loss of accuracy can be attributed to mechanical wear of the meter parts, particularly those parts which contact the fluid.

After tests and in-service experience, it was concluded by users in the petroleum industry that some means must be devised to determine the degree to which meters are inaccurate.

The first device and, until a few years ago, the most common device used, was the volumetric prover. This particular name was chosen because one of the definitions of the word "prove" means to "establish or ascertain by experiment." This is exactly what the prover was designed to do—ascertain the accuracy of the flow meter.

The volumetric prover was used, with variations, in this manner: Fluid was passed through the flow meter and then into the prover. When the prover was full, the level of liquid was read. The volume in the prover was compared with the volume registered by the meter. This comparison made it possible to determine the accuracy of the meter reading.

Accuracy obtainable with the volumetric prover was greater than by any previous method, but, in almost all areas of the petroleum industry, companies are preferentially changing to the use of the positive displacement meter provers.

From all indications, the most obvious reasons for the growing acceptance of the positive displacement meter prover can be found in its very principle of operation. This type prover makes rapid testing of a meter possible while the meter continues its normal measurement

function. The prover method is slower because it requires that the prover be filled, the meter started, the meter stopped, the prover and meter volumes read, and then the prover must be drained and the procedure repeated until satisfactory and adequate data are gathered.

Because the piston pipe prover was developed by petroleum industry pipeline personnel with pipeline equipment, it would be well at this point to offer a few explanatory notes on the background and terminology of the equipment which comprises piston pipe provers.

After months and years of use, the internal walls of pipe can become coated with foreign matter and scale. With certain fluids, this buildup can increase to the point that only a trickle of fluid can flow through the pipe.

Pipeline personnel devised a simple but effective device to remove this scale periodically from the inner walls of their pipelines. This device, called a piston, consists of a cylindrical metal body, fitted with wire brushes or rubber scraping cups. The piston was launched into the pipeline at one point, carried along inside the pipe by the fluid stream, and then was removed from the pipe somewhere downstream of the launching point.

As the fluid carries the piston along, the brushes or scraper cups scrape the inner walls and loosen the scale. The scale is then carried along and removed from the fluid in filtering systems or settling tanks.

Development of a heavy-duty, thick-walled, inflatable spheroid provided another type of piston for this application, and also played a major role in the development of the piston pipe prover. The spheroid could be inflated to a diameter larger than the inside diameter of the pipe and, when forced down a pipeline, would scrape the walls clean of foreign matter.

Another useful purpose which the cylindrical and spherical pistons served was to separate batches of different fluids in shipments in the pipeline systems. The placement of pistons at the end of each batch of fluid minimized the amount of intermingling of two dissimilar fluids.

The First Piston Provers

The first type of piston prover, developed about 12 years ago, utilized one of the pistons just described. The prover consisted of a section of pipeline, sometimes one mile long, through which a piston was sent. Two mechanically actuated electrical switches were installed on the pipe in such a manner that the passage of the piston inside the pipe would actuate the switch mechanism. These switches were in turn wired to a start-stop device on the counting register of a flow meter in the pipeline.

The volume of the pipe between these two switches was determined as accurately as possible. This section of the pipeline, between the two switches, was known as the calibrated section. This rudimentary prover system was used in this manner. A piston was launched into the pipeline downstream of the flow meter but upstream of the calibrated section. When the piston inside the pipe carried by the stream encountered the first detector switch, an electrical mechanism was triggered which initiated registration of the flow by the flow meter counter. The meter registered the quantity of fluid passing through it until the second detector switch was actuated by the piston. This switch stopped the meter counter.

The calibrated volume of the pipe was then compared to the quantity indicated by the meter. The relationship between two volumes, the "metered volume" and the "calibrated volume," represented the accuracy of the meter. This mathematical ratio of volume to volume enabled the calculation of a "meter factor" which could then be used as a multiplier or correction coefficient for future shipments through that meter.

Perhaps an example would best illustrate the application of the meter factor as a multiplier.

Assume the volume of the calibrated section of pipe was known to be 10,000 gallons. During a typical proving operation as just described, the meter counter indicated that 9,950 gallons passed through the meter. The relationship of these two volumes indicates that only 99.50 percent of the true quantity of the fluid passing through the meter was measured.

Therefore, with this meter, under conditions as they were at the time the meter was proven, any quantity of fluid indicated by the meter would have to be increased to the true quantity by use of a multiplier larger than 1.0000; in this example, by a multiplier of 1.0050.

Advantages of the Piston Prover

It can be seen from the preceding example that the meter to be tested continues its normal measurement function without interruption, under the normal operating conditions of temperature, pressure, and flow rate. Similar provings can then be made periodically to trace the meter's performance.

However, it can also be seen that there were inherent disadvantages of this early type prover system. The improper adjustment of the electrical switches could introduce error into the measurement. Also, the operator had to launch the piston manually, retrieve it downstream at a point sometimes a mile away, then return to the launch site and repeat the operation.

Later developments in the design of the type of prover just described made it possible to use curved sections of pipe and a spheroid which meant the piston could be launched and retrieved at the same site.

But the error due to the maladjustment of the switches remained. In practical terms, this meant that the calibrated volume could be altered by a change in the switch position or adjustment.

Development of the Bidirectional Prover

At this point the high-speed bidirectional meter prover was developed. Through means to be discussed later, this prover system made it possible to reverse the direction of travel of the liquid inside the prover system. Thus the piston could be forced through the calibrated section, in either direction at will. Control of the piston in this manner successfully eliminated the problem of the detector switch error, because if there were any error or discrepancy in the action of detector switches in the first pass of the prover piston, the return trip of the piston, in the opposite direction, permitted the switches to commit the same error, but in reverse sequence, thus averaging or cancelling out any significant error.

Advantage of the Bidirectional Meter Prover

Now, before beginning a technical discussion of the operation and application of the meter-prover system, it would be well to list, in collective form, the advantages of the bidirectional meter prover, which are responsible for the already widespread and growing acceptance of this system by the petroleum and other industries.

A flow meter may be tested under its actual operation conditions of flow rate, pressure, and temperature without interruption to the normal measurement function of the flow meter or disruption to the metered stream, in a shorter period of time than by any other method, and with a degree of accuracy heretofore unobtainable.

Discussion of Flow Meters

Any discussion of flow meter calibration devices should include at least a brief mention of the flow meters themselves. The two most commonly used by the petroleum industry are the positive displacement flow meter and the turbine flow meter.

Both types have one common characteristic that differentiates them from any other flow-measurement method. They both are mechanical devices that achieve rotary motion that is proportional to the rate of flow through them. These meters not only indicate revolutions, and thus flow rate, but also indicate totalized flow for any period of time by the number of revolutions of the meter rotor as shown on the meter's counting register.

The Positive Displacement Meter

The positive displacement meter is a device installed in piping by which flowing fluid is constantly divided into segments of known volume. These segments are counted as they are displaced, and their accumulated total is continuously indicated in desired units of volume by the meter register.

The principle of operation of the positive displacement meter can best be understood by remembering that it is basically a displacement pump, driven by the hydraulic energy of the stream. As in all mechanical devices, displacement meters have clearance spaces between moving parts and the inner walls of the measuring chambers. The most common source of meter error, slippage, is caused by the escape of some of the liquid from the measuring chambers between the moving parts and the inner walls of the measuring chambers.

The Turbine Meter

The turbine meter utilizes the kinetic energy of the moving stream to actuate a rotor. If the rotating speed of the rotor can be made proportional to the liquid velocity of the stream through the measuring chamber of the meter, the speed of rotation will be a correct index of the rate of flow.

In its basic form, the turbine meter consists of a propellor located in tubing or in a circular conduit housing. This rotor is driven by the moving liquid stream, and it in turn drives a totalizing register by electrical or mechanical means.

In varying degrees, positive displacement and turbine meters are sensitive to changes in flow rate, viscosity, and lubricity of the metered liquid.

Having now touched briefly on the types of meters used to measure fluids, the wide range of applications of these meters, and the variables which affect the performance of the meters, perhaps the need for the bidirectional prover, and how aptly this system has satisfied that need, can now be appreciated.

The basic principle of operation of the high-speed meter prover is this: ". . . the accurate and repetitive displacement of a precalibrated and known volume of liquid between two signaling detectors from a cylindrical container with a mechanical sealing displacing device driven through the container by the fluid energy from the stream being metered. Simultaneously, the corresponding metered volume is indicated. A ratio is determined between the known volume displaced and the meter registration to determine the meter factor" [1].

The prover consists of either a straight or a U-shaped section of pipe (called the prover barrel), a piston, two detector switches, and a valve manifold to divert the flow of the stream into the prover barrel. Also part of the prover system, but not physically located on the prover, are a meter-pulse generator, electronic-pulse counter and, of course, the meter.

The meter-pulse generator is an electrical device installed on the flow meter to provide higher resolution, or many more increments of quantity, than a mechanical counter on the meter can provide. Use of this high-frequency pulser permits the prover to be of more practical size and length. The pulse output is fed into the electronic counter which is called the proving counter or register.

The two detector switches on the prover barrel are also linked to the electronic counter. When the meter is measuring, the electrical pulser is being driven and is thus generating pulses which are not registered by the electronic counter until the first detector switch is actuated by the passage of the piston. The counter receives and totalizes pulses from the pulse generator until the second detector switch is actuated.

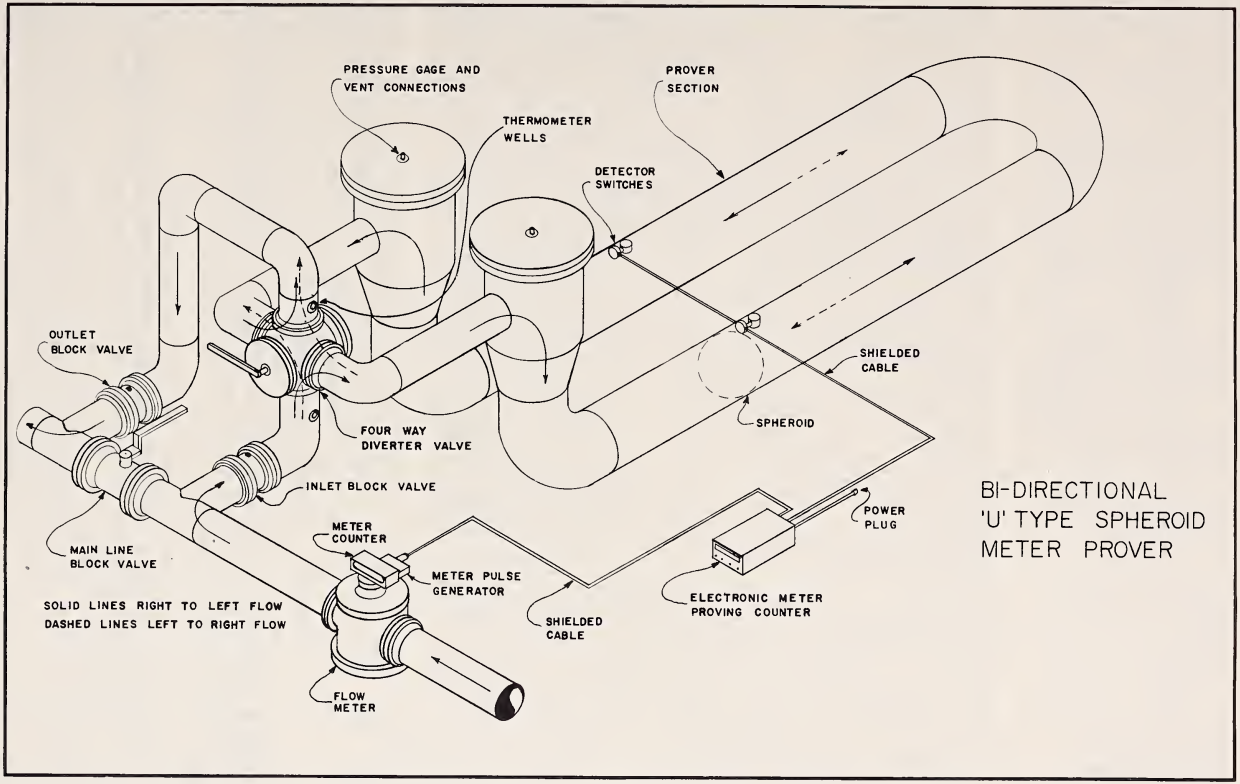
Since the number of pulses generated per gallon is a known figure, the pulses totalized by the electronic proving counter can be converted to volume. Thus, the prover volume and the metered volume (pulses) can be compared to determine meter accuracy.

As discussed earlier, the bidirectional piston prover permits travel in two directions through the barrel. Therefore, the calibrated volume is equal to the volume displaced by two trips of the piston through the barrel, one in each direction.

Bidirectional provers are readily adaptable for either permanent mounting at a meter installation or for portable use at any of a number of installations. To facilitate use of the portable prover at more than one meter setting, the system may be mounted on a trailer or truck. In some instances, it is more economical to utilize a portable prover at many locations than to install a stationary unit at each site.

The pipe which constitutes the prover barrel will be fabricated in either a straight or U configuration. The internal walls of the pipe will be sandblasted and covered with a protective coating to prevent corrosion. This treatment will also provide a smoother surface and prolong the life of the piston.

Pistons. The piston in the prover system serves two purposes. First, it serves as the displacing sealing device and, second, it provides



Bi-directional U-*type spheroid meter prover.*

a means of actuation of switches to start and stop a counting device.

One type of displacing device commonly used in mechanical provers is the elastomer spheroid which is hydrostatically filled with water, or glycol and water, under pressure and expanded so that its minimum diameter is slightly larger than the inside diameter of the prover section. Expansion to between 1 and 2 percent greater than the inside diameter of the pipe is considered satisfactory for the operating diameter of the spheroid. This allows the spheroid to act as a "squeegee" that leaves only a minute yet consistent film on the wall of the prover section. Greater expansion of the spheroid will not improve sealing ability and will generally cause it to wear more rapidly. The elastomer must be relatively impervious to the operating liquids.

A second type of sealing device is the cylindrical mechanical piston with cups. This is made so that standard pipeline scraper cups can be fastened to each end in such a way that the lips of the cups are facing away from the piston. This forces the lips of the cups out against the inside wall of the pipe when a pressure differential is exerted across the cups. The cups also act as a squeegee and leave only a minute, consistent film on the inside wall of the prover[2].

Detector switches. For any given direction of the displacer, detection devices and switches are necessary to detect the position of the displacer, within close tolerance, each time it passes the detector. They must initiate a signal to properly start and stop the proving register, and they must be actuated only by the passage of the displacer. Displacers composed entirely of an elastomer normally employ, or require, mechanically actuated switch-type detectors. For displacers composed of both steel and elastomer materials, detectors may be of the mechanical, the electrical proximity, or the induction pickup type[3].

One type of mechanical detector switch consists of a roller cam which protrudes slightly through the wall of the prover section. As the displacer passes under the detector, the displacer forces the roller cam upward which mechanically triggers an electrical momentary contact-closure switch. The switch closure starts or stops the electronic counter.

An integral component of the prover system is the valve manifold, which may consist of one valve or four valves. The primary function of the manifold is to divert the metered stream into the prover system in the chosen direction. In earlier portions of this discussion, repeated mention was made of operating the prover system bidirectionally by reversing the direction of flow of the stream. This does not mean that the entire stream is reversed, but only that portion of the stream that is integral with the prover system.

This reversing is done by means of the valve manifold. These valves are arranged in such a manner that the flow is at no time obstructed but is merely guided into the prover system, through the barrel, and out again into the pipeline.

All valves used in mechanical prover systems that can provide, or contribute to, a bypass of liquid around the prover must be bubble-tight when subjected to low differential pressure tests. It is mandatory to provide a method for checking valve leakage in the system. In bidirectional provers, the flow-directing valves should be arranged by linkage or other means to prevent hydraulic shock caused by any incorrect operations sequence[4].

It is also mandatory that a prover system be designed so that full positioning of the flow-directing valves must be completed before the first detection device is reached by the piston. This design feature is necessary to prevent bypass of fluid while the piston is between the detector switches.

Meter pulse generators. A meter should be equipped with a pulsing device which will generate electrical pulses of satisfactory characteristics for the type of proving register employed. The device should generate a sufficient number of pulses per unit volume to provide the required resolution. For positive displacement meters, a pulse-generating device is mounted on, and driven by, the meter. Many turbine meters self-produce electrical pulses[5].

Three main types of pulse generating devices are available: the reluctance type, the inductance type, and the photoelectric type.

Uniformity of rotation of the pulse-generating device, with respect to flow rate, is mandatory. As the pulse generating device usually delivers a relatively large number of pulses per revolution, the angular travel of the pulse-generating wheel for one pulse, is extremely small. For this reason, extreme care must be exercised in the design of the pulse generator driving systems to prevent loping, jumping, or other erratic action of the wheel. Wear on gears, backlash in gears, torsion in driveshafting of mechanical accumulating systems and other mechanical faults must be eliminated. Where a meter calibrator, adjuster, or temperature compensator is used, the type employing a continuous integrating mechanism is preferable to, and will usually provide greater accuracy than, the cyclic-integrating or cyclic-rotation-boosting type[6].

Meter pulse registers. Usually, an electric pulse counter is employed as the meter-proving register because of the ease and the accuracy with which it can count high-frequency pulses and because it can effectively transmit its count to remote locations. These may be simple pulse-counting devices and may be equipped with a built-in start-stop electronic switching circuit operated from the prover section detectors. Solid state counters are rugged and adaptable for field use. Such counters can be easily read in bright light, and may display the count by nixie tubes, decimal counting units, decade counting tubes, and other methods. Care must be taken to insure that electronic counters do not pick up transient pulses[7].

Design of the Bidirectional Meter Prover

A reasonable guide to follow in the design of a system would be that the volume between the detector switches be approximately 0.5 percent of the maximum flow rate per hour through the prover system [8].

A prover system designed so that it contains a calibrated volume of 0.5 percent of the maximum hourly flow rate through the system will reasonably assure that tolerances dependent on the repeatability of the prover system, resolution of the detector switches, and the resolution of the meter prover counter will be adhered to.

However, volumes less than the recommended 0.5 percent have been used with excellent results. Truck-mounted and trailer-mounted portable prover systems particularly have shown that lesser volumes are entirely satisfactory. Portable units, of necessity, must be compact and, therefore, cannot always contain the recommended volume. Some

portable units are operating successfully with calibrated volumes of approximately 0.1 percent.

Meter Prover Calibration

Before a prover system is permitted to be used as a measurement reference, its volume must be accurately determined. Determination of the volume of the pipe between the two piston detection devices is the object of the prover calibration and this volume can be ascertained by one of two methods—the water-draw method or the master-meter method. The accuracy required for either method is 0.02 percent.

The water-draw method consists of packing the prover system with water, and, by means of a pump and fluid reservoir tank, moving the piston back and forth in the barrel, thus displacing the water from between the detector switches into calibrated test measures. Two consecutive "round-trip" volumes are considered necessary to determine the calibrated volume of the prover system. Calibration of the bidirectional prover system by the master-meter method consists of using a previously calibrated meter prover and a flow meter in series with the prover to be calibrated. The first prover is used to obtain a meter factor on the master meter. Since a factor was obtained on the master meter previously, the process of deriving the meter factor is reversed, and the volume of the prover can be determined.

Volume Corrections for Prover Calibrations

The standard method of calibrating a mechanical displacement prover involves a determination of the volume which will be displaced from it, at reference conditions of 60° F and approximately atmospheric pressure, regardless of whether the calibration is made by the water-draw procedure or the master-meter procedure. This will permit utilization of such a prover under subsequent variable conditions of temperature and pressure by the use of properly tabulated correction factors.

In the water-draw calibration procedure, the volume observed as the sum of the test measure volumes for each trip of the displacer must first be corrected for any temperature difference in the water between the time the withdrawal is begun and the time the final temperature is averaged in the test measures. This is performed in accordance with the procedure described in Par. 2123 through Par. 2125, and Table I, Appendix B, of the American Petroleum Institute Standard 1101 [9].

In all likelihood, while the water was being drawn from the prover into the test measures, the water in the prover system was under higher pressure than the water being measured in the test containers. Therefore, to determine the amount of water which would be displaced at atmospheric pressure, it is necessary to correct for the compressibility of the water. This correction coefficient is listed as 0.000 003 2 per pound per square inch, in Par. 2122 of API Standard 1101 [10].

Another correction which must be made involves the expanded volume of the prover barrel due to the internal pressure on the steel. Internal pressure will cause the steel to expand and the prover will then hold more liquid than at atmospheric pressure. This correction coefficient may be determined by use of Table 2, Appendix B of API Standard 2531.

Operation of the Bidirectional Prover

The operation of the meter-prover system, to obtain a meter factor, varies with each installation, but the basic operation consists in manually or automatically reversing the flow diverting valve(s) to drive the piston alternately in opposite directions through the prover barrel. The operation also includes the recording of temperatures, pressures, flow rate, and totalized pulses at the end of each "half trip." At the end of each "round trip" of the piston, the electronic counter is read and reset.

Sufficient runs are made to determine the repeatability of the meter and prover systems. Subsequent to the proving operation, a meter-proving report is completed. This report requires the correcting of the volume of the prover for temperature and pressure effects, and the conversion of the totalized pulses from the pulse generator to liquid volume. The corrected prover volume and the metered volume are mathematically compared to obtain a meter factor, or volumetric correction coefficient, to be applied to the meter registration.

Applications of Bidirectional Meter Provers

Improvement in the techniques of meter proving has progressed to the extent that mechanical displacement provers reduce the expense and difficulty of proving meters of large capacity and makes more practical the application of such meters in large pipeline, tanker, and barge-loading operations. Yet these techniques apply equally well to smaller size meters, for example, those being used in lease automatic custody transfer operations [11].

The high-speed meter prover is readily adaptable and practical for use in almost any situation in the petroleum industry. More than 150 bidirectional prover systems have been manufactured by my company alone. The total number of provers manufactured for service in this country could safely be estimated to be 600. Some of the larger petroleum companies have as many as 40 provers in their systems. Some of these provers are used to test one meter; some test dozens of meters per month.

Bidirectional provers are compact enough to be trailer or truck mounted for portable use at more than one site. Some meter operators are now using high-speed provers for testing loading-rack meters.

It has been mentioned earlier that the chief advantage of this prover system is that it permits testing of a flow meter while the meter performs its normal measurement function, under normal conditions, without interruption of the metered stream. Meters on truck transports and at bulk loading terminals can be proved during loading and unloading operations.

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[3] *Ibid.*, page 8.
[4] *Ibid.*, page 8.
[5] *Ibid.*, page 8.
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[9] *Ibid.*, page 14.
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[11] Mechanical displacement meter provers, American Petroleum Institute, *API Standard 2531*, 1st ed., December 1963, Page 5. American Petroleum Institute, 1271 Avenue of the Americas, New York 20, N.Y.

DISCUSSION OF FOREGOING ITEM

C. H. STENDER: What is the size of these provers?

MR. HALPINE: For a 2-inch meter you could calibrate with about a 6-inch prover. On the portable units, this is a pipe about 8 feet long, 6 inches inside diameter, totaling about 2 feet wide. It is equipped with 2-inch valves.

(3) Testing Liquefied Petroleum Gas Vapor Meters

by W. A. KERLIN, *Chief, Bureau of Weights and Measures. California Department of Agriculture*

I have been asked to discuss with you, in quite general terms, some of the problems having to do with the testing of vapor meters—to present some of the technical requirements, some of the standards and equipment necessary, and to describe briefly the meters, their operation, and their test.

In California, our code requires that all meters not coming under the jurisdiction of the Public Utilities Commission (this includes LP gas dealers and trailer court installations) be tested at least once every 10 years. We feel that this test is very necessary and should be quite complete. It should include open and check-rate tests, slow-flow tests, and leak tests. We feel further that all meters not in first-class condition should be overhauled or reconditioned, since it could be 10 years before they would be tested again. A complete test should also be made each time a meter is reinstalled in a new location.

The heart of the vapor meter test program is the History Card System. Our code requires that:

3102.1. RECORDS. A record shall be kept of each individual meter owned or used by the liquefied petroleum gas dealer, or any other person engaged in the sale or resale of hydrocarbon gas, indicating its type, meter numbers, size and date purchased, together with the dates and location of each installation, the date and result of each test, and the date and character of all repairs made. These records shall be preserved for a period of one year after the meter is sold, dismantled or destroyed.

It is important that the information on these cards be kept up-to-date. This information enables the weights and measures official to keep abreast of the testing requirements of these meters.

The majority of devices covered by this service are of the small diaphragm-type displacement meter, with a capacity of approximately 150 cubic feet per hour. There are a few larger meters in use where there is a large heating load, which are also of the displacement type, with a capacity of approximately 250 cubic feet per hour. We also have a number of larger meters in resorts, schools, canneries, etc., with

a capacity of up to 5,000 cubic feet per hour. It is recommended that these larger industrial-type meters be checked more frequently than once every 10 years, and that, where a meter receives very heavy use, it should be tested annually. There is an urgent need for uniform standards of measurement to be promulgated on a national basis.

In addition to the diaphragm-type displacement meters, we also have a small number of rotary meters. The diaphragm-type meter, as its name implies, consists of two synthetic diaphragm bellows, which constitute the measuring chamber. These are connected to a drive mechanism with a system of inlet and outlet valves, causing the gas to flow alternately through the bellows and thus to produce a rotary motion through a driving mechanism, which, in turn, is passed on to a recording mechanism. The usual meter of this type has an adjustment to slow down or speed up the drive at both high and low speeds.

The rotary meter consists of a rotating displacement device which is driven by the pressure of the gas and, in turn, drives an index-recording device. Attachments are available for both the displacement meter and the rotary meter to compensate automatically for temperature changes or pressure changes, or a combination of these. Some of these devices record, as well as make, the actual change in the meter reading.

We have required that meters for use in this State indicate values in cubic feet only and that due consideration be given to altitude and temperature-compensating devices. Whenever any departure is made from so-called domestic cubic feet, altitude, pressure, and temperature multipliers should be used for altitude zones in which the meters are installed. For example, it is quite possible to have as much correction as 33 percent in favor of the dealer at 10,000 feet elevation, or, by the same token, it is possible for the dealer to suffer a loss if no correction is made for pressure. In other words, we recommend that Boyle's and Charles' Laws relating to the behavior of gases be recognized.

The American Gas Association is continuously striving to develop better techniques and to improve methods of gas measurements. It is our opinion that it would be very advantageous to all of us to make use of AGA techniques by adopting these into our code whenever they are applicable.

Now let us talk briefly about the equipment necessary for an adequate proving room. First, the room itself should be large enough for the equipment and for appropriate working space. This room must be well insulated and preferably have no outside walls or windows. The ceiling should be at least 10 feet high, and the room should be provided with complete air conditioning, permitting a temperature control within 1 degree at any temperature in a range of 50 to 80 degrees. Ventilation should be provided to exhaust noxious fumes which may be encountered when used meters are tested. The room should be equipped with fluorescent lighting, compressed air, and a sink with running water. Ventilated racks for storage of meters for acclimation should be provided.

A leak-testing device, such as a hydropneumatic leak tester, or a 50-gallon metal container is required. Air at pressure of 4.5 pounds per square inch must be available near this apparatus.

A slow-flow tester is required. This consists of an electric timer controlling a solenoid valve, which, in turn, cuts off or on an air supply at 1½ inches water-column pressure. This air is piped into a manifold with a number of outlets, each outlet having a separate shutoff valve. A rubber hose is connected to each outlet, and a spud containing a

small orifice is placed in the hose line. This hose is, in turn, connected to the meter to be tested. A flow of approximately ½ cubic foot per hour is passed through the meter. At the end of the manifold, a manometer is installed, so that any orifice may be checked to be sure it is not plugged and also to indicate the pressure at all times.

We recommend a 5-cubic-foot prover as the most useful size, although a 2-cubic-foot prover may be used if more readily available. We suggest that this prover be equipped with a blower, a solenoid valve assembly, and electric switches to facilitate filling. Equipment for this prover should include necessary connections for the various types and sizes of meters and a differential gage registering 1 inch water column in hundredths. The takeoffs for this gage should be carefully made according to the recommendations of the American Gas Association.

In general, these meter-connection tubes with pressure taps consist of a brass nipple which is 8 diameters long, the diameter being the size of the inlet of the meter. The taps are ⅛-inch pipe outlets flush on the inside of the nipple and 2½ diameters from the end to the center. A 1-cubic-foot standard bottle certified by the National Bureau of Standards must be available to test the prover from time to time. This device may be obtained in the Stillman bottle or the immerision type of standard cubic foot bottle.

The following procedure is used in the testing of small and medium vapor meters:

1. The prover room and the prover and all necessary equipment should be approved and in good condition, and the bell prover should be tested with the standard and sealed. The meters under test should be examined and tested for leaks by passing air through them at 4½ pounds pressure and submerging them in water while the meter is running. Leaks are determined by watching for bubbles. In the case of meters using the speedometer-type indicator, the indicator should be removed, cleaned, oiled, and, after the leak test, replaced on the meter.

2. All meters to be tested should be stored at least 12 hours in the prover room on suitable shelves or racks, with all obstructions removed from the inlet and outlets. The prover room air, the sealing oil in the prover tank, and the meters to be tested must be brought to the same temperature. The temperature of the liquid in the prover tank must be kept within 1 degree of the temperature of the room. Precautions should be taken to prevent any sudden change of air temperature in the prover room or any draft of air hitting the prover at any time. Meters to be tested should not be subjected to any sudden change in temperature or any other influence that might alter the temperature in the immediate vicinity of the provers.

   Meter testing may be performed with the same relative degree of accuracy at any permissible working temperature, but it is essential that the meter, the air in the prover, and the liquid in the prover be maintained at the same temperature throughout a test. Separate thermometers should be used for determining the temperature of the air and of the liquid seal. These thermometers should be tested to insure their accuracy.

3. All provers used by weights and measures officials must be adjusted to supply air at 1½ inches water column when tested with a cubic foot standard. After a meter is examined for leaks, it is subjected to a slow-flow (low flame) test. During this test, the meter is operated for a period of 1 hour at the slow-flame rate recommended by the manufacturer.

4. The inlet of the meter to be tested is attached to the prover hose by means of a suitable connection, which is, in turn, equipped with takeoff tees for the differential gage. This differential should never be permitted to be greater than ½ inch water column at any rate of flow.
The prover is first filled with air, the valve at the prover connection is opened, and the palm of the hand is placed over the meter outlet. The valve then is closed. If a pressure drop occurs in the U-gage mounted to the prover connection, this is an indication of a leak in the connections or in the meter. If the leak is in the connections it should be located and corrected before the test. If the leak is in the meter, it should be rejected.

5. When preparing to make any test, air from the prover should be passed through the meter before testing. This purging of accumulated gas in the meter should be approximately 5 cubic feet for small meters and 10 cubic feet for medium size meters. Purging should stop while the test hand of the meter is on the up movement, at a division on the proving circle which should be marked with a suitable pencil or crayon.

6. Determine, by the prover, if a volume corresponding to that marked on the proving circle passes through the meter for one revolution of the test hand. If the readings do not correspond, the indicating element should be removed and examined. If the indicator is faulty, the test should be stopped and the meter rejected.

Meters being tested on request, or for an alleged overcharge, should be tested in the same condition as received from the customer's premises and as soon after being removed as possible. Due attention must be given to securing temperature uniformity, but the index should not be removed, nor should any other mechanical change be made. Since subsequent tests may not agree with the first tests, it is recommended that only the first test be used for the basis of settlement of any claims. These first tests, especially the first check-rate test, should be accepted as the official proof of the meter. A meter which fails to register must be rejected. Each meter must be adjusted to register with an error not greater than plus or minus 2 percent of the indicated volume when air is passed through the meter at a rate which will cause a pressure drop in the meter not to exceed ½ inch water column on the differential gage. Meters are tested at a so-called open rate as recommended by the manufacturer, and again at a check rate which is also recommended by the manufacturer. The check rate is usually 20 percent of the open rate. Meters which are slightly out of tolerance may be brought back within tolerance by adjustment.

Meters which will not meet tolerances or that are mechanically defective are rejected and returned to the owner for repair or replace-

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ment. Defective removable indexes are easily renewed if supplied at the time of the testing by the owner. A supply of hand hole and index gaskets should be available.

The Bureau of Weights and Measures of the State of California has recently completed construction of a mobile field testing unit. This unit consists of a medium size step van truck which is equipped with an air compressor, a leak-testing tank, a slow-flow test unit, and a test meter with the necessary differential gage. Pressure regulators to supply air at 11 inches water column were installed. The truck is also equipped with air conditioning to maintain a constant temperature when the unit is in use. The truck also is equipped with a low flow prover, complete with a packard blower, necessary manometers, thermometers, and a selection of orifices. This device is used for proving the larger meters up to approximately 3 inches in size. We also have manometers for checking pressure regulators and gages. Other equipment includes a gage tester capable of testing gages up to 5,000-pound capacity. We have a Stillman Standard cubic foot bottle for checking the test meters and for testing county proving equipment. This mobile field testing unit should be very helpful in the checking of meters in remote locations. We expect to keep it in constant use.

In addition to the State-owned test equipment herein described, by the close of the year 12 counties will be equipped to test vapor meters. This equipment should enable us to test at least once every 10 years all vapor meters now in use in California.

We want to thank you for the opportunity of explaining to you the liquefied petroleum gas vapor meter program in California and offer the cooperation of our Bureau to the Office of Weights and Measures, National Bureau of Standards, and to any of the States, in supplying copies of our code, testing procedures, or any technical information which may be desired. Our Liquified Petroleum Gas Technician, Mr. Daniel Perkins, is a recognized authority in this field and his knowledge and experience will be made available to you upon request.

DISCUSSION OF FOREGOING ITEM

QUESTION: What is the cost of the room?

MR. KERLIN: The cost of the entire room is approximately $15,000.

QUESTION: Do the meters have to be taken to the laboratory for testing?

MR. KERLIN: Not necessarily. But you cannot test these meters on the line. You take them off the line and attach them to your portable unit.

QUESTION: What is the price of one of the portable units?

MR. KERLIN: Ten thousand dollars.

QUESTION: Including the truck?

MR. KERLIN: Including the truck, yes.

QUESTION: Do you have to shut the man's heating system off when testing?

MR. KERLIN: This is one thing that you have to do, but all of our dealers have spare meters which they can place on the line for temporary use.

QUESTION: What is the percentage of allowable error on these meters?

MR. KERLIN: It is plus or minus 2 percent.

J. F. LYLES: What percentage of these meters have you found to be inaccurate?

Mr. Kerlin: When we started there were over 33 percent of them short or in error. Now it is nowhere near that.

(4) A Self-Training Aid

presented by R. N. Smith, *Technical Coordinator, Office of Weights and Measures, National Bureau of Standards*

(Mr. Smith described and demonstrated "The Examination of a Computing Scale," which is the first in a planned series of technical presentations designed to provide self-training for the weights and measures official and for industry personnel engaged in testing weights and measures devices.)

(5) Open Forum—Weights and Measures Technical Problems

Forum Leaders: M. W. Jensen, *Conference Secretary;* R. E. Meek, *Chairman, Committee on Specifications and Tolerances;* J. H. Lewis, *Chairman, Committee on Laws and Regulations;* J. T. Daniell, *Chairman, Committee on Education*

Chairman Turnbull: I would like to direct a question to Mr. Jensen: From what did the term "sealer" originate?

Mr. Jensen: In England they still mark practically every device with what represents their official seal. Of course, in the United States we use the applied approval seal, with or without a security seal. The term simply describes what the inspector did in his official capacity. He sealed the device or sealed the weight and thus became known as a "sealer."

C. H. Wrenn: I would like to ask Mr. Jensen, in the testing of blending pumps, it is obvious that individual meters operate at very low flow at times. What should be the minimum test flow on each individual meter?

Mr. Jensen: According to Examination Procedure Outline No. 21–B, which is concerned with "Retail Gasoline Dispensers—Blended Product," the two individual metering units, that is, maximum octane and minimum octane, are tested at 5 gallons per minute.

J. R. Bird: I direct a question to Mr. Jensen. How many States, and to what extent, are doing calibration work for industry?

Mr. Jensen: As far as I know, the only officially authorized program of regular calibration and testing work for industry—this is noncommercial testing—is carried on in the State of California where statutory authority was given to make these tests and to make a charge for them.

W. A. Kerlin: Authority was given by the 1961 session of the legislature to any county to test noncommercial devices and make a charge for this. The law specifies that the sealer shall develop a schedule of charges for this purpose. But this is only for noncommercial devices.

Mr. Jensen: Undoubtedly every State does some noncommercial testing. I think, if we are going to move forward in the weights and measures field, it is going to be necessary for a State to become the center of measurement for the entire jurisdictional area, to provide laboratory facilities and capabilities so that anyone in the State—commercial, educational, scientific, industrial—can have a center to which to go for calibration, for testing, and for technical advice. I think this is imperative. What we need is 50 branches like the National Bureau of Standards.

J. E. Hampton: Our Chief Deputy asked me to get an opinion on a couple of questions. He wanted to know the intention of Hand-

book 44, regulation paragraph R. 19, "Single-Draft Vehicle Weighing," in its applicability to highway construction, regarding a double draft and single draft combination construction unit. We have a double problem on highway construction scales, and we have a requirement in the handbook that single drafting is the only thing permitted.

R. E. MEEK: We interpret regulation paragraph R. 19 in Indiana as permitting only single draft weighing. We do not permit the coupled or multiple-draft weighing of vehicles. This is for commercial purposes, of course.

MR. HAMPTON: Well, in view of the State Highway Department and Federal Bureau of Roads contract in building State-Federal roads, it is a commercial operation in most of the States.

MR. JENSEN: It is the view of many weights and measures officials that, since the highway aggregate, concrete or asphalt, is sold on the basis of cubic yards, these weighings, whether they are done in a cement batching scale or portable vehicle scale moving along the road, are noncommercial. The weights and measures official tests such scales as a matter of service to their highway agency. But I do not know how multiple-draft weighing can be approved if regulation paragraph R. 19 is effective in your State.

MR. HAMPTON: That gets down to the problem then that the Bureau of Federal Roads puts out specifications that these combination units are loose coupled, the emergency brakes are off, approaches are level, and they will accept this weighing. But now we know that the couplings are not loose; the emergency brakes are not off. We found the way you set your brakes on a truck will create a pressure.

MR. JENSEN: That's exactly the reason for regulation paragraph R. 19.

MR. HAMPTON: The other question I had was, throughout the Nation, how do you weigh railroad cars on railroad scales? Are they coupled or are they separated when they are weighed?

MR. JENSEN: Since the National Bureau of Standards has an extensive railway track scale testing program, I can give you some information on that. First, I think very few States really attempt to oversee the weighing of railway cars. Three States that I know of—Washington and Oregon jointly and the State of Minnesota—have quite active programs in this area. Railway cars are weighed variously, stopped single-draft, stopped axle by axle, and in motion.

C. H. STENDER: This week there is being mailed to the petroleum industry in South Carolina a new regulation designed to prohibit a practice that we think is deceptive. This regulation will cover advertisements, particularly concerning such terms as "100 plus," where we aren't told what "100 plus" means. Have you had any discussions in the Committee on that?

J. H. LEWIS: Mr. Stender, we appreciate very much your views on this. I am sure all of us are interested in consumer protection. However, this basically is a quality factor, and I think, in most instances, is not covered by weights and measures law. It may very well be covered in your State and other States that are in quality control.

F. F. THOMPSON: In Louisiana if an individual station owner puts on his pump, or places an ad near his station, that this gasoline is 100 octane plus, when it is brought to our laboratory and it is not 100 octane plus, he is considered to be guilty of false advertising. My

question is this: How many of our States have either stationary or portable quality control laboratories?

MR. JENSEN: I believe the States of Iowa, Louisiana, North Carolina, Florida, California and perhaps others have such equipment.

MR. THOMPSON: Why is it so important for our sealers to go and calibrate a gasoline pump and not know anything about what is being metered through that pump?

MR. JENSEN: Mr. Thompson, I think that is an excellent question. Perhaps it could be directed to the legislatures of the States. As you know, the enforcement officer operates in the area in which the statute permits him to operate. There are relatively few quality control statutes covering petroleum products in the States.

N. KALECHMAN: I would like to get an opinion from the group on a little technical question of law and regulations. We have in our H–44 code a paragraph about interlocks. Now, this is a question that came up in Connecticut. Which way should we cite a violator? Should we cite him under the statute, or should we cite him under the regulation? What do you think?

Mr. MEEK: I would interpret that as a simple violation of the code for which you could make charges against him.

Mr. KALECHMAN: We have a statute in Connecticut that says if you have in your possession any faulty or fraudulent device, you are in violation. Should we cite a violator under that statute?

Mr. MEEK: I think you could very well do that.

Mr. JENSEN: For the information of those in the room, the State of Connecticut just recently has officially promulgated Handbook 44, and this is why this sort of question comes up.

My experience has been that prosecuting attorneys usually prefer to go into a case under the terms of the statute, and they explain or expand on the terms of the statute through the use of the regulations. So the violation would be the use of an illegal device or false device as explained in paragraph S. 10.2 of the officially promulgated code.

D. I. OFFNER: Yesterday, the Conference voted in favor of the issuance of an Administrative Ruling. The conversation leading up to that implied that this was for perhaps a year's trial period. There was nothing, as I recall, officially said in the proceedings of the organization that related to a trial period. I am wondering if we can expect this question to be raised again next year automatically?

Mr. LEWIS: I am sure that most of you will recall that the idea of a one-year trial period came from industry. There was no consideration by the Committee that there would be a time limit on this. However, I think beyond doubt if we find what has been proposed is impractical, after its having been tested by application, the Committee will entertain, at any time, reasonable recommendations to amend our proposed administrative ruling.

Mr. OFFNER: My reason for asking the question is because it seems to me that an administrative ruling, by its nature, is justified only on the basis of its being a temporary measure.

Mr. LEWIS: I believe that a more proper word would be "experimental" rather than "temporary." I would be the first to admit that this is not perfect. I would like to refer to Mr. Hasko's gem of philosophy. He indicated it is better to get second or third best than wait too long to try to have the perfect presentation. So this is the basis of our approach, and it is subject to change if found necessary.

Mr. Offner: I would like to throw out a particularly vexing problem question for any reaction I can get. I suppose that throughout the country you are having the same experience that we are in St. Louis area, and that is this question of selling sides of beef. To cite a specific example that came up just last week, we got a complaint concerning a side of beef. Our inspector, along with an inspector from the adjoining jurisdiction, weighed it package by package, item by item. There was a resonable percentage of such cuts as sirloin steak, T-bone steak, and so forth, but this particular shipment had, as I recall, 4 pounds of ribs, 18 pounds of short ribs—an unreasonable proportion.

How is this being handled? It is our feeling that, if there is anything other than an identifiable side of beef, this actually is selling a prepackaged commodity. I know that in practice a man may order a side of beef, and I am quite sure he is delivered a selection of packages previously prepared.

I would like some comment on this. This is becoming a tremendous problem in the St. Louis area.

Mr. Lewis: We have approached this problem in the State of Washington and, although it hasn't been solved, it has been alleviated somewhat in that the meat cutters are educated now to require that the buyer come in by appointment and watch the cutting of his side of beef. He is standing there while it is cut and wrapped. He hauls it away, the leftovers if he wants them, bones and scraps, and then he has no argument.

Now, we have had several complaints, but never yet have we been able to actually intercept a shipment which was short. Shrinkage is a real problem, and they are allowed certain reasonable shrinkage.

T. M. Stabler: The Packers and Stockyards Division has investigated, in our State, practices similar to this. This is under their direct jurisdiction.

R. H. Fernsten: I am not clear as to the definition of a slow-flow meter. Was any consideration given to establishing a rate of flow by gallons per minute?

Mr. Meek: The definition appears in paragraph D.6: "SLOW-FLOW METER—A retail device designed for the measurement, at very slow rates, of liquid fuels at individual domestic installations."

Mr. Fernsten: The Committee felt that this was sufficient definition?

Mr. Jensen: Yes, identification is principally through the use of the device. Slow-flow meters, as defined, may deliver from a tenth of a gallon up to about 10 gallons an hour.

(The statement of the Incoming Executive Committee was presented by V. D. Campbell, *Incoming Conference Chairman, Chief, Division of Weights and Measures, Department of Agriculture, Reynoldsburg, Ohio,* and can be found beginning on page 160.)

(The Report of the Committee on Auditing was presented by A. J. Albanese, *Chairman, City Sealer of Weights and Measures, New Britain, Connecticut,* and the Report of the Treasurer was presented by C. C. Morgan, *Treasurer, City Sealer of Weights and Measures, Gary, Indiana.* These reports can be found beginning on page 206.)

(At the conclusion of the Treasurer's Report, Chairman Turnbull presented the gavel to the incoming 50th National Conference Chairman, V. D. Campbell of Ohio. The benediction was then delivered by the Conference Chaplain, Rev. R. W. Searles. Thereupon, at 12:10 p.m., the 49th National Conference on Weights and Measures was adjourned *sine die.*)

REPORTS OF THE CONFERENCE COMMITTEES

REPORT OF THE CONFERENCE EXECUTIVE COMMITTEE

presented by D. M. TURNBULL, *Director, Division of Licenses and Standards, Seattle, Washington*

(Tuesday, June 16, 1964, 1:50 p.m.)

The Executive Committee of the 49th National Conference on Weights and Measures held the first session on Monday, June 15, 1964, at 8:30 a.m.

Conference activities, program format, social activities, hotel arrangements, and locality for future Conferences were among items reviewed and discussed. During the discussion on possible Conference sites outside of Washington, the Executive Secretary pledged the support of the Office of Weights and Measures, but explained that, due to budget limitations, it would be impractical for the entire staff to participate to the degree they presently do if the Conference were to be held away from Washington. He expressed the hope that this matter might be brought to the floor of the Conference for an expression of its entire membership.

Mr. C. D. Baucom of North Carolina expressed his view that the six-day Conference was too lengthy for many delegates and his hope that a three- or four-day Conference could be planned. No further discussion on this point was forthcoming.

The Committee Chairman reported that a qualified parliamentarian had been retained to serve during the presentation of the reports of the Committees on Specifications and Tolerances and on Laws and Regulations. It is thus hoped that any controversy concerning parliamentary procedure can be avoided.

A member of the Southern Weights and Measures Association reported that Dr. G. M. Cairns of the University of Maryland, representing the National Association of State Departments of Agriculture, has been invited to appear before a subcommittee of the Committee on Appropriations of the United States Senate in the near future regarding the new State standards program. All State delegates are urged to contact Dr. Cairns in support of this important program.

It seems appropriate to point out that neither this nor past open meetings of the Executive Committee have been well attended and that relatively few suggestions or recommendations as to the Conference were put forth. The Committee reminds the delegates that they have a very real responsibility in voicing their views as to Conference affairs and Conference plans. It is sincerely urged that communications on this important subject be directed to the Executive Committee.

D. M. TURNBULL, *Chairman*
B. S. CICHOWICZ
F. M. RAYMUND
A. H. DITTRICH
W. E. CZAIA
E. W. BALLENTINE
C. D. BAUCOM
H. L. GOFORTH
W. C. HUGHES
C. L. JACKSON
J. F. MADDEN
F. D. MORGAN
M. J. SANTIMAURO
G. P. SMITH
J. G. WILLIAMS
M. W. JENSEN, *Secretary*

(On motion of the committee chairman, seconded from the floor, the report of the Executive Committee was adopted by voice vote.)

REPORT OF THE INCOMING EXECUTIVE COMMITTEE

presented by V. D. Campbell, *Chairman, Chief, Division of Weights and Measures, Reynoldsburg, Ohio*

(Friday, June 19, 1964, 9:54 a.m.)

The Executive Committee for the 50th National Conference met for breakfast at 7:30 a.m. on Friday, June 19, to consider matters falling appropriately within its authority. Decisions were reached as follows:

1. A very special Golden Anniversary Conference will be scheduled to celebrate the 50th Conference in 1965. There will be included a national weights and measures exhibit (standards, testing equipment, weighing and measuring devices, State and local governments, weights and measures associations, and weighing and measuring processes such as packages and packaging.)

2. The Conference is to be held at the Sheraton-Park Hotel, Washington, D.C., the week of June 20.

3. Registration fee will remain at $15.00.

4. The Secretary was delegated authority to plan the program.

5. Other nations will be urged to send delegates to the Conference.

6. The Conference will open with committee meetings on Monday morning and will close Friday noon, with appropriate free time for visits to the exhibits.

7. The Chairman and Secretary were authorized to appoint subcommittees of the Executive Committee to work on the details of the Conference.

8. The Secretary was authorized to arrange for an appropriate program, if practicable, including a visit to the new National Bureau of Standards site at Gaithersburg for the ladies.

Other decisions reached by the Executive Committee include:

1. The Chairman and Secretary were authorized to appoint a subcommittee to explore the possibility of holding the 51st Conference in 1966 in Denver, Colorado.

2. The Secretary was directed to maintain close liaison with Canada and to invite greater participation of the Canadian authorities in the affairs of the Conference.

3. An allocation of $400 was authorized for use by the Committee on Education for promotion of National Weights and Measures Week and to cover other official expenses of the Committee as approved by the Committee Chairman and the Conference Secretary.

The Executive Committee looks forward with great anticipation to the Golden Anniversary Conference and urges that all weights and measures officials and all associates of business and industry plan now to attend and participate in the affairs of the Conference and, if possible, to be a part of the national weights and measures exhibit.

REPORT OF THE COMMITTEE ON EDUCATION

presented by J. E. Bowen, *Chairman, City Sealer of Weights and Measures, Newton, Massachusetts*

(Tuesday, June 16, 1964, 1:55 p.m.)

1. Introduction

The official statement of the Organization and Procedure of the National Conference on Weights and Measures, including its constituent committees, delegates to the Committee on Education consideration of matters embracing the technical training of weights and measures officials, the education of the general public with relation to weights and measures matters, and the education of users of weighing and measuring devices.

The Committee on Education has been active, during the past year, on a number of projects that are of interest and concern to every weights and measures official.

The Committee met in Washington during the final days of the 48th National Conference in 1963. Throughout the year there has been much Committee business transacted by correspondence, and some by long distance telephone communication among its members, and between its Chairman and the Office of Weights and Measures of the National Bureau of Standards. The Committee Chairman and the Chairman of the Subcommittee on National Weights and Measures Week were able to confer in person during attendance of both at the New York State Weights and Measures Association Conference in Utica, New York, in July. All Committee members, except two, together with the Committee's Secretary, were present at a meeting called by the Committee Chairman in Biloxi, Mississippi, in October, when these members attended the Conference of the Southern Weights and Measures Association.

2. Home Study Technical Training Course

Shortly after the start of the Conference year, the Committe sent out a questionnaire to State weights and measures officials to determine the probable usefulness and effectiveness of the Committee-sponsored Home Study Course. Following the favorable responses received, the Committee on Education, with the assistance of the Office of Weights and Measures, National Bureau of Standards, has activated a Home Study Course for weights and measures officials.

In response to a letter addressed to the weights and measures administrative heads of each of our fifty States, offering such a Course, to be channeled through such administrative heads, your Committee was pleased that 36, or 72 percent, of our fifty States, plus two additional jurisdictions, expressed enthusiasm for this project and requested the Course material. Actual formulation and drafting of the Course was undertaken and most capably accomplished by Richard N. Smith, Technical Coordinator of the Office of Weights and Measures and staff assistant to the Committee.

The material was organized as a 12-lesson outline of systematic

study of standard text material included in National Bureau of Standards Handbooks 82, 44, 67, and Circular 593. Periodic examination questions also were included. The Course was supplied, upon request of State officials, so that they might, in view of jurisdictional variations of laws and regulations, edit and tailor the material as necessary or desirable so as to make it compatible with individual programs. State officials were requested to duplicate and circulate revised Course Material within their respective jurisdictions. The Committee on Education recommended the issuance of certificates to students upon satisfactory completion of the Course.

In answer to Committee questionnaires mailed to participating States, the Committee has received responses and is able to report that 826 students have either completed or are currently participating in the study course.

The majority of States using the course have responded with enthusiastic comments. In 16 jurisdictions certificates have been, or will be, issued to those students seriously pursuing and satisfactorily completing the Course.

Our questionnaires elicited an expressed desire upon the part of 14 States favoring the development of additional Home Study Course material. A variety of suggestions concerning material for future courses was received. Consideration of future course material is referred to our successor Committee.

3. Scale Technology Course Established

The Committee on Education has followed with interest and encouragement the Scale Manufacturers Association announcement of the establishment, by Alfred State Technical School, the Agricultural and Technical Institute of the State University of New York, of a "Measurement Science Course." As the Conference was informed this morning, the course will be a two-year, college-level scale technology course.

Alfred Tech is fully accredited by the Middle States Association of Colleges and Secondary Schools and is authorized by the Division of Higher Education of New York State to award the degree of "Associate in Applied Science."

Literature describing the "Measurement Science" Course may be obtained upon request from Alfred Tech, Alfred, New York.

Weights and measures officials are urged to give thought to the recruiting of high school students who appear to possess aptitude for this Measurement Science Course.

Graduates of ths course will have opportunities to assume good positions in the scale industry, in positions of weighing responsibility in other industries, and in Government.

The Committee on Education wishes to heartily commend and congratulate the Scale Manufacturers Association, Alfred Tech, and all others involved, for this forward step in technical education, and recommends that this 49th National Conference on Weights and Measures also be so recorded. This two-year technical, college-grade course for training qualified high school graduates in scale technology promises to be of great beneficial value to all concerned with accurate weighing.

4. Technical Training Schools for Weights and Measures Officials

The Office of Weights and Measures has continued its established

program of conducting technical training schools for weights and measures officials in the several States. These schools are of from one to four days' duration and cover both general and specific topics, depending on the participating jurisdiction's needs and desires.

Since the last Conference, technical schools have been conducted by Office of Weights and Measures personnel in the States of California, Montana, North Dakota, South Carolina, Arkansas, Kansas, New York, Indiana, Missouri, Tennessee, and Virginia. In addition, the Office of Weights and Measures has participated in training conferences in seven States and conducted field training on special equipment in six other States.

The Committee on Education commends the National Bureau of Standards on this activity and highly recommends widespread acceptance by the States of this opportunity.

The Office of Weights and Measures increased its visits to State offices and laboratories during the past year. This, in the view of the Committee, is a most effective vehicle in the effort toward nationwide uniformity of weights and measures laws, regulations, and methods of inspection. It seems appropriate to the Committee that the Office of Weights and Measures attempt to provide staff visits to each State office not less frequently than once every other year.

The Committee notes the recommendation to Dr. Astin of the Weights and Measures Advisory Committee that qualified personnel to inspect and train laboratory technicians and to intercompare standards and test laboratory apparatus in State and other laboratories be added to the Office of Weights and Measures staff. Since this seems to be an area in which the Office of Weights and Measures could provide an outstanding contribution, the Committee on Education heartily endorses this proposal of the Advisory Committee.

5. Office of Weights and Measures—Audio-Visual Technical Presentation

The Office of Weights and Measures has announced the availability of the first of a series of self-training aids on the complete examination of the basic commercial weighing and measuring devices. This first technical presentation, "The Examination of a Computing Scale," consists of 58 35-mm colored slides and a taped narration. The total running time is 20 minutes. Audio and visual instruction is given in a step-by-step procedure as recommended by the Office of Weights and Measures in the Examination Procedure Outline for a Computing Scale. The presentation may be used for individual or group instruction. This presentation is part of an overall plan of the Office of Weights and Measures to help the officials help themselves. The training series, if used, will provide an excellent tool for the promotion of uniformity in testing procedures. Loan copies of the presentation are available for short term loans, or the series may be purchased for the permanent use of a jurisdiction. The delegates of this Conference will have an opportunity on Friday morning to see and hear this audio-visual technical presentation on the examination of a computing scale.

6. Public Education in Weights and Measures

The Committee is aware of numerous and various year-round promotions through personal appearances of officials addressing local groups and numerous and varied news releases published in local news media, and has submitted material relating to this subject to the *Scale Journal*

and many News Letters. We heartily endorse such public education efforts.

The Committee considered a suggestion that this Conference sponsor and support an exhibit at the New York World's Fair. The Committee is in unanimous agreement that such enterprise would have been desirable. However, upon study of Conference financial ability and manpower problems, such a project appeared to be far beyond the limited means of this Conference. The Committee, after much deliberation was therefore unable to recommend affirmative action on this matter.

7. Communication With British Institute

Your Committee has, during the past year, established a closer liaison with our colleagues in England with a view to an increasing exchange of ideas and information pertaining to matters of weights and measures education. Our British counterpart has written to the Chairman of your Committee on Education, "As mentioned in my last letter, I reported to the Educational Services Committee of the Institute the liaison which has now been established with you, and later to the full Council itself. Everyone was extremely pleased at this turn of events and we trust that this marks the beginning of a mutually valuable era of cooperation." The British Institute has already forwarded material of interest to us, and we, in turn, have sent them considerable material related to our procedures, and have sent examples of our various educational promotions in this country. This communication appears to have great potential value to weights and measures officials of both countries.

8. National Weights and Measures Week 1964

The entire Committee on Education again functioned as a whole for the promotion of National Weights and Measures Week 1964. However, this nationwide activity was directed by Mr. Samuel H. Christie, Jr., Deputy State Superintendent of the State of New Jersey, who served as Chairman of National Weights and Measures Week. Every weights and measures official is indebted to Mr. Christie for his devoted leadership and skillful direction of this nationwide project. It will now be our pleasure to have Mr. Christie present the part of this report bearing on National Weights and Measures Week 1964.

The 1964 "Week" promotional activities were assumed by the Committee on Education as a whole as has been done during past years. Each member of the Committee served as regional co-ordinator with the State Chairman responsible for promotional operations within his own State. The 1964 "Week" saw greater activity on the part of weights and measures associations. Again "grass roots" operations by interested and experienced people paid dividends.

The shield emblem slogan of the National Conference *That Equity May Prevail* was the theme of the "Week." It has been gratifying to note the favorable reactions of representatives of industry. This has been brought about by the realization of the general public that the promotion of the "Week" is for the mutual benefit of agriculture, commerce, industry, and the consuming public.

Interest in the "Week" is increasing in some areas and decreasing in others. One jurisdiction suggested that commemoration of the "Week" be spaced at three- to five-year intervals.

At the open Committee hearing enthusiastic support was given for the continuation of the "Week" on an annual basis.

Use is being made of the entire list of available aids. "Grass roots" thinking has diversified their application. More official proclamations have been obtained and wider publication and distribution made. Literature is not only being distributed at exhibits, lectures, or movies, but is also being placed on the windshields of cars parked in the parking lots of shopping centers. More displays have been set up in the lobbies of official buildings, in the windows of stores, pharmacies, and service agencies such as banks and savings and loan associations.

Numerous officials have initiated programs of delivering lectures and showing films to school children. This was proven to be a valuable contact and the interest of the youngsters is tremendous. The activity has been extended to the colleges and the resulting support of and participation in the "Week" by student publications is gratifying and has become an exciting field to explore to greater depths. Students are of utmost importance now and will in a relatively short time be the actual consumers and business people who will benefit from our services. They will be in a position to see that such services are continued and properly supported.

"History of Measurement" posters, a new series for 1964, demonstrated that historical items can be very effective.

"Mystery" can also be successfully exploited, witness the success of the "Third Man" poster. Cute and provocative with just enough mystery to compel the average person to complete the reading of the message.

For several years stamps, seals, mail plates, and rubber stamp shield imprints were utilized as a means of telling one another what we were doing. Such practice has now been extended through the imprint of mailings by commerce and industry. In such manner the symbol of our profession is receiving wider distribution.

Considerable attention by radio and television networks has been given to Senator Hart and his Committee for their work on proper package labeling. This may account for the increase of radio and television time made available to weights and measures officials during the past year.

The Committee requests your fullest cooperation in a matter which has been instituted in anticipation of National Weights and Measures Week 1966. A request has been forwarded to U.S. Postmaster General John R. Gronouski regarding the issuance of a commemorative stamp for the 100th anniversary of the recognition by Congress of the legality of the metric system in this country. Several Senators and Congressmen have been contacted in an effort to solicit their support for this project. We urge everyone's support in contacting their legislators in order to obtain additional consideration for this important project.

This report cannot be brought to a conclusion without taking the opportunity to express grateful and most sincere thanks to all the members of this Conference, both the weights and measures officials and associates, in attendance together with those remaining at their posts of duty, who through their enthusiasm and many hours of time consuming and tedious labor are actually responsible for the success of this project.

9. Second National Survey of State Weights and Measures Legislation, Administration, and Enforcement by Dr. Leland J. Gordon

Between the months of February and September 1963 Dr. Leland J. Gordon, Director, Weights and Measures Research Center, Denison University, completed his second national survey of State weights and measures legislation, administration, and enforcement. Dr. Gordon has become, without a doubt, the outstanding unaffiliated authority in this field and has been extremely helpful to this Conference and its members.

The results of Dr. Gordon's survey are both interesting and enlightening. Unfortunately, Dr. Gordon is on a professional assignment in Japan and is unable to be here to present his report to this Conference. He has made the report available to the Conference Committee on Education and has authorized the inclusion of the report in the printed proceedings of this Conference.

The Committee commends this report for careful study by all officials and records its gratitude to Dr. Gordon for his interest and his careful, professional workmanship.

SECOND NATIONAL SURVEY OF STATE WEIGHTS AND MEASURES LEGISLATION, ADMINISTRATION, AND ENFORCEMENT

By Dr. Leland J. Gordon, *Director, Weights and Measures Research Center, Denison University, Granville, Ohio*

I

The Second National Survey of State Weights and Measures Legislation, Administration, and Enforcement, financed by a grant from Consumers Union, was conducted from February to September 1963.[1] In that eight-month period I traveled to 45 State capitals, where I spent from 1 to 10 hours with the responsible State weights and measures officials, recording answers to 175 questions. The scheduling of interviews presented a problem, but Iowa was the only State in which it was impossible to arrange a mutually satisfactory date. The opportunity to respond by mail was offered to Iowa, but was not accepted, so Iowa is not included in the following report. Nor are Hawaii or Mississippi included; no general State law is in effect in either of those States. It would have been impractical to travel to Alaska, so the weights and measures official in that State responded by mail. No response was received from Puerto Rico to a mailed questionnaire. The Model Law was enacted in Arkansas after I had already been in that area. It was not possible to return to Little Rock, but the newly appointed official did respond to my questionnaire by mail. In summary then, the following report reflects personal interviews with 45 States and the District of Columbia, plus two mail responses.

II

As my research progressed, additional questions were suggested by several officials. The first of these was, "Do you test Post Office scales in your jurisdiction?" Of course, the postal system is a Federal operation, but, in most of the Nation, official responses revealed that there is no Federal testing. State testing is done upon request only, and requests are rare; 30 States test upon request, while 18 never test. Here is an area involving hundreds of millions of dollars in which large numbers of antiquated, obsolete, and inaccurate scales are being used. The detailed findings and comments on this question alone would make a very lengthy report. The situation is especially bad in rural areas. In one jurisdiction, for example, 11 out of 13 scales were found to be inaccurate. On July 16 a letter was addressed to the Postmaster General asking for the official policy of the Post Office Department regarding the periodic testing of the accu-

[1] Results of the First National Survey were reported to the 42d National Conference on Weights and Measures in 1957 (NBS Misc. Pub. 222, pp. 60–71).

racy of weighing devices used in United States post offices. No reply had been received by August 31, so a second letter was dispatched. On October 7 the Director of the Maintenance Division responded as follows:

> The Post Office Department instructions to its employees for the checking and testing of post office scales is in Part 331.6 of the Postal Manual which requires, in effect, that all counter and lobby scales be checked daily to be certain that they are in balance at zero, and that scales at offices having test weights be checked by means of such weights not less frequently than twice each year.
>
> The Department has recently ordered a large number of test weights and is to make them available at nearly all of the larger offices. Arrangements will also be made for use of these sets of test weights at other offices throughout the country.
>
> Adequate procedures for use of the sets of test weights are being developed with the assistance of the National Bureau of Standards, and will be published for guidance of field personnel performing the testing.

Responses to my question by State officials indicate that Federal instructions to employees are ignored. The contents of the rest of the letter are hopeful. It suggests the possibility of a collaborative effort by State and Federal inspectors, to be worked out by the Post Office Department and the National Bureau of Standards. My conversations convince me that all State officials would welcome such a joint effort, and that much duplication of effort could be avoided if State inspectors inspected post office scales in rural areas.

The second supplemental question dealing with a Federal-State area was this: "Do you test weighing and measuring devices on military installations in your State, including post exchanges and commissaries?" For scales, the responses were: Yes, 12; No, 22; upon request, 14. For prepackaged items, the responses were: Yes, 4; No, 32; upon request, 7. The comments were mostly negative. For example: "We test if we can get on the Base. In general, conditions are bad. Packages are weighed gross, or worse. Servicemen are being taken for a ride. Scales and pumps are in fair condition, but food packages are pretty miserable." On July 16, a letter was addressed to the Secretary of Defense asking this question: "What is the official policy of the Department with reference to periodic testing of the accuracy of weighing and measuring devices used in Army, Navy, Air Force, and Marine commissaries and post exchanges? Are prepackaged items tested for accuracy of fill? If so, by whom and how frequently?" Here is the reply, dated July 30.

> The Department of Defense does not have a published policy pertaining to the periodic testing of the accuracy of weighing and measuring devices used in Armed Forces Commissaries and Exchanges. This function is the responsibility of the individual Military Departments.
>
> Informal information received from the Military Departments indicates that in general the accuracy of weighing and measuring devices used at military installations are [*sic*] periodically checked by the State officials or by contract in accordance with the State requirements or standards. Normally only national brand prepackaged items are carried in the Armed Forces Commissaries and Exchanges and are checked for accuracy of fill only upon receipt of a complaint.
>
> If more detailed information is desired, it is suggested that you contact the individual Military Departments.

My conversations indicate strongly that the "informal information received from the Military Departments" is inaccurate. The interests of some millions of service personnel are involved. Remedial action is needed. Perhaps the National Conference on Weights and Measures could develop a collaborative plan with the Defense Department under which State inspectors would have free access to military establishments, as they do to all other commercial establishments, for complete and periodic testing of all weighing and measuring devices and prepackaged items.

The third supplemental question dealing with a Federal-State area concerned national parks and monuments. State officials were asked: "Do you test weighing and measuring devices used by concessionaires in national parks?" Only 12 States do test, and that is only upon request. There is no testing in 28 States. This means that such tourist areas as Yellowstone, Yosemite, and Skyline Drive are not checked. Two-thirds of the land area of New Mexico

is under Federal control, but there is no weights and measures control. On August 24, a letter was written to the Secretary of the Interior asking for official policy. On September 11 the Assistant Director of the National Park Service replied:

> As of the present time, the Department has no set policy with respect to the periodic testing of the accuracy of weighing and measuring devices used by concessioners in the National Park System. However, this is a very important matter and, with the view of establishing one, we have contacted our field offices and asked them to advise us how the testing of these devices is now handled in each of their areas and for their comments on the establishment of such a policy.
>
> When their comments have been received and summarized, we will write you further in this regard.[2]

This is a positive and encouraging attitude. But here again, Federal-State collaboration is indicated. I recommend that the National Conference on Weights and Measures move toward informal conversations with the National Park Service with a view to establishing a joint program of testing and inspection.

Before leaving this topic, let it be recorded that, among States having concessionaire operations in State parks, 19 test weighing and measuring devices regularly, 6 do so upon request, and 13 do no testing. Information supplied by some officials concrening inaccuracies suggests the need for regular testing by all States.

III

Let us turn now to four supplemental questions concerning the testing of prescription scales, odometers on rental automobiles, taximeters, and scales used by airlines to weigh travelers' luggage.

Among 44 responses, 20 States regularly test drug prescription scales, 4 do so upon request, and 20 do not test. Inaugurating its testing program in April 1963, Michigan reported condemnation of 50 percent of all scales checked in a four-month period. One official reported finding a hearing-aid battery and a paper clip being used as weights. Florida found only 55 percent in compliance, but 89 percent in tolerance. Even though prescription scales may not be used as much as formerly, such inaccuracies present a health hazard, and the indication is that all States should test such scales periodically.

This Conference has given much program time to consideration of the problems involved in testing odometers. The need for testing has been documented. For example, investigation in one State showed individual odometers as much as 20 percent fast. How much testing is being done? Not much. Among 47 jurisdictions, only Florida, Massachusetts, New York, and North Carolina have any kind of a testing program in operation. Forty-three States do not test, although 5 expressed a hope "to start a program soon."

There must be many thousands of taximeters in use the accuracy of which is an unknown factor, since they are tested in only 9 States. When asked, "Do you test taximeters?" the answer was a flat "No" in 34 States. In 5 States, it was reported that some large cities test taximeters. Apparently this is another neglected area.

Airlines charge heavily for transporting passengers' excess luggage. How accurate are their scales? According to my responses, airline scales are generally well maintained and accurate. Forty States inspect airline scales regularly; only 8 reported no checking of such scales.

IV

In Part I of my questionnaire there were 71 questions seeking to compare the provisions of State laws with the recommended provisions of the Model Law, as amended through June 1962. It would be tedious and time-consuming to report the responses to each question, and it would probably be unnecessary. Parenthetically, I might say that in many interviews there was an exchange of information and judgments which many officials said was helpful to them. This was particularly true in the interviews with recently appointed and

[2] As of April 1964 there has been no further response.

younger officials, some of whom made notes to do what they are not doing and to seek legislation to strengthen gaps and ambiguities in their laws. It should be reported also that, since 1957, eleven States [3] have virtually enacted the Model Law and Wisconsin has enacted basic changes which bring its law into close conformity to the Model Law. Almost all States have added amendments which have strengthened and clarified their laws. As of 1964 there are not many States whose laws are not strong enough to provide good consumer protection. Where programs are weak the reasons are more likely to be political interference and lack of money.

One new development since 1957 has been the increased use in some States, notably South Carolina and West Virginia, of the power to order off sale packages which do not contain the amounts represented, instead of court action. This has been reported in the Southern Weights and Measures *Newsletter*, so it need not be detailed here. Use of this legal power is faster and more effective as a corrective measure than court action. Oklahoma adopted an amendment in 1959 which empowers the director to paste a copy of a stop-sale violation on the main entrance of a violative store in case of a second violation. This has been used three times and has stopped three chronic offenders.

Since 1957, prepackaging abuses have multiplied. How many States have statutory power to prevent the use of such terms as "when packed," "jumbo," "giant," "full," or do so by regulation? The words "when packed," are illegal in 28 States, legal in 20. The other three qualifying terms are illegal in 15 States, legal in 28. Many officials commented on the conflict with the United States Department of Agriculture and the Food and Drug Administration practice, citing this as an area where greater cooperation is needed.

Several good provisions of the Model Law are found in only a minority of State laws, and are not always enforced. For example, only 16 States have the requirement in Section 27 of the Model Law of a conspicuous declaration of price per single unit of weight, measure, or count for random-packed items. Section 31 of the Model Law forbids misrepresentation of price, and 23 States have such a provision. Section 31 also requires that, when prices include a fraction of a cent, the fraction shall be at least one-half the height and width of the numerals representing the whole cents, but only 11 States have such a provision.

The laws of 26 States follow the requirement in Section 39 of the Model Law that textile products in bolt, roll, or otherwise packaged must show net measure in yards or net weight. But several officials admitted to no enforcement of this provision.

In 1957, only 7 States were supervising the sale of liquefied petroleum gas. By 1963, 32 States had added this service, but with varying degrees of effectiveness.

V

In Part II of my questionnaire there were 14 questions dealing with administration. The first one concerned job security. Table I shows that weights and measures personnel in 24 jurisdictions have civil service status, either under the weights and measures law or under a general statute. Five States protect personnel against removal, discharge, reduction in pay or position except for just cause, after written notice and a hearing. But employees in 16 States have no protection against arbitrary discharge. Some of the comments raise doubts as to the effectiveness of civil service. Certainly it is no panacea. In some States, civil service is meaningless because it is not enforced, while in other States weights and measures personnel have had long tenure even though they do not have formal, legal job security. In some jurisdictions, staff members have tenure, but directors do not.

In reading the figures in column 2 of table I, which shows the total number of employees, it must be remembered that 22 States have Form 1 laws, which provide control throughout the State by State officials only. If county and city employees in Form 2 States were included in the tabulation, such States would appear to have many more employees. And perhaps more States would have one inspector for every 50,000 citizens. Many times I raised a question as to the validity of the 50,000 figure. No one seems to know its origin, and some doubt its validity. But most officials consider this to be a useful goal.

The salary figures for directors are disheartening. They speak for themselves. Too many are too low. The range is from $5,700 to $14,000. Only 9 are

[3] Alaska, Arizona, Arkansas, Delaware, Illinois, Maine, Missouri, New Mexico, Tennessee, Virginia, Washington.

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over $10,000. The salary figures for inspectors are even more disheartening. There are only three jurisdictions which start inspectors at $6,000, and only one in which an inspector may ever hope to make $10,000; in fact, there are only 7 in which he can rise to $7,000, no matter how many years he works. These figures tell a critical story for the future of weights and measures work. The National Conference is well aware of the problem and has had a committee working on it, so I shall not analyze or comment further.

What income can a weights and measures man look forward to when he must retire? Some do not know. For them, and for others who do know, the future looks bleak. A minimum desirable goal for retirement is 50 percent of retirement salary. But, if retirement salary is small, retirement income will be small, too small. The figures seem to show that, the higher the salaries, the higher the percentage of retirement income. Those who have now will continue to have in the future.

There have been 28 personnel changes since the first national survey took place just seven years ago. Only 13 directors have been in their present positions more than 10 years. In 7 States, the newly appointed director had no previous experience in weights and measures work. Twelve directors are college graduates, with two of them having earned the degree of Master of Science. Seven have had one or more years of college study, and three have attended business colleges.

In response to this question, "In order to achieve minimum uniformity in weights and measures legislation and enforcement, would you favor in principle a Federal grant to States which enact the Model Law *and* establish a minimum enforcement program, "there were 22 affirmative responses and 24 negative replies. Among the many comments, two pretty well summarize the opposing points of view. On the affirmative side, one director said: "Of course this is debatable, but we get Federal money for other purposes, such as public health and road building, so why not for weights and measures? This seems to be the trend, so we should get our share. I am not afraid of Federal control. Uniformity is so important that I am ready to risk it." Those who reject the proposal usually refer to themselves as "States' righters" and are fearful of Federal control. In the words of one man, "I never saw such a program yet under which the Feds didn't take over."

In my first report I stressed the need for, and importance of, a regular public information program. Directors' responses show only 12 States having such a program. But these figures reflect subjective judgments. In my judgment, some directors who said they do not have such programs have better programs than some who claim they do have a regular public information program. There are very few jurisdictions in which consumers are adequately aware of the weights and measures work being done in their behalf. If they were better informed, it seems reasonable to assume that they would support requests for more financial support of the important work you do.

VI

Table II presents responses to 14 questions concerning enforcement. Each director was asked how many prosecutions and how many convictions he had in 1962. Roughly, the responses divide directors into two schools of thought concerning enforcement—those who believe that "persuasion and cooperation" are more effective than prosecution, and those who believe that chronic offenders can be curbed only by legal action. Since my first survey, a significant number of directors, frustrated and impatient with the delays and favoritism in local courts, have turned to the use of the off-sale order as an enforcement weapon. They contend that it is swift and effective. It will be seen in column 1 that there were no prosecutions in 23 States, not counting Arkansas, which had no program in 1962. In some States, this means that there was really no enforcement program. I heard too many stories of collusion, and of interference by higher political officeholders. Some directors are discouraged, and some are cynical. One generalization emerges: whether as a result of "persuasion and cooperation" or prosecution, compliance is better in metropolitan centers among large firms.

Columns 3, 4, 5, and 6 in table II report budgets *in toto* and per capita. In analyzing these figures, it must be remembered that they represent understatements for Form 2 States. In Ohio, Pennsylvania, and New York, to mention only three of the larger States, counties and cities spend large additional sums for weights and measures administration and enforcement, but the total figures for such States are not known. The expenditures per capita range from a low of $\frac{9}{10}$ of a cent in Ohio to 20 cents in North Dakota. Some officials say 6 cents per capita is the minimum necessary for a good program; a few say that figure

is too low. Yet all but 11 States spend less than that amount: Florida, New Hampshire, and South Carolina spend 6 cents, Connecticut 7 cents, Oregon, 8 cents, Kentucky and Minnesota 9 cents, South Dakota 10 cents, Vermont 11 cents, West Virginia 12 cents, and North Dakota 20 cents. North Carolina spends 12 cents for its combined programs. Among these 12 States, 9 have Form 1 laws. Notice that West Virginia is the only State in this group which considers its budget adequate, while Arkansas, California, Illinois, Nebraska, and Oklahoma consider their budgets adequate even though the budgets amount to less than 6 cents per capita. One might well ask, "What is an adequate budget?" On the basis of my studies I must say that, in my judgment, some States whose budgets are less than 6 cents per capita have stronger programs than some whose budgets are 6 cents or more. However, there remains a strong presumption that a State with a Form 1 law and a budget of 6 cents or more per capita will have a strong weights and measures program.

"Does your law provide for, or permit, the use of fees?" Directors in 22 States responded affirmatively to this question. "Do you think it is a good idea to charge inspection fees to finance, or help to finance, enforcement of the law?" A minority of 10 directors answered "Yes." A typical comment was that, when testing is done at the request of the owner of the device or when testing requires special equipment, a fee is justified. On the other hand, when the testing is for public benefit, the service should be performed without a fee, as police and fire protection are provided. The use of fees tends to cause resentment. Inspectors are accused of testing just to collect their fees. To avoid this problem, Oklahoma tried billing from the office, but that was unsatisfactory. It is significant that 12 of the 22 directors in States which use fees would like to abolish them, while only 3 officials whose laws do not permit fees would like to install a fee system.

Of the 47 States, plus the District of Columbia, included in the survey, 42 have officially adopted Handbook 44, while 3 States follow it unofficially.[4] This represents a long step toward uniformity among the States.

Responses to the next two questions may be discussed jointly. Only 18 State directors think their equipment is adequate to do the job they would like to do, and only 14 report adequate laboratory facilities. The basic essentials to a good weights and measures program are personnel and equipment, while an adequate budget is essential for both. The disparity among the States in equipment and personnel is much too great. In some jurisdictions equipment is, in effect, purchased with money which should go for salaries. As prices continue to rise year by year, the low-budget States fall farther and farther behind in salaries and equipment. At the same time, population continues to grow. This is why a formula relating budgets to cents per capita is important. The 6-cents-per-capita formula is no longer valid. Perhaps a Conference committee should study this problem and provide a new formula. Something in the order of a 50-percent increase (9 cents per capita) seems appropriate as a beginning for discussion.

"Would you favor, in principle, having the National Bureau of Standards test and approve all new equipment as a prerequisite for sale in your State?" The overwhelming affirmative response to this question is impressive. Out of 46 replies, 37 do favor NBS-type approval. If the compulsory feature were eliminated, two more officials would have answered affirmatively. This is an 80-percent affirmative vote. This issue has been discussed and debated more than once in this Conference. In addition, it has been discussed in regional conferences. Having listened to some of those discussions, I had gotten the impression that there was more opposition to the plan than my survey shows. Answers to the two preceding questions emphasize the inability of most States to test new equipment adequately. Now some States depend on the National Bureau of Standards and small-budget States depend on large-budget States. In the words of one official, "This is not a States'-rights issue." Rather it is an issue involving equity and uniformity in testing greatly increasing numbers of complicated weighing and measuring devices.

Another policy issue was presented in this question: "Do you think it is feasible to do more checking of package weights in processing plants?" This question was suggested by an incident related to me in the first survey. In Form 1 State X, an inspector found all one-pound cans of Y brand coffee short weight 4 ounces. A subsequent statewide inspection found 100,000 cans of Y brand coffee each short weight 4 ounces. All cans were condemned and re-

[4] This number includes those States that have taken official action subsequent to the survey.

turned to the packer. All of this inspecting required many man hours, which could have been saved if one man had sample-checked the weights in the packing plant. Subsequent disclosures before the Hart Committee during the hearings on S. 387 seemed to stress the importance of quantity control at the source. Finally, the publicly announced Wisconsin policy of shifting emphasis from 100-percent testing of retail devices to selective testing of such devices and to emphasis on at-the-source package checking gave this question added significance. The preponderance of affirmative responses indicates an imminent basic change in State enforcement programs. Out of 46 replies, 38 (83 percent) were affirmative. There were surprisingly few comments. One concerned the problem of moisture loss for certain commodities. Another expressed the view that quantity control is the packer's responsibility. Obviously, quantity control is also a responsibility of the retailer, yet weights and measures officials traditionally inspect not only devices but also packages in retail stores. Combined with a similar cooperative program for packaging plants, inspection can be strengthened in the 38 States whose officials favor more plant inspection.

The last question in Part III also was suggested by comments in response to a question in the first survey. When asked what consumer-buyers could do to help themselves, a substantial number of directors said: "Tell them to be alert; to watch the weighing and measuring process; and to report anything which they think should be checked by an official inspector." These replies led me to visualize an "unofficial inspector" program in which a director would enlist the interest and support of an organization like the League of Women Shoppers. The weights and measures program would be described to the women, who would then "be alert" and report anything to the director which they thought should be investigated. These "unofficial inspectors" obviously would add a considerable number to the staff of inspectors and thereby make the inspectors' work more effective. Of those interviewed, 28 (60 percent) favor such a plan. In fact, the plan is already in operation in Connecticut.

VII

This brings us to the general concluding questions in Part IV of the questionnaire. Seven years ago, more directors made estimates of the annual dollar loss to consumer-buyers as a result of short weights, short measures, and short counts in their States. A typical response was: "I don't know. I couldn't even guess. But I am sure it would be enormous." In one State which has a good program and whose director is an experienced official, the estimate was $150 per person, which would amount to $900 million annually in that one State. Other directors insisted that the loss is negligible. Perhaps this question should be left with the generalization in quotation marks above.

"Are checkout practices a problem?" Table III shows that directors in 15 States think they are; most of the others do not think so. Hardly any State laws give administrative officials authority over checkout practices. This is not a weights and measures problem. But whose problem is it? Likewise, with shortchanging. Seven directors think shortchanging is common enough to be a problem. But whose problem is it? Should inspectors in each jurisdiction periodically investigate checkout practices and the accuracy of change? Perhaps this is a task on which "unofficial inspectors" could be used.

Only 7 officials would hazard an estimate as to the number of consumer-buyers who try to take advantage of retail sellers by such dishonest tricks as shifting price labels, pilfering from packages, and so on. Not all consumers are honest, nor are all sellers dishonest. Yet the presumption seems to prevail that consumers are the innocent victims in the market who must alway be protected. Obviously, this is not a weights and measures problem, but it is one to the solution of which weights and measures officials might make a contribution.

What about the other side of the counter? Sellers have the advantage if they wish to short weight and short measure. Drawing on their experience, directors were asked what percentage of the retail sellers in their States seem to be deliberate shorters. Twenty-five did not venture an estimate, but did make such comments as these: "It's being done." "Very small; have some." "Any answer would be an indictment of an industry." "Very few, mostly corner groceries." "Almost all are careless." "Deliberate shorting exceeds careless shorting. Big stores are O.K. Little stores are the offenders." "More shorters in gas stations than in stores." Column 4 shows 20 responses with estimated percentages ranging from 1 to 25, with 5 being the most frequently mentioned figure. One respondent said, "I managed a store 8 years. Managers are under the

pressure of incentive plans and are eager beavers." Another director said, "Most butchers are crooked, according to a chainstore supervisor." And another, "Meat and produce are the worst areas." Out of the wisdom of many years, one director said, "Sixty-five percent are real honest; 25 percent are as honest as you make them be; 10 percent are never honest."

What percentage of retail merchants are shorters, not because they intend to be, but because of carelessness? Out of 21 estimates, table III, column 5 shows percentage figures ranging from ½ to 30, with 10 being mentioned six times, 15 five times, and 5 three times.

The next two questions dealt with most common methods of shorting and suggestions for consumer-buyers to help them protect themselves. Responses to similar questions in the first survey were reported in *Watch Your Weights and Measures*, published by the Council on Consumer Information, Greeley, Colorado, 1957. In that pamphlet, 45 methods of shorting were described and antidotes prescribed. This survey shows most of the old shorting methods still in use, plus a few new tricks. The evidence suggests that eternal vigilance is necessary.

State officials were asked whether they have any special problems, other than lack of money and personnel. Seventeen responded negatively, and 23 said yes. The farm milk tank is still a problem in 8 States. In 6 of the large western States, the sparse population and long distances to travel present an obvious problem. Parenthetically, it should be reported, as it was 7 years ago, that there is strong sentiment west of the Mississippi River to alternate National Conference meetings between Washington and, perhaps, Boulder, Colorado. The present imbalance in the Conference between nearby States and distant States calls for correction. Other special problems mentioned concerned LP Gas enforcement, slow-flow meters, large fuel-oil meters, and the calibration of plastic liquid-fertilizer tanks.

Table III, column 6, shows only 13 States have promulgated the Model State Regulation Pertaining to Packages, adopted by the National Conference in 1960 and amended in 1961. Five State directors reported that they follow the Model in essence. Among the 33 negative responses, one official said he had never heard of the Model regulation, and I suspect there were others who were unaware of it.

Responses to the next question, shown in column 7 of table III, are much more affirmative. Thirty-three States follow *Handbook 67* when checking prepackaged commodities, and two more follow it in essence. One disquieting fact which emerged is that too many of the negative-response States are not doing any packaging checking. The usual apology was lack of money and personnel.

Not shown in the table are the 35 States which favor required registration of scale servicemen with the department of weights and measures. Several States now require registration, and some others have it under consideration.

A major development since the first survey has been the introduction in Congress of S. 387 by Senator Philip A. Hart, who has addressed this Conference on two occasions. In his second appearance here, the Senator presented a preview of the bill, upon which hearings were subsequently held. Five State directors had not studied the bill up to the time of our interview, but two of them expressed opinions nonetheless. As column 8 shows, 35 of the respondents favor the bill and 8 oppose it. This is an impressive 81-percent vote for the bill. Here are some negative comments: "It grants unlimited authority to Federal agencies, and present laws are adequate; what we need is stronger enforcement." "The bill is O.K., but I don't like F&D and FTC administering it." "It is too extreme and unreasonable; it would increase cost to consumers." "Federal authority would be divided still more among FDA, FTC, USDA, and Treasury, creating more confusion." "We are States' righters: the purpose of the bill is good, but we should do the job." The last comment came from a Great Lakes area State.

A contrasting view in support of the bill comes from a southern State in these words: "I am not fearful of States' rights." Another from a border State: "I have no qualms about the Feds. It can't be done any other way. States can't do it." "It would strengthen our hand," says one New Englander. Another said, "It deserves the support of every official. We can see improvement in attitudes after the hearings." A similar view from a western State: "The publicity so far has helped. This bill would save the States a lot of duplication of effort and would cure a lot of ills."

In 1962, and again in 1963, the Weights and Measures Advisory Committee strongly recommended that the United States change to the metric system of weights and measures "in order to continue to operate most effectively in world commerce." Thirty-five out of 44 responding directors (80 percent) agree with the Committee. In one midwestern State, the director and his staff believe the

Table I

State	1 Civil Service	2 Number of employees	3 1 inspector per 50,000	4 Director's salary 1963	5 Inspector's salary minimum	6 Inspector's salary maximum	7 Compulsory retirement?	8 What age?	9 Retirement income as percent of salary	10 No. of years as Director	11 No. of years W&M work	12 Favor Federal grant?	13 Information program?
Alabama	Y	19	N	6,000	3,540	4,560	Y	70	(?)	5	16	Y	N
Alaska	N	1	N	10,020	N.A.	N.A.	Y	N.A.	(?)	3	3	N.A.	N.A.
Arizona	N	7	N	9,600	6,000	6,000	Y	70	N.A.	20	20	N	N
Arkansas	N	7	N	N.A.	N.A.	N.A.	N	------	N.A.	0	0	N	N
California	Y	59	N	13,992	5,280	11,520	Y	70	75	3	26	N	N
Colorado	Y	14	N	8,727	6,840	6,840	N	------	50	10	37	Y	N
Connecticut	Y	24	Y	8,900	4,760	7,640	Y	70	50	1	N.A.	Y	Y
Delaware	Y	5	N	7,000	5,000	6,000	Y	70	[8] 42	1	1	Y	Y
District of Columbia	N	18	N	13,340	6,090	7,935	Y	70	80	21	21	N	N
Florida	N	79	N	12,042	3,620	6,000	N	------	[8] 70	37	[9]18	N	N
Georgia	Y	28	N	7,020	2,628	3,900	Y	70	(?)	7	8	Y	N
Idaho	N	7	N	5,820	5,400	5,940	Y	70	[8] 33	8	8	N	N
Illinois	Y	35	N	10,800	4,380	6,000	N	------	------	2	0	N	N
Indiana	Y	8	Y[1]	8,400	5,700	7,200	Y	70	50	30	30	Y	Y
Kansas	Y	8	N	9,456	3,708	5,232	Y	70	[8] 50	16	16	N	Y
Kentucky	N	36	N[2]	7,800	3,516	4,740	Y	65	56	16	16	Y	N
Louisiana	Y	21	N	[4] 7,800	4,560	5,280	Y	65	50	2	15	N	N
Maine	Y	4	N	6,240	4,914	4,914	Y	70	50	7	15	Y	N
Maryland	N	7	N	(7)	4,540	5,677	Y	70	[8] 50	10	12	N	N
Massachusetts	Y	21	N	9,035	6,825	6,825	Y	70	80	4	4	Y	N
Michigan	Y	21	N	(5)	5,500	7,000	Y	70	50	5	5	Y	N
Minnesota	Y	36	N	7,850	4,620	7,104	Y	70	50	3	16	Y	N
Missouri	N	11	N	5,700	3,300	4,200	Y	65	------	6	10	N	Y
Montana	N	10	N	6,400	4,500	6,300	Y	70	70	1	9	N	N
Nebraska	N	11	N	7,200	4,200	4,800	N	------	[10]	15	22	N	N
Nevada	Y	12	Y	9,444	4,584	5,568	N	------	65	4	10	N	N
New Hampshire	N	7	N	5,474	4,764	4,764	Y	70	50	14	14	N	N
New Jersey	Y	53	Y	11,000	3,063	6,482	Y	70	50	5	24	N	N
New Mexico	N	7	N	(7)	4,800	6,300	Y	70	60	1	1	N	N
New York	Y	11	N	10,950	5,200	6,600	Y	70	50	5	21	Y	Y
North Carolina	N	76	N	10,608	3,600	5,000	Y	65	N.A.	35	35	N	N
North Dakota	N	6	N	6,000	4,800	4,800	N	------	[10]	1	6	Y	N
Ohio	Y	6	N	8,640	3,168	4,800	Y	70	40	4	24	N	N
Oklahoma	Y	18	N	6,600	3,960	4,440	N	------	[11]	4	14	Y	N
Oregon	Y	14	N	7,860	5,760	5,760	Y	70	50	14	18	Y	Y
Pennsylvania	N	30	N	13,308	3,900	N.A.	N	------	(?)	8	8	Y	Y
Rhode Island	Y	4	Y[3]	6,400	3,380	5,200	Y	70	75	34	34	Y	Y
South Carolina	N	21	N	8,250	4,000	5,000	Y	72	40	3	17	N	Y
South Dakota	N	6	N	5,940	[6] 5,400	5,400	N	------	[10]	½	½	N	N
Tennessee	N	8	N	8,220	3,960	3,960	Y	70	75	18	16	Y	N
Texas	N	50	N	7,008	4,320	5,580	N	------	50	0	8	N	N
Utah	N	4	N	7,196	5,392	7,188	N	------	[12]	3	5	Y	N
Vermont	Y	7	N	7,982	4,212	5,746	Y	70	34	9	18	N	N
Virginia	Y	34	N	8,890	4,300	5,400	Y	65	[8] 40	7	11	N	N
Washington	N	15	N	7,860	5,098	6,048	Y	70	60	5	5	N	N
West Virginia	N	28	N	7,300	4,770	4,770	N	------	50	3	3	Y	N
Wisconsin	Y	19	N	(7)	5,220	9,240	Y	65	75	2	12	Y	Y
Wyoming	N	4	N	7,320	4,800	6,300	Y	68	43	11	12	Y	Y

"Y" indicates "Yes."
"N" indicates "No."
"N.A." indicates "No answer."
Question mark (?) indicates "Does not know."

[1] Counting local officials.
[2] Do have 1 to 50,000 for all but congested areas.
[3] Counting 49 local inspectors.
[4] Expects to go to $9,600; two raises behind.
[5] No one official is responsible for weights and measures only. If there were such an official, his salary would probably be $10,500 to $11,600.
[6] Salaries to be increased in 1963.
[7] Confidential.
[8] Plus Social Security.
[9] No weights and measures work until 1945.
[10] No State plan, but are under Social Security.
[11] Retirement plan expected this session.
[12] Retirement plan enacted two years ago; includes Social Security.

Table II

State	1	2	3	4	5	6	7	8	9*	10	11	12	13	14	15
	Prosecutions 1962?	Convictions 1962?	$ Budget 1963	Cents per capita	Adequate?	$ Money needed?	Use fees?	Approve fees?	H–44 adopted?	Equipment adequate?	Laboratory adequate?	Favor NBS type approval?	Favor store test scales?	Check packages in plants?	Favor "unofficial inspectors"?
Alabama	0	0	67,000	2	N	100,000	N	Y	Y	N	N	Y	Y	Y	Y
Alaska	N.A.	N.A.	N.A.	----	--	N.A.	N	Y	Y	Y	Y	Y	Y	Y	Y
Arizona	0	0	70,785	5	--	140,000	Y	N	N [6]	N	N	Y	Y	Y	Y
Arkansas	0	0	72,000	4	Y	---------	N	Y	Y	N	N	N.A.	Y	N.A.	N
California	144	133	650,418	4	Y	N.A.	N	N	Y	Y	Y	Y	Y [7]	Y	Y
Colorado	2	2	89,024	5	N	154,087	Y	N	Y	N	N	Y	N	Y	N
Connecticut	0	0	174,000	7	N	200,000	Y	Y	Y	Y	Y	N	Y	Y	Y
Delaware	5	5	66,100	1	N	84,000	N	N	Y	N	N	Y	Y [7]	N	N
District of Columbia	49	49	[1] N.S.B.	----	--	---------	N	N	Y	Y	Y	N	N	N	N
Florida	0	0	325,000	6	N	650,000	N	N	Y [8]	Y	N	N	Y	(?)	N
Georgia	0	0	[1] N.S.B.	----	--	---------	N	N	Y	N	Y	Y	Y	Y	Y
Idaho	0	0	64,275	1	N	70,675	Y	(2)	Y	N	N	Y	Y	Y	Y
Illinois	0	0	192,000	2	Y	---------	Y	Y	Y	Y	N	Y	Y	Y	N
Indiana	0	0	[1] N.S.B.	----	--	---------	N	N	Y	N	N	Y	N	Y	?
Kansas	1	1	79,127	4	N	104,127	N	N	Y	N	N	Y	N	N	Y
Kentucky	7	7	265,000	9	N	331,000	N	N	Y	N	N	Y	Y	Y	Y
Louisiana	0	0	151,000	5	N	200,000	N	N	Y	N	N	Y	N	Y	Y
Maine	0	0	38,000	4	N	100,000	Y	N	Y	N	N	Y	Y	Y	Y
Maryland	1	0	[1] N.S.B.	----	N	N.A.	N	N	N [6]	Y	N	N	N	N	Y
Massachusetts	32	32	140,691	3	N	150,000	Y	Y	Y	N	N	Y	N	Y	N
Michigan	145	145	150,000	2	N	300,000	N	N	Y	N	N	Y	N	N	N
Minnesota	8	8	290,684	9	N	N.A.	Y	Y [3]	N	N	N	Y	Y	Y	Y
Missouri	0	0	87,280	2	N	214,120	N	N	Y	N	N	Y	Y	N	Y
Montana	8	8	93,995	1	N	188,000	Y	N	Y	N	N	Y	N	Y	Y
Nebraska	0	0	30,000	2	Y	---------	Y	D [4]	N	Y	Y	Y	N	Y	N
Nevada	0	0	123,000	4	N	400,000	Y	Y	Y	N	N	Y	N	Y	Y
New Hampshire	0	0	38,354	6	N	75,000	Y	N	Y	N	N	Y	N	Y	Y
New Jersey	800	770	320,000	5	N	425,000	N	N	Y	N	N	N	N	Y	Y
New Mexico	0	0	62,000	5	N	124,000	Y	N	Y	N	N	Y	N	Y	Y
New York	------	------	85,000	1/2	N	170,000	N	N	Y	N	Y	N	Y	Y	Y
North Carolina	------	------	133,257	3	--	---------	----	----	----	----	----	----	----	----	----
	12	10	398,355	9	N	N.A.	N	N	Y [9]	Y	Y	N	N	N	N
North Dakota	3	3	123,953	20	N	150,000	Y	N	Y	N	N	Y	Y	Y	N
Ohio	0	0	57,802	6/10	N	65,000	N	N	Y [9]	N	Y	Y	N	Y	N
Oklahoma	4	0	100,000	4	Y	---------	Y	N	Y	Y	N	Y	Y	Y	Y
Oregon	1	1	133,922	8	N	230,000	Y	N	Y	Y	N	Y	N	Y	N
Pennsylvania	N.A.	N.A.	276,000	2	N	552,000	N	N	Y	Y	N	Y	Y	Y	Y
Rhode Island	0	0	30,039	3	N	N.A.	Y	N	N [6]	N	N	N	Y	Y	Y
South Carolina	0	0	135,000	6	N	200,000	N	N	Y	N	N	Y	Y	Y	N
South Dakota	0	0	65,000	10	N	100,000	[5] Y	Y	Y [10]	Y	Y	Y	Y	Y	N
Tennessee	0	0	65,000	2	N	195,000	N	N	Y	Y	Y	Y	Y	Y	Y
Texas	N.A.	N.A.	[1] N.S.B.	----	--	---------	Y	Y	Y	Y	Y	Y	N	Y	N
Utah	0	0	[1] N.S.B.	----	N	---------	Y	Y	Y	N	N	Y	Y	Y	N
Vermont	0	0	45,590	11	N	65,000	N	N	Y	N	Y	Y	Y	Y	Y
Virginia	16	14	265,000	4	N	325,000	Y	N	Y	Y	N	N	Y	Y	Y
Washington	5	4	132,621	5	N	264,000	Y	N	Y	N	N	Y	N	Y	Y
West Virginia	25	25	224,000	12	Y	---------	N	N	Y	N	N	Y	N	N	N
Wisconsin	16	6	215,000	5	N	300,000	N	N	Y	N	Y	N	N	Y	Y
Wyoming	0	0	[1] N.S.B.	----	N	56,000	N	N	Y	Y	N	Y	Y	Y	N

"Y" indicates "Yes."
"N" indicates "No."
"N.A." indicates "No answer."
Question mark (?) indicates "Not sure."

[1] "N.S.B." indicates "No separate budget."

[2] Mixed reactions. "No" for food and gas pumps, but "yes" when public is not using. For example, farm milk tanks.

[3] When at owner's request, or when special equipment or lab work is required.

[4] Debatable.

[5] Only on heavy-duty scales.

[6] Follow unofficially.

[7] No in prepackage stores, because of tare problem. Delaware says tare problem can be handled by tare chart.

[8] Follow 98 percent.

[9] Minor alterations.

[10] Partially adopted.

*This column has been updated as of June 1, 1964.

TABLE III

State	1 Checkouts a problem?	2 Shortchanging a problem?	3 Percent of buyers dishonest?[1]	4 Percent of sellers deliberate shorters?	5 Percent of sellers careless shorters?	6 Adopted Model Package Regulation?	7 Follow H–67?	8 Favor S. 387?	9 Should U.S. go metric?	10 Public support metric?	11 Relations with FDA OK?	12 Relations with USDA OK?	13 Relations with FTC OK?	14 Relations with IRS OK?	15 Suggestions?
Ala.	(?)	Y	N.A.	N.A.	N.A.	Y	Y	Y	Y	N.A.	Y	Y	N.E.	N.E.	Y
Alaska[3]															
Ariz.	N	N	(2)	N.A.	N.A.	N	N	Y	N	N	Y	Y	N.E.	Y	N
Ark.	N.A.	(?)	(?)	(?)	(?)	Y	Y	N.A.	Y	N	Y	Y	Y	Y	N
Calif.	N	N	(2)	1	5	N[4]	N	Y	Y	Y	Y	N	N.E.	N.E.	Y
Colo.	N	N	(2)	2	10–12	N	N[5]	Y	N	N	Y	Y	Y	Y	N
Conn.	Y	N	1	1	5	N	N	Y	Y	N	Y	Y	N.E.	Y	N
Del.	N	N	N.A.	25	N.A.	Y	Y	Y	Y	N	Y	N.E.	N.E.	N.E.	N
D.C.	N	N	(2)	5	10	N	N	N	Y	Y	N	Y	N.E.	N.E.	Y
Fla.	Y	N	(2)	N.A.	N.A.	N[4]	N[4]	N	Y	N	N.E.	N	N.E.	N.E.	Y
Ga.	N	N	(2)	2	2	N[4]	Y	Y	Y	Y	Y	Y	N.E.	N	N
Idaho	N	N	(2)	(2)	(2)	Y	Y	Y	Y	Y	Y	Y	N.E.	N.E.	Y
Ill.	(?)	(?)	N.A.	N.A.	N.A.	Y	Y	Y[6]	Y	Y	N	N.E.	N.E.	N	N
Ind.	N	N	N.A.	5	10	N[5]	Y	Y	Y	N	Y	Y	N.E.	N.E.	Y
Kans.	Y	Y	N.A.	5	30	Y	Y	Y	Y	N	Y	Y	N.E.	N.E.	Y
Ky.	Y	N	N.A.	5	15	Y	Y	Y	Y	Y[6]	N	N	N.E.	N	Y
La.	Y	(1)	1–3	5	15	Y	Y	Y	N	N	Y	Y	Y	Y	N
Maine	N	N	N.A.	(2)	(2)	N	Y	Y	Y	N	N	N.E.	N.E.	N.E.	Y
Md.	N	N	N.A.	N.A.	N.A.	N[4]	Y	Y[6]	Y	N.A.	Y	Y	N.E.	Y	N
Mass.	N	N	(2)	N.A.	N.A.	N	N	Y	Y	N	Y	Y	Y	Y	N
Mich.	Y	N	(?)	N.A.	N.A.	N	Y	N	Y	(?)	Y[7]	Y[7]	Y[7]	N	Y
Minn.	N	N	N.A.	(2)	(2)	N	Y	Y	Y	Y	Y[7]	N.E.	N.E.	N.E.	N
Mo.	Y	Y	5	3–4	5	Y	Y	Y	Y	N	Y	Y	N.E.	N.E.	Y
Mont.	Y	N	(2)	5	15	N	Y	Y	Y	N	Y	Y	N.E.	N.E.	Y
Nebr.	N	N	(?)	(2)	(2)	N	N	N.A.	Y	N	Y	Y	N.E.	N.E.	N
Nev.	N	N	N.A.	N.A.	N.A.	N	Y	Y	N.A.	Y[6]	Y	Y	Y	N.E.	Y
N.H.	Y	N	(2)	(2)	½	N	Y	Y[6]	Y	N	Y	Y	N.E.	N.E.	Y
N.J.	N	N	2–5	2–3	15	N	N[4]	Y	(?)	(?)	Y[6]	Y	N	N.E.	Y
N. Mex.	Y	Y	(?)	4	10	N	Y	N	Y	N	N.E.	Y	N.E.	N.E.	Y
N.Y.	N	N	(2)	N.A.	N.A.	Y	Y	Y	N	N	Y	Y	Y	N.E.	Y
N.C.	N	N	N.A.	(2)	(2)	N	N	N	N	N	N	N	N	N	Y
N. Dak.	N	N	(?)	(?)	(?)	N.A.	N	Y	(?)	(?)	Y	Y	N.E.	N.E.	N
Ohio	N.A.	N.A.	N.A.	N.A.	N.A.	N	Y	N	N[6]	N	Y	Y	N.E.	N.E.	Y
Okla.	N	N	(?)	(?)	(?)	N	N	Y	Y	N	Y	N.E.	N.E.	N.E.	N
Oreg.	N	N	N.A.	(?)	(?)	N	Y	Y	Y	Y	Y	Y	N.E.	N.E.	N
Pa.	N	N	(?)	(?)	(?)	N	Y	Y	Y	N	Y	Y	Y	Y	Y
R.I.	Y	Y	(?)	(2)	(2)	N	Y	Y	Y	N	Y	Y	Y	Y	N
S.C.	N	N.A.	N.A.	10	N.A.	Y	Y	Y	Y	N[6]	Y	Y	N.E.	N	N
S. Dak.	Y	N	(2)	N.A.	(?)	N	Y	Y	Y	N	Y	Y	Y	Y	N
Tenn.	N	N	15	10	25	Y	Y	Y[6]	Y	N	Y	Y	N.E.	N.E.	N
Tex.	N	N	N.A.	N.A.	N.A.	N	N	N.A.	N	N	Y	Y	N.E.	N.E.	N
Utah	Y	N	(?)	N.A.	N.A.	N	Y	N.A.	Y	Y	Y	Y	N.E.	N.E.	N
Vt.	N	N	(?)	10	25	N	N	Y	N	N	Y	Y	Y	Y	Y
Va.	(?)	N	5	7	10	Y	Y	N	Y	N	N	N	N.E.	N	Y
Wash.	N	N	(2)	5	10	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
W. Va.	N	N	N.A.	(2)	(2)	N[4]	Y	N	N	N	N.E.	Y	N.E.	N.E.	N
Wis.	Y	Y	N.A.	1	3–4	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wyo.	Y	Y	(?)	(?)	(?)	N	Y	Y	Y[6]	Y[6]	Y	Y	N.E.	N.E.	Y

Question mark (?) indicates "Do not know."
"Y" indicates "Yes."
"N" indicates "No."
"N.A." indicates "No answer."
"N.E." indicates "No experience."

[1] In some places.
[2] Small; no problem.
[3] No answers to any Part IV questions.
[4] But do it much the same.
[5] Hope to adopt soon.
[6] Qualified answer.
[7] Limited experience.

change is coming and, when buying new equipment, they anticipate the need for metric measurements. There were not many comments by those who favor the change, but here are four negative views. "If they want our goods, they will buy. Changeover to the decimal system has slowed down the clamor for metric." "Let Europe conform to us. We are furnishing the money; we favor the decimal system, which is legal in our State." "What would consumers gain?" "We have done pretty well with our system. Let the other guys do the changing. I bet the scale manufacturers would like to see this change go through."

"In working on mutual weights and measures problems with the Food and Drug Administration, the U.S. Department of Agriculture, the Federal Trade Commission, and the Internal Revenue Service, has your experience been satisfactory?" For FDA, 38 directors answered affirmatively, 6 negatively, and 3 reported no experience with that agency. Responses concerning USDA were almost identical, 37, 5, 5. Thirty-two States have not had any experience with FTC. Among the 15 which have had contacts, 13 reported satisfaction, and only 2 were dissatisfied. Responses concerning IRS were quite similar, 27, 13, 7, Because of the small number of unsatisfactory experiences reported for all of these Federal agencies and because this report is already too long, I have decided to omit the comments made to me. I think they have all been expressed in the National Conference or in regional conferences.

The interviews ended with this question: "Do you have any suggestions for improving Federal-State cooperation in weights and measures?" In this case a "No," of which there are 22, indicates complete satisfaction with the work of the Office of Weights and Measures. Among the 25 who offered suggestions, they were preponderantly favorable and constructive. Repeatedly I recorded responses like these: "OWM has been wonderful. Their attitude is good. I hope ours has been as good and that NBS will continue to assist us." "Of all Federal agencies, I am most happy with NBS. Somehow NBS works more closely with the States." "NBS is doing an outstanding job on the State Training Program, especially considering the limited personnel." "Bussey, Jensen, Wollin are topnotch men." "OWM doing a splendid job." "OWM cooperation is marvelous. I don't know how it could be improved." "The technical training program has done me more good than anything else. People should be waiting in line." "We need their help, but they need more money."

Many of the interviews concluded with discussions of the National Conference organization and programs. Many State officials are satisfied with things as they are, but there are many who would like to see some changes. For emphasis, I repeat the prevalence of dissatisfaction among States west of the Mississippi River with the practice of convening the National Conference in Washington every year. Far-away officials feel that they are discriminated against. Because of small budgets, they cannot travel so far, nor can their staff members. Travel time is a factor also. As a result, the larger delegations from nearby States dominate the Conference. In the words of one western director, "They can vote in or vote down whatever they wish." A director in a southern State suggested that this problem be met by unit voting and a roll call by States. Another said: "We are a long way from Washington. They don't get here, so why should we go there? I send all my inspectors to the Western Conference and thereby get more for our money than by sending one man to Washington." Still another complained that, "although I have been asked to serve on Conference committees, the invitation was tied to the condition that I attend the Conference every year, which I cannot do." Still another said, "I am a little guy from a little State and I get squashed; so why go?" Thirteen men said, in effect, "It would be to our advantage to have the National Conference meet in Boulder every other year."

There were many comments concerning the Conference program, ranging from complete approval to trenchant criticism. Some think it is too long. It is so tight that one does not have time to talk with Federal officials or with fellow State officials. Some like speakers from other countries, but others think the time could better be spent on State problems. There is a substantial body of opinion that industry representatives exercise disproportionate influence on Conference deliberations. As one director expressed it: "I sometimes feel more time is spent on industry problems than on our problems." "Why let them in our plenary sessions? All they do is lobby." Also the practice of voice voting "makes it possible for them to vote." There are mixed reactions to the trade party—positive, neutral, and negative. The absence of a body of consumer representatives was noted. The annual meeting has become a semisocial convention more than a conference, in the opinion of some respondents. "Why not have evening meetings?"

The strength of a democratic organization lies in its capacity to accept and act upon criticism. On the basis of my survey, it is my considered judgment that, in the years 1964 and 1965, the new leaders of the National Conference have an opportunity to pause, take stock, and evaluate Conference organization, procedures, and program. Even if no changes were made, the process of free, open, honest, critical self examination could have a salutary effect. The National Conference on Weights and Measures is a unique and excellent organization. It serves its purposes, its members, and the public well. But, like all organizations, it must guard against becoming institutionalized. Traditions are valuable and venerable, but they should not impede adjustment to rapid technological changes. As this Conference looks to the future, under new leaders, let us all join in the hope that it will serve the States and the people as effectively as it has in the past.

10. Summary

In conclusion, this Committee wishes to acknowledge its great indebtedness to William S. Bussey, recently retired as Secretary of the National Conference, for his always well-considered advice and cooperation in the accomplishment of Committee business, and wishes to express its appreciation for the identical qualities proven so apparent in his successor Secretary, Malcolm W. Jensen, Chief, Office of Weights and Measures, and Richard N. Smith, Technical Coordinator, Office of Weights and Measures of the National Bureau of Standards. Mr. Jensen, and Mr. Smith as staff assistant assigned to the Committee, through inspirational assistance have both proven possessed of an understanding of Committee problems and procedures, and this wholehearted cooperation in the furthering of Committee projects is indispensable to the successful functioning of this Committee.

The Committee also wishes to offer grateful thanks for the many suggestions that have been received and for the excellent cooperation of weights and measures officials, weights and measures associations, business organizations, representatives of industry, and others, and takes this opportunity to register officially its sincere appreciation.

J. E. Bowen, *Chairman*
C. H. Stender
J. T. Daniell
S. H. Christie
L. A. Gredy
M. W. Jensen, *Secretary*

(On motion of the Committee Chairman, seconded from the floor, the Report of the Committee on Education was adopted by voice vote.)

REPORT OF THE COMMITTEE ON SPECIFICATIONS AND TOLERANCES

presented by R. E. Meek, *Chairman, Director, Division of Weights and Measures, State Board of Health, State of Indiana*

(Thursday, June 18, 1964, 11:08 a.m.)

The Committee on Specifications and Tolerances submits its report to the 49th National Conference on Weights and Measures, the report being comprised of the Tentative Report as amended by this Final Report.

1. SCALE CODE

1.1. *General Revision*

For several years the Committee has been studying the Scale Code to determine the feasibility of a complete revision directed toward simplification, clarification, and adjustment of tolerances. Such revision has been recommended by certain State and regional weights and measures associations and by the Scale Manufacturers Association. The 48th National Conference in 1963 adopted a recommendation of the Committee that this item be continued on the agenda for further study. Because of the pressure of other matters and the magnitude of this particular project, the Committee has not been able to devote to it sufficient time to develop firm recommendations. Additionally, it is the view of the Committee that, if a total revision of the Scale Code is to be undertaken, consideration should be given to similar revisions to other codes. Accordingly, the Committee makes no recommendation as to a Scale Code general revision at this time.

1.2. *Crane Scale*

The Scale Code was amended in 1960 by adding, among other things, a regulation paragraph (R. 4.6) requiring that the value of the minimum graduated interval on a crane scale be not greater than 0.2 percent of the nominal capacity of the scale; whereas for other large-capacity scales (except certain of these for which specific values for minimum graduated intervals are stipulated), the value of the minimum graduated interval is permitted to be not greater than 0.1 percent of the nominal capacity of the scale or ¼ pound, whichever is greater, and in any case not greater than 50 pounds (R. 4.7.). During discussions in the Committee and on the Conference floor in 1960, the term "crane" scale was used in its generic sense as a machine for raising and lowering heavy weights and, while holding them suspended, transporting them a limited lateral distance. Recently, from several sources, there has come to the attention of the Committee the question as to whether this larger minimum graduated interval should be permitted for any scale that, in effect, suspends a load.

It is the opinion of the Committee that the special requirements for crane scales should be applied only to those devices that truly are crane scales as the generic definition is interpreted severely.

(Item 1, Scale Code, was adopted by voice vote.)

2. CODE FOR LIQUID-MEASURING DEVICES

2.1. *Specification Paragraph S.3.3, ADVANCEMENT AND RETURN TO ZERO.*

A local weights and measures official has raised a question as to whether the requirements of specification paragraph S. 3.3 should be expanded to provide that, when a device is cleared by reversing the indicating elements to zero position, such reversal, once started, could not be interrupted or the indications be automatically obscured until the elements reach zero position. This question evolved from the installation of a new retail motor-fuel dispenser that is so designed that the indicating elements are returned to zero by reverse direction, and this return can be interrupted, thus providing an indication lower than the quantity actually delivered.

The Committee has studied this matter as it affects the total philosophy of weights and measures supervision. The design specifications of Handbook 44 generally are so written as to provide equity in commerce and generally so as to prevent any design that would tend to perpetrate fraud or to cause inaccuracy on the part of the equipment operator. The Committee believes that this is a sound philosophy and that the operator of a device is quite competent to look out for his own interests, whereas the customer normally has no control over the device.

The Committee recommends no action on this matter.

2.2. *Slow-Flow Meters*

The introduction to commercial service of so-called slow-flow meters for the purpose of measuring liquid fuel as this is delivered from a central storage facility and consumed at individual installations was discussed in the report of the Committee to the 48th National Conference on Weights and Measures. At the recommendation of the Committee, the Conference adopted a tentative table of tolerances for such meters for the purpose of exploration by enforcement officials of the technical requirements for such meters.

With the great increase in the installation of slow-flow meters and with the additional experience gained, the Committee now recommends that the Code for Liquid-Measuring Devices be amended to include all appropriate requirements for these devices.

The Committee received, during its open meeting, from the Meter Manufacturers Subcommittee for Slow-Flow Meters certain recommendations with respect to the Tentative Report. After full study of the matters, the Specifications and Tolerances Committee is of the view that the Liquid-Measuring Device Code amendments presented in its Tentative Report stand, except for notes paragraph N.2.3. NORMAL TESTS which, it is now recommended, be made to read as found in this final report.

Accordingly, the Committee recommends amendments to the Code for Liquid-Measuring Devices (1) to cover specifically slow-flow meters and (2) to realign the entire Notes section, the entire Tolerances section, and two Regulations paragraphs—all for the purpose of simplifying the clarifying existing requirements.

Renumber present definition paragraphs D.6. through D.13. to become D.7. through D.14., and insert a new definition paragraph D.6.

D.6. SLOW-FLOW METER.—A retail device designed for the measurement, at very slow rates, of liquid fuels at individual domestic installations.

Amend specification paragraph S.5.2. to read:

S. 5.2. LIMITATION OF USE.—If a device is intended to measure accurately only products having particular properties, or to measure accurately only under specific installation or operating conditions, or to measure accurately only when used in conjunction with specific accessory equipment, these limitations shall be clearly and permanently stated on the device.

Add after the center title between specification paragraph S. 5.2. and S. 10., page 86, the words

(BUT NOT TO SLOW-FLOW METERS)

Replace the present "N" Section with the following:

N. NOTES.

N.1. TEST LIQUID.—A liquid-measuring device shall be tested with liquid of the same general physical characteristics as the liquid to be commercially measured.

N.2. TESTING PROCEDURES.

N.2.1. TEST DRAFTS.

N.2.1.1. FOR RETAIL PISTON-TYPE AND VISIBLE-TYPE DEVICES.—The full capacity delivery and each intermediate delivery for which the device is designed shall be tested.

N.2.1.2. FOR SLOW-FLOW METERS.—Test drafts shall be equal to at least four times the minimum volume that can be measured by the device and indicated through either a visible indication or an audible signal.

N.2.1.3. FOR LUBRICANT DEVICES.—Tests shall include drafts of 1 quart and of 4 or 6 quarts.

N.2.1.4. FOR OTHER RETAIL DEVICES.—Tests shall include drafts of 1 or more amounts, including drafts of at least 5 gallons.

N.2.1.5. FOR WHOLESALE DEVICES.—Test drafts should be equal to at least the amount delivered by the device in one minute at its maximum discharge rate, and shall in no case be less than 50 gallons.

N.2.2. EVAPORATION AND VOLUME CHANGE OF TEST LIQUID.—Care shall be exercised to reduce to a minimum, evaporation losses and volume changes resulting from changes in temperature of the test liquid.

N.2.3. NORMAL TESTS.—The "normal" test of a meter or meter-type device shall be made at the maximum discharge rate that may be anticipated under the conditions of installation.

N.2.4. SPECIAL TESTS.—Special tests, to develop the operating characteristics of liquid-measuring devices, shall be made as circumstances require.

N.2.4.1. FOR SLOW-FLOW METERS.—A slow-flow meter shall be tested at a flow rate at least as small as twice the minimum flow rate, and not smaller than the minimum flow rate, to which the meter is subjected according to the particular installation.

N.2.4.2. FOR RETAIL MOTOR-FUEL DEVICES.—A retail motor-fuel device shall be tested at a minimum discharge rate of (a) 5 gallons per minute or (b) the minimum discharge rate marked on the device, whichever is less.

N.2.4.3. FOR OTHER RETAIL DEVICES.—These shall be tested at a minimum discharge rate of (a) 50 percent of the maximum discharge rate developed under the conditions of installation or (b) the minimum discharge rate marked on the device, whichever is less.

N.2.4.4. FOR WHOLESALE DEVICES.—A wholesale device with a rated maximum discharge rate of less than 75 gallons per minute shall be tested at a minimum discharge rate of (a) 15 gallons per minute or (b) the minimum discharge rate marked on the device, whichever is

less. A wholesale device with a rated maximum discharge rate of 75 gallons per minute or more shall be tested at (a) 20 percent of the marked maximum discharge rate or (b) the minimum discharge rate marked on the device, whichever is less.

N.2.5. ELAPSED-TIME TESTS.

N.2.5.1. DURATION.—The duration of an elapsed-time test on a liquid-measuring device shall in no case exceed 24 hours.

N.2.5.2. TEMPERATURE CORRECTION. In an elapsed-time test, the observed error on the delivery made after the device has stood unused shall be "corrected," if necessary, by allowing for the unavoidable volume change of the liquid in the device (approximately 1½ gallons in a retail meter-type device, and varying volumes in a wholesale device, depending on the installation) resulting from changes in temperature occurring during the period of nonuse of the device. In the case of motor fuels this temperature-volume change may be computed at 0.6 percent per 10° F, and 1.1 percent per 10° C, change of temperature.

* * * * * * *

Replace the present "T" section with the following:

T. TOLERANCES. (See also G–T.5. and G–T.6.)

T.1. APPLICATION.

T.1.1. TO UNDERREGISTRATION AND TO OVERREGISTRATION.—The tolerances hereinafter prescribed shall be applied to errors of underregistration and errors of overregistration. (See G–D.15.) (The error of a liquid-measuring device—to which the tolerance is applied—is the difference between the indication of the device and the amount of liquid actually delivered by the device.)

T.2. FOR RETAIL DEVICES EXCEPT SLOW-FLOW METERS.—Maintenance tolerances and acceptance tolerances, except on elapsed-time tests, shall be as shown in table 1.

TABLE 1.—*Tolerances for retail devices, except slow-flow meters and except on elapsed-time tests*

Indication	Maintenance tolerance (On normal and on special tests)	Acceptance tolerance (On normal and on special tests)
Gallons	*Cubic inches*	*Cubic inches*
½ or less	2	1
1	3	1½
2	4	2
3	5	2½
4	6	3
5	7	3½
Over 5	Add 1 cubic inch per indicated gallon	Add ½ cubic inch per indicated gallon

T.3. FOR SLOW-FLOW METERS.—Maintenance tolerances and acceptance tolerances shall be as shown in table 2.

TABLE 2.—*Tolerances for slow-flow meters*

Indication	On normal tests				On special tests	
	Maintenance tolerances		Acceptance tolerances		Maintenance and acceptance tolerances	
	Percent	(*Minims*)	*Percent*	(*Minims*)	*Percent*	(*Minims*)
1 gill	1. 00	(20)	0. 75	(15)	1. 25	(25)
0.05 gallon	1. 00	(30)	0. 75	(25)	1. 25	(40)
½ pint	1. 00	(40)	0. 75	(30)	1. 25	(50)
0.10 gallon	1. 00	(60)	0. 75	(45)	1. 25	(75)
1 pint	1. 00	(75)	0. 75	(60)	1. 25	(95)
0.20 gallon	1. 00	(120)	0. 75	(90)	1. 25	(155)
	(*Fl. drams*)		(*Fl. drams*)		(*Fl. drams*)	
1 quart	1. 00	(2½)	0. 75	(2)	1. 25	(3)
½ gallon	0. 75	(4)	0. 60	(3)	1. 00	(5)
1 gallon and over	0. 75	(8 per gallon)	0. 60	(6 per gallon)	1. 00	(10 per gallon)

T. 4. FOR WHOLESALE DEVICES.—Maintenance tolerances and acceptance tolerances, except on elapsed-time tests, shall be as shown in table 3.

TABLE 3.—*Tolerances for wholesale devices, except on elapsed-time tests*

Indication	On normal tests		On special tests
	Maintenance tolerance	Acceptance tolerance	Maintenance and acceptance tolerances
Gallons	*Cubic inches*	*Cubic inches*	*Cubic inches*
50	50	25	50
Over 50	Add ½ cubic inch per indicated gallon	Add ¼ cubic inch per indicated gallon	Add 1 cubic inch per indicated gallon

T.5. ON ELAPSED-TIME TESTS.—Maintenance tolerances on elapsed-time tests of liquid-measuring devices shall be as follows: For a retail device, 2 cubic inches on a test extending over a period of 1 hour or less, plus an additional ½ cubic inch for each hour or fractional part thereof beyond the first hour, but in no case more than 6 cubic inches. For a wholesale device, 5 cubic inches per hour. Acceptance tolerances shall be one-half the maintenance tolerances. (The error to which these tolerances are applied is the leakage error (see D. 14.).) (See also D. 13., N. 2.5.1., and N.2.5.2.)

Amend regulation paragraph R.2. to read:

R.2. LENGTH OF DISCHARGE HOSE.—The length of the discharge hose on a retail motor-fuel device shall not exceed 15 feet, measured from the outside of the housing of the device to the inlet of the discharge nozzle (on a hose that is coiled or otherwise retained or connected inside the housing, the measurement shall be made with the hose fully extended), unless it can be demonstrated that a longer hose is essential to permit deliveries to be made to receiving vehicles or vessels. Unncessarily remote location of a device shall not be accepted as justification for an abnormally long hose.

Amend regulation paragraph R.3. to read:

R.3. RETURN OF INDICATING ELEMENT TO ZERO.—On any device used in making individual retail deliveries to individual consumers, the primary indicating element shall be returned to zero before each such delivery.

(Item 2, Code for Liquid-Measuring Devices, was adopted by voice vote.)

3. CODE FOR LIQUEFIED PETROLEUM GAS LIQUID-MEASURING DEVICES

3.1. ***Specification Paragraph S.11.2. VISIBILITY.***

In 1962, the 47th National Conference voted to delete from the Liquid-Measuring Devices Code specification paragraph S.11.3 pertaining to the visibility of retail devices. For the reasons set forth in the report of that Conference, the Committee recommends that the paragraph in this code containing the same language as the deleted paragraph in the LMD Code now be deleted also.

3.2. ***General Note.***

When the Code for Liquefied Petroleum Gas Liquid-Measuring Devices was adopted by the National Conference in 1957, the Committee made very clear its view that the use of a vapor-return line during any metered delivery of liquefied petroleum gas was in direct opposition to good commercial practices and to accuracy in measurement. In order to avoid unreasonable hardship on the industry, the Committee added a general note at the end of the code which recorded its conviction that such vapor-return lines should, in the future, be specifically prohibited.

A questionnaire was sent out by the Committee Secretary during the fall of 1963 in an attempt to develop a consensus among those officials who have had experience in the testing of LP Gas liquid meters. Responses to this questionnaire and further committee investigation have led to the recommendation that there be now added to this code a regulation paragraph:

Representatives of the liquefied-petroleum gas industry, by letter communication and by oral presentation during the open meeting of the Committee, recommended that there be included in the proposed regulation paragraph R.5. a

temperature (80°F.) above which the use of a vapor-return line would be permitted if necessary to permit safe, normal, metered delivery.

The Committee has studied this matter thoroughly and has consulted with weights and measures officials with experience. The Committee now feels that definite progress has been made and must continue to be made in the commercial delivery of the liquefied petroleum gas without the use of the so-called vapor-return line. The Committee is convinced, however, that there may be technical problems that at present are insurmountable with respect to even new containers installed on the property of LP Gas customers. To provide for continuing progress, to avoid the possibility of complicating factors, and to cover a point of terminology raised by Mr. Kerlin of California, the Committee recommends that regulation paragraph R.5. VAPOR-RETURN LINE be amended to read:

> R.5. VAPOR-RETURN LINE.—During any metered delivery of liquefied petroleum gas from a supplier's tank to a receiving container, there shall be no vapor-return line from the receiving container to the supplier's tank:
>
> (a) In the case of any receiving container to which normal deliveries can be made without the use of such vapor-return line.
>
> (b) In the case of any new receiving container when the ambient temperature is below 90°F.

(Item 3, Code for Liquefied-Petroleum Gas Liquid-Measuring Devices, was adopted by voice vote.)

4. CODE FOR VEHICLE TANKS

4.1. ***Specification Paragraph S.20.3. DELIVERY HOSE.***

The Weights and Measures Subcommittee of the American Petroleum Institute Committee on Operations and Engineering has pointed out that for many years it has been a common practice in many areas to equip pump-discharge vehicle-tank meters with both a wet delivery hose and a dry delivery hose, in order to facilitate both normal deliveries at some distance from the vehicle and very rapid deliveries to purchasers of large quantities where the vehicle can be located immediately adjacent to the receiving vessel. Since this seems to be a firmly established practice, it is the opinion of the Committee that Specification paragraph S.20.3 should be amended to provide for it and also to stipulate certain restrictions.

During the open meeting of the Committee, technical questions with respect to the accuracy of pump-discharge vehicle-tank meters equipped with both a wet delivery hose and a dry delivery hose were raised by the delegates from the State of California and from the City of Detroit, Michigan. It is the view of the Committee that this matter should have a thorough exploration and that said exploration should be conducted by the staff of the Office of Weights and Measures, National Bureau of Standards. Accordingly, the Committee withdraws its recommendation that specification paragraph S.20.3 be amended and recommends that the technical investigation be conducted in time for consideration of the results by the Committee during its anticipated interim meeting early in 1965.

4.2. ***Specification Paragraph S.21.1.4. MOVEMENT AND RETURN TO ZERO.***

It has been brought to the attention of the Committee from several sources that there have been incorporated in vehicle-tank meters de-

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vices that, by their design, seem to facilitate inaccurate meter reading and product billing. Meters incorporating such devices are so designed as to permit the return to zero of both the visual primary indicating element and a primary recording element. However, it is possible to return the visual primary indicating element to zero without automatically returning the primary recording element to a zero position.

The weights and measures officials of the City of Dayton, Ohio, the State of Ohio, and the City of Danville, Virginia, are to be commended for their official concern and for their reference of this matter to the Committee. There appears to be no doubt about the mechanical feasibility of automatic synchronization of the visible indicating elements and the recording elements of a meter with respect to the return-to-zero operation. Nonetheless, it is the opinion of the Committee that (1) it would be unjustifiable to require such mechanical synchronization when this code specifically provides for a zero-start visible indicator on a device equipped with a cumulative recording element, and (2) adequate enforcement authority for the protection of customers is provided in Regulation paragraph R.3. RETURN OF INDICATING AND RECORDING ELEMENTS TO ZERO.

The Committee recommends no action on this matter.

(Item 4, Code for Vehicle Tank, was adopted by voice vote.)

5. CODE FOR MEASURE CONTAINERS

AND

CODE FOR MILK BOTTLES

The Southern Weights and Measures Association has recommended that the Committee review the tolerance requirements for measure containers and milk bottles, in light of the fact that tolerances in both excess and deficiency are provided for such devices. Thus, it would be possible for the average of the quantity of contents of a lot of particular containers to be less than the labeled quantity—seemingly in direct conflict with the philosophy set forth in the Model Regulation Pertaining to Packages. The Committee has studied this matter and is of the opinion that, although the thesis presented by the Southern Weights and Measures Association is quite accurate, no changes are advisable in these codes.

Measure containers and milk bottles are considered to be commercial measuring devices, similar in many respects to other devices for which codes are presented in Handbook 44. It is a basic philosophy of weights and measures supervision that errors in overregistration and in underregistration or errors in excess and in deficiency, as the case may be, are permitted for devices, and normally these errors are equally distributable above and below. In the case of measure containers and milk bottles definite design specifications and fixed standard sizes are provided as a point of protection for consumers. If measure containers or milk bottles are found in a particular jurisdiction within tolerance but invariably with errors in deficiency, the Committee recommends that the authority set forth in general specification G–S. 2. FACILITATION OF FRAUD be imposed and that the manufacturer of such devices be required to initiate corrective measures so as to bring about reasonable equality in excess and deficiency.

The Committee recommends no action on this matter.

(Item 5, Code for Measure Containers and Code for Milk Bottles, was adopted by voice vote.)

6. CODE FOR MILEAGE-MEASURING DEVICES

Since the 47th National Conference, the Committee has devoted a considerable amount of time to the subject of odometers on rental vehicles. Two speakers discussed odometer accuracy before the Conference in 1962, but because of inconclusive information the Committee did not make firm recommendations with respect to code amendments at that time. The Office of Weights and Measures of the National Bureau of Standards conducted a detailed technical study of odometer accuracy, testing equipment, and testing procedures between the 47th and 48th Conferences and made available to the Committee the results of that study, including definite recommendations as to amendments to the Code for Mileage-Measuring Devices.

Investigation by the Office of Weights and Measures has continued since the 48th Conference at the specific request of the automobile manufacturing industry. This industry, represented by the Odometer-Speedometer Committee of the Automobile Manufacturers Association, urged that efforts be made toward the development of a single vehicle speed for odometer testing and that further studies be conducted with respect to tolerances. During negotiations with industry representatives, it was agreed that the studies of the Office of Weights and Measures should be made coordinately with similar studies conducted by automobile manufacturers in order that independently derived data could be compared.

The Committee has received a report developed jointly by the Office of Weights and Measures of the National Bureau of Standards and by the Odometer Subcommittee of the Automobile Manufacturers Association covering their investigation of odometer accuracy. The report included certain recommendations concerning odometer requirements. The Committee has studied this material and believes that it should be included in this Final Report.

Report Submitted to the Committee on Specifications and Tolerances, 49th National Conference on Weights and Measures

Introduction.—Subsequent to the 48th National Conference, engineering personnel of the Office of Weights and Measures and of automobile manufacturers have conducted an extensive testing program to determine the accuracy capabilities of automobile odometers. Tests conducted by the Office of Weights and Measures included both new and nearly new vehicles; tests conducted by the industry committee were on new vehicles.

Test Procedure.—In order that test data accumulated by both groups might be treated similarly from the satistical standpoint, a test procedure such as could be recommended to weights and measures officials was agreed upon, and the fifth-wheel test was established as the "standard" test, as follows:

1. Attach calibrated fifth wheel to rear bumper of vehicle under test.
2. Inflate tires to test pressure and drive test vehicle approximately 5 miles at approximately 35 mph to stabilize tire pressures. Stop vehicle with the top edge of either the 5/10 or the 7/10 mile indication on the odometer precisely at the top of the instrument frame opening.
3. Readjust rear tire pressures (front tire pressures for front-wheel driven odometers) to test pressure, readjust fifth-wheel tire pressure, if necessary, to calibration pressure, and zero fifth-wheel mileage counter.
4. Slowly accelerate to desired test speed, drive approximately 1.8 miles, and slowly bring the vehicle to a stop with the 5/10 or 7/10 mile odometer

indication at precisely the same position in the frame opening as at the start of the test.

Vehicles are tested (1) to correlate results between the fifth wheel and a measured road test and between the fifth wheel and the simulated road testing device, (2) to determine the effect of vehicle speed on test results, and (3) to determine the effect of tire pressure variations.

Analysis of Test Results.—More than 200 vehicles of all manufacturers were tested, and the results analyzed by statisticians of both the National Bureau of Standards and the industry. The statistical analysis of the test data indicated that the variation of odometer errors on fifth-wheel tests, as measured by the standard deviation, was 1.74 percent. (The standard deviation is defined as an estimate of the dispersion of the variables around the mean, or the average variability of the results.)

Since all of the tests reported were conducted by highly qualified personnel and test conditions were very carefully controlled, an estimate of test variability under enforcement conditions in magnitude of 1 percent seems realistic. Treating these two values statistically, a standard deviation of 1.88 percent is arrived at.

Statistical theory establishes, with calculated confidence, that 95 percent of a population will fall within the limits of ± 2 times the standard deviation. Thus, a tolerance of 2×1.88, or 3.76, rounded to ± 3.75 percent, appears to be a realistic and justifiable tolerance for odometers, and this value is recommended to the Committee on Specifications and Tolerances.

Official Test Details.—(1) Distance. An official test of 2 runs each of 2 miles duration is recommended. (2) Speed. Many advantages can be seen from a single test speed rather than the dual-speed tests now provided for, and the experimental tests prove that a single speed test is completely appropriate. Although no actual records are available, it is estimated that a large majority of the commercial miles recorded in vehicles rented by the mile is highway mileage; thus, a test speed of approximately 45 miles per hour is recommended. (3) Tire pressure. To provide a single "test pressure" for all vehicles that is representative of an "average" pressure recommended for the various vehicles available for rent on a mileage basis, a "hot" pressure (pressure after approximately 5 miles of driving) of 28 psi is recommended. (The 28 psi "hot" pressure is approximately equivalent to a 24 psi "cold" pressure.) (4) Test load. A test load of two persons in the front seat is recommended.

Effective Date.—Because certain design changes will be necessary, prompt action by the industry, immediately following the 49th National Conference on Weights and Measures, can, at best, bring about delivery of new automobiles with "specification" odometers by January 1, 1965. Serial numbers of automobiles manufactured after January 1, 1965, will be made available to the Office of Weights and Measures and passed on to the States, counties, and cities through the OWM Tech Memo. It is recommended that the Code for Mileage-Measuring Devices be amended by the 49th National Conference and that enforcement of the accuracy provisions be made effective with respect to automobiles provided with "specification" odometers.

Testing Equipment.—The soft, 2-ply tires presently used on the large majority of new passenger vehicles create undisciplined and unanticipatable measurement characteristics when the odometer accuracy is checked on the simulated road testing device. Beginning with the 1965 automobiles, new "low-profile" tires will be standard equipment, and experimental runs with such tires seem to indicate that even greater problems will be encountered with the "simulator." Although the simulated road testing device seems to be appropriate for taximeter testing, the proving of simulated road testing results against a measured road course or with the fifth wheel is strongly recommended. Additionally, certain passenger vehicles drive the odometer from a front wheel. Obviously the simulated road testing device is not adaptable to such vehicles. It is further recommended that only the road test or the fifth-wheel test be used for odometer testing.

Continuing Investigation.—The Office of Weights and Measures and the Odometer Subcommittee of the Automobile Manufacturers Association will pursue a continuing program of odometer testing and will report further developments to the Committee on Specifications and Tolerances.

R. A. PITTMAN: Mr. Meek, Members of the Committee, and Gentlemen, my name is Ray Pittman. I'm Chairman of the Automobile Manufacturers Technical Odometer Committee. I would like to comment that for the past year, we have spent hundreds of test hours on the track and have worked with the Office of Weights and Measures to develop the test procedures and tolerance recommendations which you have just read. I'd like to comment, Mr. Meek, to you, to the Committee, and to those in assembly here, that we think you are very fortunate to have such people as Mr. Jensen and his technical staff working with you. We found their cooperation outstanding and their technical integrity excellent.

As you have reported, Mr. Meek, this is a combined report of the Office of Weights and Measures, and the Automobile Manufacturers Technical Odometer Committee. As of January 1, 1965, cars furnished to the rental fleets will fall within the recommended tolerance range. I would like to further add that with the changes that we are introducing into production between now and January 1, 1965, we expect that 50 to 60 percent of the total population of new cars—not just those going to rental fleets—will fall within this range. After the 1966 model change, we expect the percentage of cars falling within the recommended tolerance range to increase further. I can't give you an exact figure of this at this time because we're still in the process of testing and evaluating the systems for reliability.

Thank you, Mr. Meek.

MR. MEEK: The Committee recommends the following changes in the Code for Mileage-Measuring Devices:

Amend definition paragraph D.15. to read:

D.15. SIMULATED ROAD TEST.—A mileage test appropriate for taximeters only, similar to a road test except that the vehicle wheel or wheels that actuate the mechanism rest in a cradle formed by rollers, one of which is a mileage-measuring element. The vehicle remains at rest during this test.

Amend notes paragraph N.1.2. to read:

N.1.2. FOR ODOMETERS. The mileage test of an odometer, whether a road test or a fifth-wheel test, shall be preceded by a run of at least 5 miles for the purpose of stabilizing tire temperatures and shall include at least 2 runs of at least 2 miles each at a speed of approximately 45 miles per hour.

Amend notes paragraph N.4. to read:

N.4. VEHICLE LADING.—During a road test, a simulated road test, or a fifth-wheel test, the vehicle shall carry two persons.

Amend notes paragraph N.5. to read:

N.5. TIRE PRESSURE.—At the beginning of each test run, the tires on the vehicle under test shall be adjusted to 28 pounds per square inch at stabilized tire temperatures (see N. 1. 2.).

Amend tolerance paragraph T.2. to read:

T.2. FOR ODOMETERS.—Maintenance and acceptance tolerances, on overregistration and on underregistration, shall be 3.75 percent of the interval under test (±396 feet on a 2-mile test run).

(The error of the odometer—to which the tolerance is applied—is the difference between the mileage indication of the odometer for the interval under test and the corresponding mileage actually traveled or indicated.)

(Item 6, Code for Mileage-Measuring Devices, was adopted by voice vote.)

7. OTHER ITEMS

The Committee received, during its open hearing, three recommendations from Mr. C. D. Baucom of North Carolina:

(1) Recommended Specifications for Liquid Fertilizer Meters.—It was recommended that specific requirements be inserted in the handbook to cover liquid-measuring devices used in the commercial measurement of liquid fertilizer, particularly to provide for the fabrication of elements that come in contact with the commodity to be of such nature as to be resistant to corrosive effects.

The Committee points out that general specification paragraph G–S.3. PERMANENCE was designed to provide the type protection anticipated here. Nonetheless, the Committee will keep itself informed on the developments in the liquid fertilizer business in order that it can anticipate the need for specific code requirements.

(2) Standardization of the Gallon for LP Gas.—The delegate from North Carolina recommended that there be established by the Committee a "standard" gallon for LP Gas to be defined as "231 cubic inches at equilibrium pressure (the vapor pressure at a given temperature expressed in pounds per square inch)."

The Committee is of the opinion that it has invariably been the official view of this Conference that the United States gallon in commerce must be the 231 cubic-inch gallon at time of delivery, regardless of temperature. The Committee, therefore, makes no recommendation on this point.

(3) Specifications for LP Gas Vapor Meters.—Mr. Baucom recommends that the Committee consider at the earliest possible time the development of a code for vapor meters in LP Gas Service.

The Committee is sympathetic with this recommendation and is hopeful that such a code can be developed for consideration by the 50th National Conference.

(Item 7 was adopted by voice vote.)

8. GENERAL

The Committee desires to state formally its appreciation to all who have participated in its deliberations since the 48th National Conference, either through correspondence, or in person during the interim

meeting or during the open Committee meeting held on Monday of this week.

The Committee needs and appreciates the full cooperation of weights and measures officials and representatives of business and commercial interests. Further, the Committee recognizes that, as weights and measures technology becomes more complicated and sophisticated, true progress will result only from the complete cooperation of all concerned.

It is the desire of the Committee in this Report to record its sincere appreciation for the technical assistance and general leadership provided by its retiring Secretary, W. S. Bussey, who has been instrumental in the progress made during the past thirteen years.

R. E. Meek, *Chairman*
G. L. Johnson
H. J. McDade
J. F. McCarthy
M. W. Jensen, *Secretary*

(On motion of the Committee Chairman, seconded from the floor, the Conference, by voice vote, adopted the Report of the Committee on Specifications and Tolerances.)

presented by J. H. Lewis, *Acting Chairman, Chief, Weights and Measures Section, Department of Agriculture, State of Washington*

(Thursday, June 18, 1964, 2:37 p.m.)

The Committee on Laws and Regulations of the 49th National Conference on Weights and Measures is grateful for the many constructive suggestions received by mail and during its interim and open Conference meetings.

The Committee held two meetings since the 48th National Conference. The first meeting, a special session called by the Committee Chairman, was held in Washington, D.C., at the National Bureau of Standards on December 16, 1963, for the purpose of initiating a study in the area of "Prominence and Placement of Quantity Statement on Packages." The regular interim meeting was held in Washington, D.C., on February 17 and 18, 1964. The afternoon of February 17 was devoted to an open session on package labeling. Private hearings and executive sessions were held throughout the remainder of the two-day period.

1. STANDARDIZATION OF PACKAGE SIZES

As reported to the 48th National Conference, the Committee recommended that this item be retained on the agenda for the ensuing year. Committee activity in the area of package standardization has, however, been limited due to the pressure of other matters.

The Committee wishes to acknowledge the favorable results which have been achieved by those segments of the packaging industry that have taken steps toward standardizing package sizes. Such voluntary effort on behalf of the industry is to be commended and encouraged.

The Committee plans to continue interest in this matter and solicits the cooperation of business and industry in the effort for continued progress in standardization of package sizes.

(Item 1 was adopted by voice vote.)

2. THE USE OF QUALIFYING TERMS

Sections 26 and 29 of the Model Law and Section 3.9 of the Model Regulation Pertaining to Packages.

Some misunderstanding exists among weights and measures officials and certain segments of the packaging industry regarding the use of qualifying terms. The Model Law and Model Package Regulation clearly prohibit the use of such terms as "jumbo," "giant," "full," and the like in connection with the required quantity declarations on packages (for example, "giant quart" or "full pound").

The use of similar terms for other purposes, such as designating the size of a package, is not prohibited. Such use is not considered a weights and measures problem for it has no direct relationship to

quantity. The Committee suggests, however, that, when such terms are used to designate a particular size package (or for other reasons), the statement should either include the term "size" (such as "Giant Size") or be so located as not to appear to be a qualification of the quantity declaration.

(After some discussion, and by a standing vote of 87 to 23, item 2 was adopted.)

3. THE USE OF SUPPLEMENTARY STATEMENTS OF QUANTITY

Section 26 of the Model Law and Section 3.5 of the Model Regulation Pertaining to Packages

A question was raised during the interim meeting of the Committee as to the permissibility of the use of supplementary statements of quantity on packages—for example, supplementary statements of "16 fluid ounces" or "one-half quart fluid" on a package where the required statement is "1 pint fluid." It is the opinion of the Committee that neither the Model Law nor the Model Package Regulation prohibits such supplementary declarations so long as (1) the required quantity declaration appears prominently and conspicuously on the principal display panel, (2) any supplementary statement is accurate, (3) any supplementary statement is displayed neither in larger size type nor more prominently than the required statement, and (4) any supplementary statement is not so located on the label as to confuse or mislead as to the precise meaning of the required statement. The Committee does, nonetheless, urge all packagers to review the real advisability of supplementary quantity statements.

(Subsequent to the issuance in the Tentative Report of the statement above, the Committee received a communication from a State weights and measures official who registered his disagreement with the opinion of the Committee and recommended that action by this Conference be delayed pending further consideration. The Committee acknowledges that the use of unnecessary supplementary statements of quantity are to be discouraged, but, at the same time, it feels it has no justification to change its opinion.)

(Item 3 was adopted by voice vote.)

4. MODEL STATE LAW ON WEIGHTS AND MEASURES

(1) Two recommendations were received by the Committee with respect to amendments to the Model Law, one pertaining to item 1 of Section 26 (the identification of a packaged commodity), and the other to Section 38 (the possible distinction between oil used for cooking and oil used in cooking). The Committee is sympathetic to both recommendations, but feels that it must guard zealously the dignity and permanence of the Model Law and that amendments to it should await proven and almost drastic need. The Committee will record on its agenda these two recommendations and, whenever an amendment is deemed necessary, these will be studied seriously.

(2) The Committee received two resolutions from Mr. C. D. Baucom, Superintendent, Weights and Measures Division, North Carolina, both relating to the meter sale of liquefied petroleum gas. In one resolution Mr. Baucom recommends that the Model Law be amended so as to acknowledge and provide guidelines for handling the compressibility and expandability of LP Gas; in the other he recommends that the Model Law be amended to provide specific technical guidance in the correction of metered volume to a standard temperature.

The Committee records its gratitude to Mr. Baucom for bringing these matters to its attention and respectfully refers them to the Office of Weights and Measures of the National Bureau of Standards for further study. It is deemed necessary, however, to point out that the National Conference on Weights and Measures has never acknowledged the propriety or the legality of the retail sale of any products on a temperature-adjusted basis—it being the apparent consensus of weights and measures officials that the U.S. gallon in commerce must be 231 cubic inches at the time of delivery. The Committee will continue to watch developments in this area.

(Item 4 was adopted by voice vote.)

5. MODEL STATE REGULATION PERTAINING TO PACKAGES

SECTION 3.1.—The Conference has expressed itself informally, and weights and measures officials appear to be united in the view, that the declarations of quantity on packaged aerosol products must be representative of the amount of the product that will be delivered by the aerosol package. To formalize this view and to state it clearly in regulatory language, the Committee recommends that Section 3.1. of the Model Regulation be amended to read as follows:

> 3.1. *NET QUANTITY.*—The declaration of quantity shall disclose the net quantity of the commodity—that is, the quantity of commodity in the package exclusive of wrappers and any other material packed with such commodity: *Provided,* That the declaration of quantity on an aerosol package shall disclose the net quantity of the commodity (including propellant) that will be expelled when the instructions for use as shown on the container are followed, and that such net quantity be determined in accordance with methods established by the Office of Weights and Measures, National Bureau of Standards.

During discussion on this item, the point was made that technical procedures are not normally included in regulatory language. The motion of the Committee Chairman to adopt Section 3.1. of the Report was amended by a motion made by Mr. John Mahoney, seconded from the floor, to delete from the proposed Section 3.1. the language "and that such net quantity be determined in accordance with methods established by the Office of Weights and Measures, National Bureau of Standards." This motion to amend was adopted by voice vote, thus making the Committee recommendation as amended read:

> 3.1. *NET QUANTITY.*—The declaration of quantity shall disclose the net quantity of the commodity—that is, the quantity of commodity in the package exclusive of wrappers and any other material packed with such commodity: *Provided,* That the declaration of quantity on an aerosol package shall disclose the net quantity of the commodity (including propellant) that will be expelled when the instructions for use as shown on the container are followed.

SECTION 3.4.—At the strong recommendation of many segments of the packaging industry, the Committee has explored the real justification for the present requirement in this section with respect to the need for the discrimination in the required declaration of quantity on a package between the fluid and the dry pints and quarts. It is the Committee's view that, since dry pints and quarts are used relatively infrequently and then only for specific berries and small fruits, there no longer exists a justifiable need for qualification on packages labeled in terms of fluid pints or quarts. Accordingly, the Committee recommends that Section 3.4. of the Model Package Regulation be amended

to read as follows, and that a similar interpretation of its requirements be issued by the Food and Drug Administration:

> 3.4. *UNITS WITH TWO OR MORE MEANINGS.*—When the term "ounce" is employed in a declaration of quantity, the declaration shall identify the particular meaning of the term by either of the qualifiers "avoirdupois" or "fluid"; however, such distinction may be omitted when, by association of terms (as in "1 pound 4 ounces," "weight 6 ounces," or "1 pint 4 ounces"), the proper meaning is obvious. The term "pint" or the term "quart" may be employed in the declaration of quantity without qualification when it is employed to indicate the fluid pint or the fluid quart, as the case may be; whenever the declaration of quantity is in terms of the dry pint or the dry quart, the declaration shall include the word "dry."

In connection with this presentation of this recommendation with respect to units with two or more meanings, the Committee finds it necessary to issue, in rather strong terms, its interpretation of the intended meaning of this section as it appeared in the Model Package Regulation in effect as of the beginning of this Conference and also in the Model Package Regulation that was the predecessor to the current regulation. At least one jurisdiction has ruled that the word "avoirdupois" must be used in connection with quantity statements on packages when these are in terms of weight, even though, through the use of such terms as "pound," "weight," or the like, it is explicitly clear to the prospective purchaser that the statement is, in fact, in terms of weight.

The Committee regrets that lack of precision in regulatory language might have brought about such an interpretation, and it regrets even more this break in the enthusiastic effort among all weights and measures officials toward nationwide uniformity in package labeling requirements. It is urged, with all sincerity, that any jurisdiction that encounters such a legal interpretation of its regulatory requirements take immediate steps to issue clarifications that preclude such interpretations.

DISCUSSION OF FOREGOING ITEM

W. I. Thompson: Should not mention be made of the possible use of the term "troy" which might conceivably be used in place of the term "avoirdupois"?

M. W. Jensen: The Model Regulation, Section 3.3. UNITS—WEIGHT, MEASURE, states: "A declaration of quantity in units of weight shall be in terms of the avoirdupois pound or ounce." So troy, which is used only for precious metals, is not acceptable as a system of weight for packages.

SECTION 3.8.—The Committee received a suggestion from a weights and measures official that there be considered the elimination of the presently permitted labeling of packages in terms of "minimum" quantity. Since such labeling is specifically permitted in the regulations promulgated under the Federal Food and Drug Law, the Committee deemed it inadvisable to consider this matter before discussing it with appropriate Federal officials. Accordingly, the Committee Chairman and Secretary were authorized to enter into discussions with officials of the Federal Food and Drug Administration and then to report back to the Committee.

The Committee Secretary communicated with Mr. George P. Larrick, Commissioner of Food and Drugs, in inquiry as to the currency of and need for the "minimum quantity" qualification. Under date of April 24, 1964, Commissioner Larrick replied as follows:

Although we have made no comprehensive survey concerning the extent to which the quantity of contents is presently declared in terms of minimum quantity, we know that this manner of declaration is still being used on a significant proportion of food labels. There may be some circumstances under which this would be the best means for informing consumers of the quantity of contents. We know of no reason why we should amend our regulations to withdraw authorization for use of quantity of contents statement in terms of minimum contents.

The Committee recommends no action on this matter.

(Item 5, as amended, was adopted by voice vote of the Conference; thus, Sections 3.1. and 3.4. of the Model State Regulation Pertaining to Packages were amended.)

6. MODEL REGULATION FOR PAPER PRODUCTS

(1) Mr. Charles Carey, Executive Secretary of the Gift Wrappings and Tyings Association, advised the Committee that, increasingly, the industry is changing the packaging of gift wrapping papers from folded sheets to rolls. To cover gift wrappings specifically, the Committee recommends that the Model Regulation for Paper Products be amended by inserting after paragraph 4 a new paragraph 5 and by renumbering Sections 5, 6, and 7 to become Sections 6, 7, and 8.

5. *GIFT WRAPPING PAPER.*—The declaration of quantity on a package of gift wrapping paper, whether packaged as individual sheets or in roll form, shall indicate the numerical count and the dimensions of the individual sheets. Effective January 1, 1965, any linear dimension in excess of 48 inches shall be expressed in terms of feet.

(2) Communication was received from the Tissue Association, Inc., in which it was pointed out that packs of paper products are now being packaged in multiple units and in which a recommendation as to an amendment to this regulation is proposed. On this basis, the Committee recommends that the Model Regulation for Paper Products be amended by inserting a new Section 9 to read as follows, and by renumbering current Section 8 to become Section 10.

9. *MULTIPLE PACKS.*—Multiple packs of paper products shall bear on the outside wrapper, clearly and conspicuously, a quantity declaration indicating the number of individual rolls or packages and the usable unit count and sheet size for each individual roll or package, unless such individual rolls or packages are so labeled that the content of each is clearly visible through the outer wrapper.

(Item 6 was adopted by voice vote.)

7. MODEL STATE REGULATION PERTAINING TO PACKAGES

SECTION 6. *PROMINENCE AND PLACEMENT*

The 48th National Conference adopted a recommendation of this Committee that a broad technical study be conducted leading to firm recommendations as to the prominence and placement of the required quantity statement on packages of commodities.

To get the study underway, the Committee Chairman issued invitations to more than 200 trade association executives (plus a few selected representatives of packagers who long have demonstrated their interest in the National Conference and its programs) to meet in Washington

on December 16, 1963, for the purpose of discussing the problem and initiating efforts toward its solution.

Almost 100 individuals responded to that invitation and met with the Committee Chairman, Secretary, and two other members. During the meeting, the packaging industry was urged to seek a reasonable solution to the two main problems: (1) A definition of the "principal" panel on packages and (2) minimum type sizes as a function of the area of the principal panel. The Chairman noted that at least two trade organizations—The Cereal Institute and The Tissue Association—already had agreed to and published standards for their members.

Before the December meeting adjourned, it was suggested by a trade association executive that the packaging industry form an *ad hoe* committee, representative of the industry, to study the problem and to attempt to develop recommendations prior to the regular interim meeting of the Committee on Laws and Regulations. Such an *ad hoc* committee subsequently was formed, and its members elected as officers Mr. Frank T. Dierson, Grocery Manufacturers of America, Inc., Chairman, Mr. James W. Bell, National Canners Association, Vice Chairman, and Mr. John F. Speer, International Association of Ice Cream Manufacturers, Secretary.

At the time of the interim meeting of the Laws and Regulations Committee in February, the Industry *Ad Hoc* Committee reported definite recommendations.

Principles Recommended by the Ad Hoc Industry Committee on Quantity Declaration to the National Conference on Weights and Measures

1. The quantity statement should appear on the principal display panel, except:
   (a) where the principal display panel is less than four (4) square inches in size, or
   (b) in the case of packages whose principal display panel is not likely to be presented, displayed, or examined under customary conditions of purchase, such as industrial-type packages.
2. "Principal display panel," as used in these sections, means that part of a label most likely to be presented, displayed, or examined under customary conditions of purchase.
3. (a) In view of existing statutory and regulatory provisions, rules governing type size are not necessary, but to insure that any guidelines established for type size are uniform, industry should continue to cooperate with the National Conference on Weights and Measures.
   (b) Rules relating to the size of type used in quantity statements should be advisory and not mandatory.
   (c) Advisory rules as to type size should be stated in terms of linear measurement.
   (d) Such rules should relate the size of the quantity statement to the area of the principal display panel.
   (e) A satisfactory type size, to be used as a guideline only, is as follows:

Area of Principal Display Panel	*Recommended Height of Quantity Statement*
Not more than 25 square inches	1/16 inch
More than 25 but not more than 120 square inches	1/8 inch
More than 120 but not more than 400 square inches	1/4 inch
More than 400 square inches	1/2 inch

4. All information required to appear on a package shall be prominent, definite, and plain, and shall be conspicuous as to size and style of letters and numbers and as to color of letters and numbers in contrast to color of background. Any required information that is either in hand lettering or hand script shall be entirely clear and equal to printing in legibility.
5. [The Industry Committee suggested that] the type size and placement provi-

sions be applicable to:

(a) all labels redesigned thereafter;

(b) all labels prepared from plates, dies, cylinders, etc., made thereafter; and

(c) All other labels two (2) years thereafter; except that these provisions shall not apply to labels on single-use or reusable containers originally filled within said two (2) year period.

6. Industry requests that the National Conference remain open to consideration of further amendments to its Model Regulation upon a showing by industry representatives of a need for changes or exceptions to the principles set forth above.

Specific recommendations were submitted also by the National Association of Frozen Food Packers. With respect to type size of the quantity declaration, the Frozen Food Packers recommended as follows:

Area of Principal Display Panel	*Minimum Height of Quantity Statement*
Less than 20 square inches	1/16 inch
20 to 39 square inches	3/32 inch
40 to 79 square inches	1/8 inch
80 or more square inches	1/4 inch

This association also suggested language as to the determination of the "declaratory area" of the principal display panel, namely: ". . . that facing of the package which is presented to the consumer under customary purchase conditions." In the case of a rectangular box, this is the square-inch area obtained by multiplying the length by the width; for cylindrical containers, the area is determined by multiplying the height of the cylinder by one-third its circumference; and, for polybagged frozen foods, the area is the printed area of the flat, empty bag, or one-third the area of the flat bag, whichever is greater.

As the result of the report made to the Committee by the Ad Hoc Industry Committee and of study by committee members, tentative recommendations were included in the Committee's Tentative Report. Subsequent to the issuance of that report, many communications were received from those interested in or affected by package labeling, and many persuasive and helpful suggestions were made during the open meeting of the Committee. The Committee is sincerely grateful for this outpouring of interest and information. Based on these and on further study, the Committee now submits for Conference consideration and adoption the following: (It is to be noted that under subsection 2.3. of Section 2, EXEMPTIONS, there is stated in the proposed administrative ruling a specific exemption for packages of alcoholic beverages. The Committee includes this exemption in its proposal only in recognition of the situation as it actually exists and certainly not in recognition of any real need of the alcoholic beverage industry for exemption to requirements on prominence and placement of quantity declarations on packages. The Committee urges that the Alcohol and Tobacco Tax Division of the Internal Revenue Service revise its regulations so as to require that the quantity statement on a package of alcoholic beverage be prominently and conspicuously displayed on the principal panel of the package label and that the blown-in declaration in the bottle be no longer acceptable; the Committee further requests that its Secretary communicate with Internal Revenue Serv-

ice in an effort to bring about the implementation of the recommendation expressed herein.)

Committee Recommendation.—Unless there is a compelling reason to the contrary, the Committee recommends that there be no amendment to law or regulation at this time. The Committee recommends that the States give serious consideration to the issuance of an administrative ruling substantially as follows:

ADMINISTRATIVE RULING—PROMINENCE AND PLACEMENT OF QUANTITY STATEMENTS ON PACKAGE LABELS

1. *APPLICATION.*—This ruling shall apply to any commodity in package form, except as exempted by law or regulation or by section 2 below, and the compliance or noncompliance with the stipulations of law and regulation of the declaration, or declarations, of quantity on a package shall be determined on the basis of the standards set forth herein.

2. *EXEMPTIONS.*

2.1. *Industrial-Type Packages.*—A so-called "industrial" type or "nonconsumer" type package (one that is not intended to be displayed on a retail shelf or to be sold for home consumption) shall be exempt from the specific type sizes hereinafter set forth, and the conformance or nonconformance of the labeling of such a package shall be determined by the facts of the case

2.2. *Containers Standardized by Device Regulation.*—Containers, such as milk bottles and lubricating-oil bottles, for which standards are established and specifications are set forth in National Bureau of Standards Handbook 44, *Specifications, Tolerances, and Regulations for Commercial Weighing and Measuring Devices,* shall be exempt from the requirements hereinafter set forth.

2.3. *Packages of Alcoholic Beverages.*—Packages of alcoholic beverages, for which the labeling requirements are specified in Federal law, shall be exempt from the requirements hereinafter set forth.

3. *DEFINITIONS.*

3.1. *Label.*—The term "label" shall be construed to mean a display of written, printed, or graphic matter applied or attached to a package for the purposes of branding, identifying, and giving other information on the contents of the package.

3.2. *Principal Display Panel or Panels.*—The term "principal display panel or panels" shall be construed to mean that part, or those parts, of a label that is, or are, so designed as to be most likely to be displayed, presented, shown, or examined under normal customary conditions of display and purchase.

3.3 *Area of Principal Display Panel or Panels.*—Barring evidence to the contrary, the square inch area of the principal display panel, or of each of the principal display panels if there be more than one, shall be (1) in the case of a rectangular container, one or more entire side or sides of which properly can be considered to be the principal display panel or panels, the product of the height times the width of that side or those sides; (2) in the case of a cylindrical or nearly cylindrical container where the label covers the entire cylindrical or nearly cylindrical surface, 40 percent of the product of the height times the circumference; (3) in the case of a cylindrical or nearly cylindrical container where the label does not cover the entire cylindrical surface, the total actual area of the label or 40 percent of the product of the height time the circumference, whichever is less; (4) in the case of a sack or bag, or other flat container, the total printed area or one-third the total flat area, whichever is greater; and (5) in the case of a container with a distinctly identifiable label or label area, the total actual area of the label or label space: *Provided,* That this section shall not apply to permanently labeled reusable glass containers, for which see 8. below.

4. *EFFECTIVE DATE.*—This ruling shall be effective with respect to those labels that are (a) redesigned after January 1, 1965, (b) prepared from plates, dies, cylinders, and the like made after January 1, 1965, and (c) all labels as of July 1, 1966: *Provided*, That this section shall not apply to permanently labeled reusable glass containers, for which see 8. below.

5. *QUANTITY DECLARATION.*

5.1. *Location.*—The declaration, or declarations, of quantity of the contents of a package which appears on the principal display panel, or panels if there are more than one, shall be presented in such a manner as to be generally parallel to the base on which the package rests as it is designed to be displayed.

5.2. *Style of Type of Lettering.*—The declaration, or declarations, of quantity shall be in such a style or type or lettering as to be boldly presented, clearly and conspicuously, with respect to other type or lettering or graphic material on the panel or panels.

5.3. *Color Contrast.*—The declaration, or declarations, of quantity shall be in a color that contrasts definitely with its background: *Provided*, That this section shall not apply to permanently labeled reusable glass containers, for which see 8. below.

6. *MINIMUM HEIGHT OF NUMBERS AND LETTERS.*—The height of any letter or number in the required quantity statement shall be not less than those shown in Table 1, with respect to the square inch area set forth in section 3.3 above: *Provided*, That the height of the numbers of a common fraction shall be not less than one-half the dimensions shown: *And Provided further*, That this section shall not apply to permanently labeled reusable glass containers, for which see 8. below.

TABLE 1.—*Minimum height of numbers and letters*

Square Inch Area of Principal Panel	*Minimum Height of Numbers and Letters*
4 square inches and less	No minimum.
Greater than 4 square inches and not greater than 25 square inches.	1/16 inch.
Greater than 25 square inches and not greater than 120 square inches.	1/8 inch.
Greater than 120 square inches and not greater than 400 square inches.	1/4 inch.
Greater than 400 square inches	1/2 inch.

7. *FREE AREA.*—The declaration, or declarations, of quantity shall be presented in an area sufficiently free from other printing, lettering, or marking, to make said declaration, or declarations, stand out definitely with respect to the surrounding printing, lettering or marking.

8. *PERMANENTLY LABELED REUSABLE GLASS CONTAINERS.*

8.1. *Label Information Blown into Surface.*—When all label information is blown into the glass surface, the required declaration, or declarations, of quantity may also be blown into the surface: *Provided*, That in such cases said declaration or declarations shall appear in close proximity to the trade or brand name and the height of any letter or number shall be not less than 3/16 inch for containers of one pint or less capacity and not less than 3/32 inch for containers of greater than one pint capacity.

8.2. *Label Information Applied to Surface of Containers.*—When any label information is applied to the surface of a reusable glass container in white or in any color, the required declaration, or declarations, of quantity shall also be applied to the surface and shall be, in size, not less than 1/8 inch for containers of one pint or less capacity and not less than 3/16 inch for containers of greater than one pint capacity.

8.3. *Label Information on Cap or Crown of Containers.*—When all label information is displayed on the cap or crown of a reusable glass container, the required declaration of quantity may also be displayed on the cap or crown and shall be displayed prominently, conspicuously, and in color contrasting with the background.

8.4. *Effective Date.*—The requirements set forth in sections 8., 8.1., 8.2., and 8.3. shall be effective with respect to orders placed after July 1, 1966: *Provided*, That all containers that are manufactured to conform

to these requirements shall be permanently marked with the letter "S" followed by the final two digits of the year in which the order was placed: *And Provided further,* That permanently labeled reusable glass containers in service as of July 1, 1966, may remain in service.

(The Administrative Ruling recommended by the Committee was voted on section by section. Following the presentation of Section 6, *Minimum Height of Numbers and Letters*, Mr. W. A. Kerlin, State of California, made a motion to amend Table 1 of Section 6 as listed below.)

Square Inch Area of Principal Panel	*Minimum Height of Numbers and Letters*
Less than 20 square inches	1/16 inch
20 square inches to less than 40 square inches	1/8 inch
40 square inches to less than 100 square inches	1/4 inch
100 square inches to less than 400 square inches	3/8 inch
400 square inches and over	1/2 inch

Discussion on the motion to amend Table 1 was entered into by the following delegates: Mr. Lewis, Mr. Jensen, Mr. Goforth (State of Illinois), Miss Newman (National Consumers League), Mr. Hensel (Swift and Company), Mr. Lynch (Nestle Company, Inc.), Mr. McGee (State of Georgia), Mr. Ring (National Paint, Varnish and Lacquer Association), Mr. Mahoney (State of Maryland), Mr. Campbell (State of Ohio), and Mr. Lyles (State of Virginia).

(The amendment was defeated by a standing vote of the delegates 46–54.)
(Item 7, including all sections of the Administrative Ruling as presented, was adopted by voice vote.)

8. GENERAL

The Laws and Regulations Committee desires to record its sincere commendation and appreciation to all representatives of the packaging industry who, by attending the committee meetings, serving on the Industry Committee, or otherwise participating, evidenced a high degree of public consciousness in this diligent effort to solve a difficult problem of considerable duration.

The Committee also wishes to express its appreciation to those officials of Government, consumer organizations, and others who provided enthusiastic assistance and cooperation in the studies that were made and in the development of this Report.

Communications have been received from Mrs. Esther Peterson, Special Assistant to the President for Consumer Affairs, transmitting a copy of a resolution adopted by the Consumer Advisory Council and from Reverend Robert J. McEwen, Chairman, Consumer Council, Executive Department. The Commonwealth of Massachusetts, and Mr. George Brunn, Chairman, Program Advisory Committee to the Consumer Counsel to the Governor of California, transmitting a similar resolution adopted unanimously by that Council. These resolutions, which urge weights and measures officials to adopt minimum height of letters of quantity declarations on consumer-type packages no smaller than those presented in the 1963 Tentative Report of this Committee, are appreciated, as are the interest and support of these three dedicated organizations.

The Committee also is grateful to Miss Aileen Newman of Greenbelt Consumers Services, Inc., Beltsville, Maryland, for her interest in the

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matters before the Committee and for the data on her very interesting survey on package labeling.

The Committee by formal action notes its grateful acknowledgment for the many years of outstanding service to the Committee and to the Conference by its former Secretary, W. S. Bussey, and extends its best wishes to Mr. and Mrs. Bussey for many, many years of healthy, happy retirement.

The Committee would also like to acknowledge sincerely the efforts of our Executive Secretary, Mr. Jensen, and of Mr. Harold Wollin in their assistance to the Committee in the preparation of this Final Report.

With respect to this Report, it has been presented by your Committee respectfully. We appreciate your vigorous assistance in considering this Report. I have a very warm feeling that this action has been the action of the Committee, and more strongly so the action of the Conference. We appreciate your participation. This is what makes the Conference what it is—the privilege to express, the privilege to be heard, and the privilege to take an action in a unified manner.

J. L. Littlefield, *Chairman*
L. Baker
M. Jennings
J. H. Lewis
H. M. Turrell
M. W. Jensen, *Secretary*

(On motion of Mr. Lewis, seconded from the floor, the Conference by voice vote adopted the Report of the Committee on Laws and Regulations, comprising the Tentative Report as amended by the Final Report.)

Mr. Lewis: Mr. Chairman, I have one additional motion to make. I wish to move that the Conference Executive Secretary be given authority to make any appropriate editorial changes in the Report you have just adopted without changing the intended meaning, including any necessary renumbering of paragraphs, in the preparation of the manuscript for printing.

(The foregoing motion, seconded from the floor, was adopted by voice vote.)

REPORT OF THE COMMITTEE ON NOMINATIONS AND ELECTION OF OFFICERS

presented by C. H. Stender, *Chairman, Assistant to Commissioner, Department of Agriculture, State of South Carolina*

(Thursday, June 18, 1964, 2:07 p.m.)

As provided in the organization and procedure of the Conference, the Director of the National Bureau of Standards, Dr. A. V. Astin, is the President of the Conference, and is authorized to designate the Executive Secretary. All other officers are to be elected by vote of the Conference with the exception that vacancies occurring during the Conference year may be filled by the Executive Committee.

In selecting active members of the Conference to nominate for elective officers as presented in this report, consideration was given by the committee to several factors, such as attendance records, geographical distribution, conference participation, and interest shown in promoting weights and measures administration.

The Nominating Committee submits the following report, nominating for office for the National Conference on Weights and Measures and to serve during the ensuing year or until their successors might be elected, the following:

Chairman: Verne D. Campbell, Ohio

Vice Chairmen: John H. Lewis, Washington; J. Ellis Bowen, Massachusetts; Lawrence Barker, West Virginia; W. I. Thompson, New Jersey.

Treasurer: C. C. Morgan, Indiana

Chaplain: R. W. Searles, Ohio

Executive Committee: N. Berryman, Florida; R. M. Bodenweiser, New Jersey; J. M. Boucher, District of Columbia; R. J. Fahey, Illinois; R. H. Fernsten, California; Frank Gersz, Connecticut; M. Jennings, Tennessee; D. E. Konsoer, Wisconsin; J. F. Lyles, Virginia; E. A. Vadelund, Pennsylvania.

C. H. Stender, *Chairman*
S. H. Christie
H. E. Crawford
N. Kalechman
R. E. Meek
J. F. True
R. Williams

(There being no further nominations from the floor, nominations were declared closed and the officers nominated by the Committee were elected unanimously by voice vote.)

presented by L. BARKER, *Chairman, Commissioner, Department of Labor, State of West Virginia*

(Thursday, June 18, 1964, 2:12 p.m.)

Resolutions of appreciation were adopted as follows:

1. To Dr. Richard H. Holton, Assistant Secretary of Commerce for Economic Affairs, for his constructive contribution to the program of this 49th National Conference on Weights and Measures.

2. To Mrs. Esther Peterson, Special Assistant to the President for Consumer Affairs, for her constructive presentation.

3. To Mr. T. L. E. Gregory, Chief Inspector of Weights and Measures for Nottinghamshire, England, for his splendid address and for contribution to the success of the Committee hearings by participating in the deliberations.

4. To all program speakers.

5. To business and industry for cooperating with the Conference, for attending and participating in the Conference, and for contributing to the success of the Conference through their participation and their gracious hospitality.

6. To all State and local governing agencies that have arranged or have made possible the attendance at this meeting of one or more representatives of their organizations, to participate in the deliberations directed toward the betterment of weights and measures controls throughout the Nation.

7. To the Director and staff of the National Bureau of Standards for their tireless efforts to insure a successful Conference and planning and administering the program and other details so essential to an interesting and educational meeting.

RESOLUTION ON W. S. BUSSEY

Resolved, That the 49th National Conference on Weights and Measures assembled in the City of Washington on the 18th day of June, A.D. 1964, does hereby express to Mr. W. S. Bussey its gratitude for faithful and dedicated service and its best wishes for a long and happy retirement; and be it further

Resolved, That the Secretary forward a copy of this resolution to Mr. Bussey, to be read by him while reclining in his new reclining chair as he enjoys his new television set.

RESOLUTION ON WEIGHTS AND MEASURES ADVISORY COMMITTEE

Whereas, the Weights and Measures Advisory Committee of the National Conference on Weights and Measures to the National Bureau of Standards, since its inception, has proved to be of extreme value to all affiliated groups of the Conference, acting as liaison between field and laboratory; and

Whereas, the National Conference on Weights and Measures has been advised of the possible termination of this advisory group effective June 30, 1964: Therefore, be it

Resolved, That the National Conference on Weights and Measures in session assembled this 18th day of June, 1964, at Washington, D.C., does hereby urge that this Advisory Committee be continued and directs the Executive Secretary of this Conference to present this recommendation to all appropriate authorities concerned with the continuance of the Weights and Measures Advisory Council.

C. H. Stender: I would like to add one sentence to the resolution, as an amendment. As I listened to it, the thought came to my mind that in 1954 we took a position here on the Conference, and I feel that the Conference should reaffirm its position and that copies of this resolution should be sent to the Secretary of Commerce and to the Director of the National Bureau of Standards as an indication of our reaffirmation that there be a continuance of the Advisory Committee. That is the kind of sentence I think should be added, and I ask that this be accepted.

R. E. Meek: Mr. Chairman, I take the microphone for the sole purpose of endorsing this resolution. I possibly have been accorded the privilege of serving longer as a member of the Advisory Committee than any other member of this Conference or of industry. I am well aware of its accomplishments. To me it has proven a two-way street. One way we have taken the message of this Conference, the feelings of weights and measures officials and of industry, directly to the National Bureau of Standards, to Dr. Astin and others of his staff. In turn, we have carried back to this Conference their messages and decisions. I think it has been a wonderful help to weights and measures officials and to this Conference, and I heartily endorse the continuation of the Committee.

(Opinions similar to those of Mr. Stender and Mr. Meek were voiced by Mr. Jennings of Tennessee, Mr. Sanders of the Scale Manufacturers Association, Mr. Slough of Akron, Ohio, Mr. Johnson of Kentucky, Mr. Williams of Nassau County, New York, and several others in attendance.)

Chairman Turnbull: Mr. Committee Chairman, will you please re-read the resolution as amended.

RESOLUTION ON WEIGHTS AND MEASURES ADVISORY COMMITTEE

Whereas, the Weights and Measures Advisory Committee of the National Conference on Weights and Measures to the National Bureau of Standards, since its inception, has proved to be of extreme value to all affiliated groups of the Conference, acting as liaison body between the field and laboratory; and

Whereas, the National Conference on Weights and Measures has been advised of the possible termination of this advisory group effective June 30, 1964: Therefore, be it

Resolved, That this Conference reaffirm its position taken in 1954 with respect to the many advantages to be derived from the Weights and Measures Advisory Committee; and be it further

Resolved, That the National Conference on Weights and Measures in session assembled this 18th day of June, 1964, at Washington, D.C., does hereby urge that this Advisory Committee be continued, and directs the Executive Secretary of this Conference to present this recommendation to the Secretary of Commerce and Director of the National Bureau of Standards, who are concerned with the continuance of the Weights and Measures Advisory Committee.

L. Barker, *Chairman*
N. Berryman
E. W. Bucklin
F. M. Gersz
F. B. Jones
J. I. Moore
F. D. Morgan

(On motion of the Conference Chairman, seconded from the floor, the report of the Committee on Resolutions was adopted by voice vote.)

REPORT OF AUDITING COMMITTEE

presented by A. J. Albanese, *Chairman, City Sealer of Weights and Measures, New Britain, Connecticut*

(Friday, June 19, 1964, 11:57 a.m.)

On June 16, 1964, the Auditing Committee met with the Conference Treasurer and examined his books and records.

They were found to be in good order.

A. J. Albanese, *Chairman*
G. L. Delano
A. L. Little

(The report of the Auditing Committee was adopted by voice vote.)

REPORT OF THE TREASURER

presented by C. C. MORGAN, *Treasurer, City Sealer of Weights and Measures, Gary, Indiana*

(Friday, June 19, 1964, 11:59 a.m.)

Balance on hand June 1, 1963		$2,953.66
RECEIPTS:		
Registration fees—328 at $15.00	$4,920.00	
Refund from Education Committee	20.00	
Sale of Luncheon Tickets	96.00	
Mr. Wells, 250 Mats	8.75	
Bank Interest Accrued	162.02	
Subtotal	5,206.77	5,206.77
Total		8,160.43
DISBURSEMENTS:		
W. S. Bussey, Flowers	10.30	
Geo. W. Allen Co., Inc., Luncheon Tickets	13.39	
D.C. Transit System, Inc., Ladies' Tour	123.20	
Sheraton-Park Hotel, Audio Charges	30.00	
The Chesapeake & Potomac Telephone Co	13.39	
J. Ellis Bowen, Education Committee Postage	25.00	
American Electrotype Co., Inc., 2,000 Mats	72.58	
American Electrotype Co., Inc., 500 Mats	19.04	
S & T Committee	1,218.66	
L & R Committee	872.07	
M. W. Jensen, Stamps	14.00	
Deposit on Account of Mr. Gray and Mr. Gotz	125.00	
Cash Book	2.25	
Miscellaneous expenses (duplicating, printing, telephone, telegraph, postage, messenger, porter, maid, reporting, recording, photographs, taxi, drayage, hotel meeting and committee room service, badges, registration desk, press, flowers, cards, prizes, hotel for luncheon, etc.)	1,900.64	
Bank charges	8.00	
Subtotal	4,447.52	4,447.52
Total balance on May 1, 1964		3,712.91

DEPOSITORY:
Bank of Indiana, Gary, Indiana.
First Federal Savings and Loan Association, Gary, Indiana.

(Signed) C. C. MORGAN.

(On motion of the chairman, seconded from the floor, the report of the Treasurer was adopted by the Conference.)

PERSONS ATTENDING THE CONFERENCE

Delegates—State, City, and County Officials

ALABAMA

State—D. P. Widemire, State Inspector, Division of Weights and Measures, Department of Agriculture, State Office Building, Montgomery 36104.

ARIZONA

State—D. E. Wheeler, Deputy Inspector, Department of Weights and Measures, Capitol Building, Room 139, Phoenix.

ARKANSAS

State—A. L. Little, Head, Weights and Measures Division, State Plant Board, 421½ W. Capitol, P.O. Box 1069, Little Rock 72203.

CALIFORNIA

State—W. A. Kerlin, Chief, Bureau of Weights and Measures, Department of Agriculture, 1220 N Street, Sacramento 95814.
Mrs. H. E. Nelson, Consumer Counsel, Governor's Office, State Capitol, Sacramento 95814.
V. V. MacKenzie, Administrative Advisor to Consumer Counsel, State Capitol, Room 1030, Sacramento 95814.

County:
- Alameda—R. H. Fernsten, County Sealer of Weights and Measures, 333 Fifth Street, Oakland.
- Kern—A. D. Rose, County Sealer of Weights and Measures, 1116 East California Avenue, Bakersfield.
- Los Angeles—F. M. Raymund, County Sealer of Weights and Measures, 3200 North Main Street, Los Angeles 90031.
- San Bernardino—H. E. Sandel, County Sealer of Weights and Measures, 160 East 6th Street, San Bernardino.
- San Diego—H. J. McDade, County Sealer of Weights and Measures, 1480 F Street, San Diego.
- Santa Cruz—G. S. Anderson, County Sealer of Weights and Measures, 1010 Fair Avenue, Santa Cruz.
- Ventura—E. H. Black, County Director of Weights and Measures, P.O. Box 1610, Ventura 93002.

COLORADO

State—H. N. Duff, State Supervisor, Weights and Measures Section, Department of Agriculture, State Services Building, 1525 Sherman Street, Denver 80203.
H. H. Houston, Director, Oil Inspection Department, 1024 Speer Boulevard, Denver 80204.

CONNECTICUT

State—F. M. Gersz, Deputy Commissioner, Department of Consumer Protection, State Office Building, Hartford 06115.

City:
- Hartford—Nathan Kalechman, City Sealer of Weights and Measures, 550 Main Street.

Middletown---------- Peter Grassi, City Sealer of Weights and Measures, P.O. Box 223, City Hall.
New Britain---------- A. J. Albanese, City Sealer of Weights and Measures, City Hall.

DELAWARE

State---------- W. H. Naudain, Director, Department of Weights and Measures, State Board of Agriculture, Dover 19901.
F. C. Colamaio, State Inspector.
F. D. Donovan, State Inspector.
Kendall Gibbs, State Inspector.
Eugene Keeley, State Inspector.
R. R. Smith, State Inspector.

DISTRICT OF COLUMBIA

Weights, Measures, and Markets Branch, Department of Licenses and Inspections, Room 227 Esso Building, 261 Constitution Avenue NW., Washington, D.C., 20001.

District---------- J. T. Kennedy, Chief.
J. M. Boucher, Supervisor.
J. T. Bennick, Inspector and Investigator.
R. E. Bradley, Inspector and Investigator.
J. M. Burke, Inspector and Investigator.
W. R. Cornelius, Inspector and Investigator.
D. K. Forbes, Inspector and Investigator.
F. C. Harbour, Inspector and Investigator.
Kenneth Hayden, Inspector and Investigator.
H. P. Hutchinson, Inspector and Investigator.
G. P. Kosmos, Inspector and Investigator.
E. E. Maxwell, Inspector and Investigator.
I. L. Wagner, Jr., Inspector and Investigator.
W. W. Wells, Inspector and Investigator.

FLORIDA

State---------- Nalls Berryman, Director, Division of Standards, Department of Agriculture, Nathan Mayo Building, Room 107, Tallahassee 32304.

City:
Jacksonville (32202). H. E. Crawford, Inspector of Weights and Measures, City Hall, Room 203.
Miami (33133)----- H. E. Howard, Supervisor, Division of Trade Standards, Coconut Grove Station, P.O. Box 708.

GEORGIA

State ---------- J. B. McGee, Director, Weights and Measures Division, Department of Agriculture, Agriculture Building, Capitol Square, Atlanta 30303.
R. M. Buchanan, Field Supervisor, Weights and Measures Division, 19 Hunter Street, S.W., Atlanta 30303.
J. W. D. Harvey, State Oil Chemist, Department of Revenue, 264 Capitol Place, Atlanta.

ILLINOIS

State ---------- H. L. Goforth, Superintendent, Division of Feeds, Fertilizers, and Standards, Department of Agriculture, 531 East Sangamon Avenue, Springfield 62706.

City:	
Chicago (60610)	R. J. Fahey, Acting City Sealer, Department of Weights and Measures, Central Office Building, Room 302, 320 North Clark Street. Luke Prendergast, Chief Taximeter Inspector, Public Vehicle License Commission, 1111 S. State Street, Room 105.
Oak Park (60302)	H. E. Rentner, Deputy Inspector, Weights and Measures Department, 655 Lake Street.

INDIANA

State	R. E. Meek, Director, Division of Weights and Measures, State Board of Health, 1330 West Michigan Street, Indianapolis 46207. L. A. Gredy, State Inspector.
County:	
Delaware	J. P. Janney, County Inspector of Weights and Measures, Patterson Building, Room 9, Muncie.
Gibson	W. R. Sevier, County Inspector of Weights and Measures, 112 East Emerson Street, Princeton.
Grant	Harvey Cline, County Inspector of Weights and Measures, Court House, Marion.
Howard	I. R. Frazer, County Inspector of Weights and Measures, 113 North Washington Street, Kokomo.
Lake	Nicholas Bucur, County Inspector of Weights and Measures, Lake County Building, 4th and Broadway, Gary.
Madison	C. W. Moore, County Inspector of Weights and Measures, Court House, Anderson.
Marion	E. H. Maxwell, County Inspector, City-County Building, Room G–4, Indianapolis.
St. Joseph	C. S. Zmudzinski, County Inspector, Division of Weights and Measures, Court House, Room 11, South Bend.
Vigo	R. J. Silcock, County Inspector of Weights and Measures, Court House, Room 5, Terre Haute.
City:	
Gary	C. C. Morgan, City Sealer of Weights and Measures, City Hall.
Hammond	Dean Brahos, City Sealer of Weights and Measures, 5925 Calumet Avenue.
Indianapolis	W. R. Copeland, Director, Department of Weights and Measures, City-County Building, Room G–6.
South Bend	B. S. Cichowicz, City Inspector of Weights and Measures, City Hall.
Terre Haute (47801).	J. T. Harper, City Inspector of Weights and Measures, City Hall.

IOWA

State	J. C. Boyd, Chief State Field Supervisor, Weights and Measures Division, Consumer Protection Services, Department of Agriculture, Capitol Building, Des Moines 50319.

KANSAS

State	J. F. True, State Sealer, Division of Weights and Measures, State Board of Agriculture, State Office Building, Topeka 66612.

KENTUCKY

State	G. L. Johnson, Director, Division of Weights and Measures, Department of Agriculture, Capitol Annex, Frankfort 40601.

LOUISIANA

State ---------- J. H. JOHNSON, Director, Division of Weights and Measures, Department of Agriculture and Immigration, Box 4292, Capitol Station, Baton Rouge 70804.
H. T. BOOGAERTS, Field Supervisor, 510 Wyandotte Street, Shreveport 71101.
F. F. THOMPSON, Chief Chemist, Petroleum Products Division, P.O. Box 8374, University Station, Baton Rouge 70821.

MAINE

State---------- H. D. ROBINSON, Deputy State Sealer of Weights and Measures, Department of Agriculture, State House, Augusta 04330.

City:
Portland---------- C. J. WILLS, Jr., City Sealer of Weights and Measures, 389 Congress Street.

MARYLAND

State---------- J. E. MAHONEY, State Superintendent of Weights and Measures, Department of Markets, State Board of Agriculture, University of Maryland, College Park 20742.
T. M. STABLER, Assistant Superintendent.
L. H. DEGRANGE, State Inspector of Weights and Measures, Route 2, Frederick.
R. W. GLENDENNING, State Inspector of Weights and Measures, P.O. Box 356, Chestertown.
C. R. STOCKMAN, State Inspector of Weights and Measures, Route 5, Box 251, Cumberland.

County:
Montgomery---------- E. W. BUCKLIN, Director, Department of Inspections and Licenses, County Office Building, Rockville.
M. S. SOWARD, Chief, Division of Permits and Licenses, County Office Building, Rockville.
G. L. FULLER, County Inspector of Weights and Measures.
L. B. MORTON, County Inspector of Weights and Measures.
J. P. SOLTYSIAK, County Inspector of Weights and Measures.
Prince Georges------ R. J. CORD, Chief Sealer of Weights and Measures, Court House, Upper Marlboro.
L. S. GRASSO, Deputy Sealer of Weights and Measures.
D. G. TRASK, Deputy Sealer of Weights and Measures.

City:
Baltimore---------- G. H. LEITHAUSER, Chief Inspector, Division of Weights and Measures, Municipal Building, Room 1106.

MASSACHUSETTS

State---------- W. C. HUGHES, Head Administrative Assistant, Division of Standards, Department of Labor and Industries, State House, Boston 02133.
F. J. HANNABURY, Inspector.

City:
Boston---------- J. F. MCCARTHY, City Sealer of Weights and Measures, City Hall Annex, Room 105.
Cambridge (02139)-- A. T. ANDERSON, City Sealer of Weights and Measures, City Hall, Room 202.
Everett---------- L. L. ELLIOTT, City Sealer of Weights and Measures, City Hall.
Fitchburg---------- W. T. DELOGE, City Sealer of Weights and Measures, City Hall Annex.

Newton—J. E. Bowen, City Sealer of Weights and Measures, City Hall, Newton Centre.

Somerville—F. C. Gravelle, Deputy Sealer of Weights and Measures, Public Works Building.

MICHIGAN

State—J. L. Littlefield, Chief, Division of Foods and Standards, Department of Agriculture, Lewis Cass Building, Lansing 48913.
C. O. Cottom, Supervising Inspector.

City:

Dearborn—J. A. Hughes, Director, Licenses, Weights and Measures, City Hall.

Detroit (48216)—J. T. Daniell, Deputy Sealer, Bureau of Weights and Measures, 2693 Eighteenth Street.

Grand Rapids—L. W. Stoll, City Sealer of Weights and Measures, 301 Market Avenue, S.W.

Livonia (48154)—R. C. Baumgartner, City Sealer of Weights and Measures, 15050 Farmington Road.

Pontiac—Fred Stormer, City Sealer of Weights and Measures, 110 E. Pike Street.

MINNESOTA

State—W. E. Czaia, Supervisor, Department of Weights and Measures, Railroad and Warehouse Commission, One Flour Exchange, Minneapolis 55415.
Ed. Skluzacek, State Inspector, 325 South 3rd Street, Minneapolis.

City:

Minneapolis—J. G. Gustafson, Chief Inspector, Department of Licenses, Weights, and Measures, City Hall, Room 101A.

MISSISSIPPI

State—W. G. Sellers, State Inspector of Weights and Measures, Route 1, Laurel.

MISSOURI

City:

St. Louis, (63103)—D. I. Offner, Commissioner of Weights and Measures, City Hall, Room 12.

MONTANA

State—G. L. Delano, Chief Sealer, Division of Weights and Measures, Department of Agriculture, Capitol Building, Helena 59601.

NEVADA

State—J. E. Hampton, Acting Chief Deputy State Sealer, Bureau of Weights and Measures, Department of Agriculture, P.O. Drawer 1209, Reno 89504.

NEW HAMPSHIRE

State—W. J. Tusen, State Inspector of Weights and Measures, 232 Lawrence Road, Salem.

City:

Keene—R. M. Seaver, City Sealer of Weights and Measures, 72 Pine Avenue.

State — S. H. Christie, Jr., Deputy State Superintendent, Division of Weights and Measures, Department of Law and Public Safety, 187 West Hanover Street, Trenton 08625.
A. T. Smith, Supervisor of Licensing.
J. R. Bird, Supervisor of Technical Services.
L. E. Lefkowitz, Deputy Attorney General, Department of Weights and Measures, State House Annex, Trenton.

County:

Bergen — M. J. Santimauro, County Superintendent of Weights and Measures, 66 Zabriskie Street, Hackensack.
E. E. Dawson, Assistant County Superintendent of Weights and Measures.

Camden — A. C. Becker, County Superintendent of Weights and Measures, City Hall, Camden.

Cumberland — G. A. Franks, County Superintendent, Department of Weights and Measures, Court House, Bridgeton.
Nicholas DiMarco, Assistant County Superintendent.

Essex — W. H. Schneidewind, County Superintendent of Weights and Measures, 278 New Street, Newark.

Monmouth — W. I. Thompson, County Superintendent of Weights and Measures, P.O. Box 74, Allenhurst 07711.
J. A. J. Bovie, Assistant County Superintendent of Weights and Measures, 82 West Wall Street, Neptune City 07753.
W. G. Dox, Assistant County Superintendent of Weights and Measures, 40 Waverly Place, Red Bank 07701.
E. H. Camoosa, County Inspector, 1106 Jeffrey Street, Asbury Park 07712.

Passaic — William Miller, County Superintendent of Weights and Measures, 317 Pennsylvania Avenue, Paterson 07503.

Sussex — J. M. Heater, County Superintendent of Weights and Measures, 18 Church Street, Newton.
Jack Prout, Jr., Lab.

Warren — G. E. Connolly, County Superintendent of Weights and Measures, Court House, Belvidere.

City:

Jersey City — H. J. Myers, Municipal Superintendent of Weights and Measures, City Hall.

Kearny — James Pollock, Municipal Superintendent of Weights and Measures, 402 Kearny Avenue.

Linden — L. T. Reagan, Municipal Superintendent of Weights and Measures, Room 206, City Hall.

Passaic — Paul DeVries, Municipal Superintendent of Weights and Measures, City Hall.
Joseph Shaw, Assistant Municipal Superintendent.

Paterson (07505) — J. P. Leonard, Municipal Superintendent of Weights and Measures, 115 Van Houten Street.

Trenton — R. J. Boney, Municipal Superintendent of Weights and Measures, 324 East State Street, City Hall Annex.

NEW MEXICO

State — C. B. Whigham, Chief, Division of Markets, Weights and Measures, Department of Agriculture, Box 457, University Park 88070.

State ---------- J. F. MADDEN, Director, Bureau of Weights and Measures, Department of Agriculture and Markets, Laboratory Building, 1220 Washington Avenue, Albany 12226.

County:

Cayuga ---------- VERNON PARMENTER, County Sealer of Weights and Measures, King Ferry.

Monroe ---------- R. J. VENESS, County Sealer of Weights and Measures, 1400 South Avenue, Rochester.
L. P. ROMANO, Deputy County Sealer.

Nassau ---------- ROBERT WILLIAMS, County Sealer of Weights and Measures, 1035 Stewart Avenue, Garden City 11533.
A. W. WEIDNER, Jr., Assistant County Sealer.

Wayne ---------- H. H. WRIGHT, County Sealer of Weights and Measures, 30 Catherine Street, Lyons.

City:

Auburn ---------- E. M. MARCO, City Sealer of Weights and Measures, Memorial City Hall.

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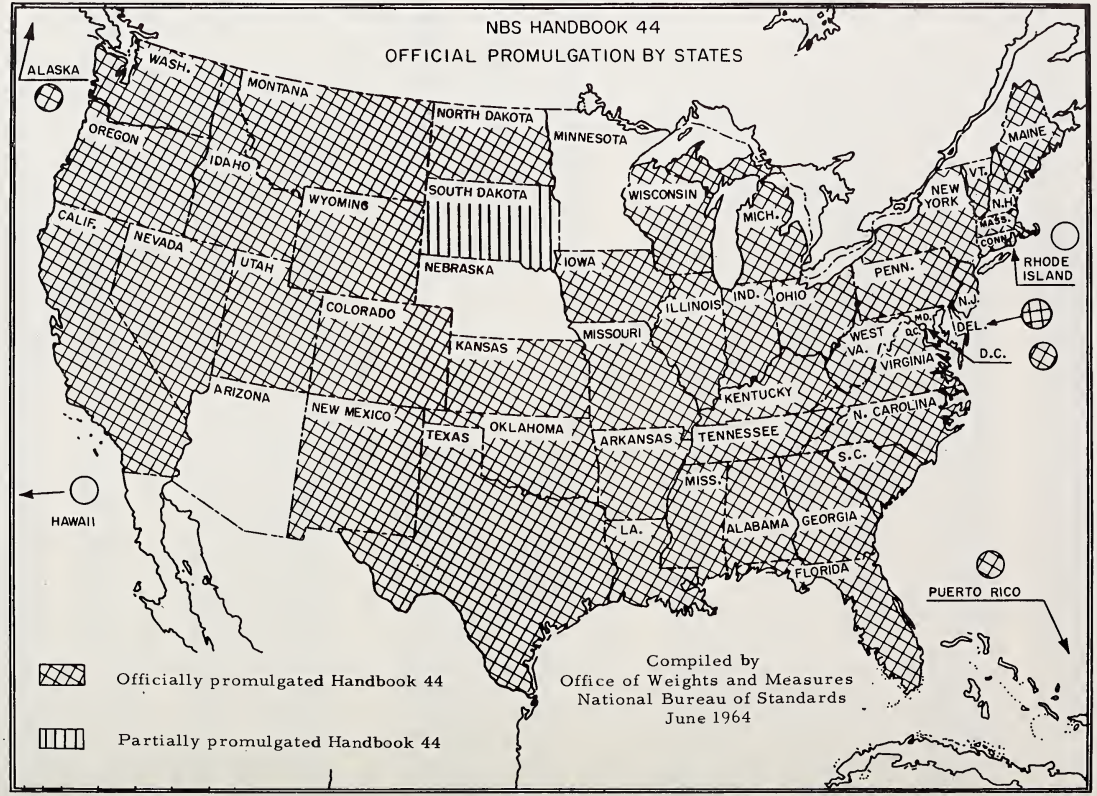

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