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METRIC CONVERSION ACT OF 1975

GOVERNMENT

Storage

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25 1976

HEARINGS

BEFORE THE

THE LIBRARY
KANSAS STATE UNIVERSITY

COMMITTEE ON COMMERCE

UNITED STATES SENATE

NINETY-FOURTH CONGRESS

FIRST SESSION

ON

S. 100

TO PROVIDE A NATIONAL PROGRAM IN ORDER TO MAKE
THE INTERNATIONAL METRIC SYSTEM THE PREDOMINANT
BUT NOT EXCLUSIVE SYSTEM OF MEASUREMENT
IN THE UNITED STATES AND TO PROVIDE FOR CONVERTING
TO THE GENERAL USE OF SUCH SYSTEM WITHIN TEN
YEARS

S. 1882

TO ESTABLISH A NATIONAL POLICY RELATING TO CON-
VERSION TO THE METRIC SYSTEM IN THE UNITED STATES

H.R. 8674

TO DECLARE A NATIONAL POLICY OF COORDINATING THE
INCREASING USE OF THE METRIC SYSTEM IN THE UNITED
STATES, AND TO ESTABLISH A UNITED STATES METRIC
BOARD TO COORDINATE THE VOLUNTARY CONVERSION
TO THE METRIC SYSTEM

OCTOBER 8 AND 10, 1975

Serial No. 94-46

Printed for the use of the Committee on Commerce



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METRIC CONVERSION ACT OF 1975

WEDNESDAY, OCTOBER 8, 1975

U.S. SENATE,
COMMITTEE ON COMMERCE,
Washington, D.C.

The committee met at 10:05 a.m. in room 1318, Dirksen Senate Office Building, Hon. Daniel K. Inouye presiding.

OPENING STATEMENT BY SENATOR INOUE

Senator INOUE. This morning the Committee on Commerce opens hearings on proposed metric conversion legislation, S. 100, S. 1882, and H.R. 8674.

On September 5, by a vote of 300-63, the House of Representatives passed H.R. 8674, the Metric Conversion Act of 1975. Favorable action by the House has moved the Congress closer to the adoption of the metric international system of weights and measures than at any time in our history.

In 1972 the Senate passed by a voice vote a metric conversion bill sponsored by Senator Claiborne Pell of Rhode Island. Thus, there is clearly substantial support within Congress to move to the metric system and to discard the antiquated customary system which our Nation currently utilizes.

The United States is one of only five nations not using or converting to the metric system. Only Brunei, Burma, Yemen, and Liberia accompany the United States as outposts in a metric world. Ironically, even the United Kingdom, home of the customary system, has decided to abandon the medieval measurements that country originated.

Use of metric measurements in the United States is widespread and growing rapidly. Several American industries and industrial firms already use metric measurements exclusively. Within the last few years many States have adopted programs of metric education. Several Federal agencies are promulgating regulations designed to result in metric standardization. In short, the United States is moving haltingly to metric conversion even without congressional action. The questions we need to answer today and in the future are not whether we go metric but at what pace and in what fashion.

Because of restrictions on time, we have had to limit the number of witnesses. Nevertheless, the committee welcomes the views of all interested parties. Those who were unable to appear should feel free to submit a statement for inclusion in the hearing record.

Staff member assigned to these hearings: Eric H. M. Lee.

[The bills and agency comments follow:]

94TH CONGRESS
1ST SESSION

S. 100

IN THE SENATE OF THE UNITED STATES

JANUARY 15, 1975

Mr. PELL (for himself and Mr. INOUE) introduced the following bill; which was read twice and referred to the Committee on Commerce

A BILL

To provide a national program in order to make the international metric system the predominant but not exclusive system of measurement in the United States and to provide for converting to the general use of such system within ten years.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 SHORT TITLE

4 SECTION 1. This Act may be cited as the "Metric Con-
5 version Act of 1975".

6 FINDINGS

7 SEC. 2. The Congress finds that—

8 (1) the United States is the only industrially

II—O

★★(Star Print)

1 developed nation which has not established a national
2 policy committing itself to and facilitating conversion
3 to the metric system; and

4 (2) as a result of the study to determine the
5 advantages and disadvantages of increased use of the
6 metric system in the United States authorized by Pub-
7 lic Law 90-472 (82 Stat. 693), the Secretary of
8 Commerce has found that increased use of the metric
9 system in the United States is inevitable, and has con-
10 cluded that a national program to achieve a metric
11 changeover is desirable; that maximum efficiency will
12 result and minimum costs to effect the conversion will
13 be incurred if the conversion is carried out pursuant
14 to a national plan; that the changeover period be ten
15 years, at the end of which the Nation would be
16 predominantly, although not exclusively, metric; that a
17 central planning and coordinating body be established
18 and assigned to plan and coordinate the changeover in
19 cooperation with all sectors of our society; and that
20 immediate attention be given to education of the pub-
21 lic and to effective United States participation in
22 international standards making;

23 (3) the adoption of the metric system would result
24 in new jobs in the United States;

25 (4) the adoption of such system would enhance our
26 position in world trade markets;

1 (5) the benefits of conversion would offset the
2 costs of conversion;

3 (6) conversion to such system would be a stimulus
4 to the economy and to new investment in plant
5 equipment;

6 (7) the language and tools of our scientific com-
7 munity are already using such system;

8 (8) a common system of measurement would
9 improve international communication;

10 (9) the Nation is already heading toward such
11 system slowly and haphazardly;

12 (10) such system is based on fundamental relation-
13 ships and is easily understood and would be an aid to
14 our educational system;

15 (11) small businesses and self-employed crafts-
16 men would benefit from a coordinated conversion
17 program;

18 (12) new international standards are currently
19 being developed into such system and the United States
20 is not fully participating in such development;

21 (13) the use of the metric system of weights and
22 measures in the United States was authorized by the
23 Act of July 28, 1866 (14 Stat. 339);

24 (14) the United States was one of the original
25 signatories to the Convention of the Meter (20 Stat.
26 709), which established the General Conference of

1 Weights and Measures, the International Committee of
2 Weights and Measures, and the International Bureau of
3 Weights and Measures; and

4 (15) the metric measurement standards recognized
5 and developed by the International Bureau of Weights
6 and Measures have been adopted as the fundamental
7 measurement standards of the United States and the cus-
8 tomary units of weights and measures used in the United
9 States have been since 1893 based upon such metric
10 measurement standards.

11 SEC. 3. (a) It is therefore declared that the policy of the
12 United States shall be—

13 (1) to establish the metric system of measurement
14 as the sole language of measurement in the United
15 States within ten years from the date of the enactment
16 of this Act except for exemptions granted pursuant to
17 the provisions of this Act;

18 (2) as part of the plan establishing such system,
19 to provide a method of appeal under which exemptions
20 may be granted to persons and businesses upon proof of
21 excessive costs substantially outweighing benefits to the
22 Nation, custom and tradition as a member of a class
23 outweighing such benefits, or other factors determined
24 as part of such plan;

25 (3) to facilitate and encourage the substitution of

1 metric measurement units for customary measurement
2 units in education, trade, commerce, and all other
3 sectors of the economy of the United States with a view
4 to making metric units the predominant, although not
5 exclusive, language of measurement with respect to
6 transactions occurring after ten years from the date of
7 the enactment of this Act;

8 (4) to facilitate and encourage the development as
9 rapidly as practicable of new or revised engineering
10 standards based on metric measurement units in those
11 specific fields or areas in the United States where such
12 standards will result in rationalization or simplification
13 of relationships, improvements of design, or increases in
14 economy;

15 (5) to facilitate and encourage the retention in
16 new metric language standards of those United States
17 engineering designs, practices, and conventions that are
18 internationally accepted or embody superior technology;

19 (6) to cooperate with foreign governments and
20 public and private international organizations which are
21 or become concerned with the encouragement and coor-
22 dination of increased use of metric measurement units
23 or engineering standards based on such units, or both,
24 with a view to gaining international recognition for
25 metric standards proposed by the United States;

1 (7) to assist the public through information and
2 educational programs to become familiar with the mean-
3 ing and applicability of metric terms and measures in
4 daily life, including—

5 (A) public information programs conducted by
6 the Board through the use of newspapers, maga-
7 zines, radio, television, other media, and through
8 talks before appropriate citizens groups and public
9 organizations; .

10 (B) counseling and consultation by the Secre-
11 tary of Health, Education, and Welfare and the
12 Director, National Science Foundation with educa-
13 tional associations and groups so as to assure that
14 the metric system of measurement is made a part of
15 the curriculum of the Nation's educational institu-
16 tions and that teachers and other appropriate per-
17 sonnel are properly trained to teach the metric
18 system of measurement;

19 (C) consultation by the Secretary of Commerce
20 with the National Conference of Weights and Meas-
21 ures so as to assure that State and local weights and
22 measures officials are appropriately informed of the
23 intended metric changeover and are thus assisted in
24 their efforts to bring about timely amendments to
25 weights and measures laws; and

1 (D) such other public information programs by
2 any Federal agency in support of this Act which
3 relate to the mission of the agency;

4 (8) to accomplish a changeover to the greatest
5 practical extent within ten years by Federal agencies
6 to the metric system of measurement pursuant to the
7 comprehensive plan developed by the Board; and

8 (9) to utilize Federal procurement activities to
9 encourage the general use of the metric system of
10 measurement.

11 (b) It is the purpose of this Act—

12 (1) to provide for the formulation and initial
13 effectuation of a plan for conversion to the metric system;

14 (2) to establish a National Metric Conversion
15 Board to develop and implement a metric conversion
16 plan for the United States;

17 (3) to provide limited assistance to businesses and
18 individuals, substantially effected by metric conversion,
19 in bearing the cost of such conversion; and

20 (4) to provide for the establishment of a national
21 information program about metric conversion.

22 DEFINITIONS

23 SEC. 4. For the purpose of this Act—

24 (a) The term "metric system of measurement" means
25 the International System of Units as established by the

1 General Conference of Weights and Measures in 1960 and
2 interpreted or modified for the United States by the Secre-
3 tary of Commerce.

4 (b) The term "engineering standard" means a standard
5 which prescribes a concise set of conditions and requirements
6 to be satisfied by a material, product, process, procedure,
7 convention, test method, and the physical, functional, per-
8 formance and/or conformance characteristics thereof.

9 (c) The term "changeover period" means the length
10 of time for the United States to become predominantly,
11 although not exclusively, metric.

12 ESTABLISHMENT OF NATIONAL METRIC CONVERSION

13 BOARD

14 SEC. 5. There is hereby established a National Metric
15 Conversion Board (herein referred to as the "Board") to
16 implement the policy set out in this Act.

17 COMPOSITION OF BOARD

18 SEC. 6. The composition of the Board shall be as
19 follows:

20 (a) Nine members shall be appointed by the President,
21 with the advice and consent of the Senate, from among those
22 persons with experience and competence in the following
23 areas: business, labor, education, consumer protection,
24 science, and technology. The President shall designate one
25 member appointed by him to serve as Chairman. The mem-

9

1 bers first appointed under this section shall continue in
 2 office for terms of 1, 2, 3, 4, or 5 years, from the date this
 3 section takes effect, the term of each to be designated by
 4 the President at the time of nomination. Their successors
 5 shall be appointed each for a term of five years from the
 6 date of the expiration of the term which his predecessor
 7 was appointed. No more than five of the members shall
 8 be appointed from the same political party;

9 (b) One Member of the Senate shall be appointed by the
 10 President of the Senate; and

11 (c) One Member of the House of Representatives, who
 12 shall not be a member of the same political party as the
 13 Member of the Senate, shall be appointed by the Speaker of
 14 the House of Representatives.

15 VACANCIES AND VICE CHAIRMAN

16 SEC. 7. No vacancy on the Board shall impair the right
 17 of the remaining members to exercise all the powers of the
 18 Board. Six members of the Board shall constitute a quorum
 19 for the transaction of business. The Board shall annually
 20 elect a Vice Chairman to act in case of the absence or dis-
 21 ability of the Chairman or in case of the vacancy in the
 22 Office of the Chairman.

23 PLAN

24 SEC. 8. (a) Within eighteen months after funds have
 25 been appropriated to carry out the provisions of this Act

1 the Board shall, in furtherance and in support of the policy
2 expressed in section 3 of this Act, develop and submit to
3 the President and the Congress a comprehensive plan to
4 accomplish a changeover to the metric system of measure-
5 ment in the United States. Such a plan may include recom-
6 mendations for legislation deemed necessary and appropriate.
7 Such a plan shall include proposed Executive orders or other
8 directives, which the President is authorized to promulgate
9 and make effective, requiring such conversion activities of the
10 Federal Government, including procurement, in accordance
11 with an appropriate time schedule and pursuant to the com-
12 prehensive plan. In developing this plan the Board shall—

13 (1) consult with and take into account the interests
14 and views of the United States commerce and industry,
15 including small business; science; engineering; labor;
16 education; consumers; government agencies at the Fed-
17 eral, State, and local level; nationally recognized stand-
18 ards developing and coordinating organizations; and such
19 other individuals or groups as are considered appropriate
20 by the Board to carry out the purposes of this section;

21 (2) consult, to the extent deemed appropriate, with
22 foreign governments, public international organizations
23 and, through appropriate member organizations, private
24 international standards organizations. Contact with for-
25 eign governments and intergovernmental organizations

1 shall be accomplished in consultation with the Depart-
2 ment of State.

3 (b) Any amendment to the plan shall be submitted by
4 the Board to the President and the Congress under the pro-
5 visions set out in subsection (a) of this section and section 9
6 of this Act.

7 IMPLEMENTATION

8 SEC. 9. (a) The Board shall begin implementation of
9 the plan at the end of the first period of sixty calendar days
10 that Congress is in continuous session after the date on which
11 the plan is transmitted to it and to the President unless be-
12 tween the date of transmittal and the end of the sixty-day
13 period, either House passes a resolution stating in substance
14 that it does not favor the plan or the President disapproves
15 the plan and gives his reasons therefor.

16 (b) For the purpose of subsection (a) of this section—

17 (1) continuity of session is broken only by an ad-
18 journment of Congress sine die; and

19 (2) the days on which either House is not in
20 session because of an adjournment of more than three
21 days to a day certain are excluded in the computation
22 of the sixty-day period.

23 POWERS

24 SEC. 10. In carrying out its duties, the Board is author-
25 ized to:

1 (a) enter into contracts in accordance with the
2 Federal Property and Administrative Services Act of
3 1949, as amended, with Federal or State agencies,
4 private firms, institutions, and individuals for the con-
5 duct of research or surveys, the preparation of reports,
6 and other activities necessary to the discharge of its
7 duties;

8 (b) conduct hearings at such times and places as it
9 deems appropriate;

10 (c) establish such committees and advisory panels
11 as it deems necessary to work with the various sectors of
12 the American economy and governmental agencies in the
13 development and implementation of detailed changeover
14 plans for those sectors; and

15 (d) perform such other acts as may be necessary
16 to carry out the duties prescribed by this Act.

17 COMPENSATION OF BOARD

18 SEC. 11. Members of the Board who are not in the
19 regular full-time employ of the United States shall, while
20 attending meetings or conferences of the Board or otherwise
21 engaged in the business of the Board, be entitled to receive
22 compensation at a rate of \$100 per day, including traveltime,
23 and, while so serving on the business of the Board away from
24 their homes or regular places of business, they may be al-

lowed travel expenses, including per diem in lieu of subsistence, as authorized by section 5703 of title 5, United States Code, for persons employed intermittently in the Government service. Payments under this section shall not render members of the Board employees or officials of the United States for any purpose.

DIRECTOR AND CONSULTANTS

SEC. 12. (a) The Board is authorized to appoint an Executive Director who shall serve full time and receive basic pay at a rate not to exceed the rate provided for GS-18 in section 5332 of title 5, United States Code, and to appoint and fix the compensation of such staff personnel as may be necessary to carry out the provisions of this Act.

(b) The Board is authorized to employ experts and consultants or organizations thereof as authorized by section 3109 of title 5, United States Code, compensate individuals so employed at rates not in excess of the rate prescribed for grade 18 of the General Schedule under section 5332 of such title, including traveltime, and allow them, while away from their homes or regular places of business, travel expenses (including per diem in lieu of subsistence) as authorized by section 5703 of said title 5 for persons in the Government service employed: *Provided, however,* That contracts for such employment may be renewed annually.

1

13

14

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26

(c) Upon the request of the Board, the Secretary of the

1 Treasury may invest and reinvest in securities of the United
2 States any moneys contained in the fund herein authorized.
3 Income accruing from such securities, and from any other
4 property accepted to the credit of the fund authorized herein,
5 shall be disbursed upon the order of the Board.

6

ANNUAL REPORT

7 SEC. 15. The Board shall submit annual reports of its
8 activities to the President and the Congress with respect to
9 (1) progress being made under such plans; (2) tangible
10 costs and benefits being incurred thereunder; and (3) any
11 additional legislation needed to carry out the policy stated
12 in this Act.

13

AUTHORIZATION

14 SEC. 16. There are hereby authorized to be appro-
15 priated, for the preceding sections, not to exceed \$3,000,000
16 for the fiscal year beginning July 1, 1975, not to exceed
17 \$4,000,000 for the fiscal year beginning July 1, 1976,
18 and for each of the following three fiscal years not to exceed
19 \$4,500,000. Appropriations to carry out those provisions
20 may remain available for obligation and expenditure for
21 such period or periods as may be specified in the Acts making
22 such appropriations.

23

TAX ASSISTANCE

24 SEC. 17. (a) Section 167 of the Internal Revenue
25 Code of 1954 (relating to depreciation) is amended by

1 redesignating subsection (m) as (n) and by inserting after
2 subsection (1) the following new subsection:

3 “(n) PROPERTY NECESSARY FOR METRIC CONVER-
4 SION.—

5 “(1) USEFUL LIFE.—At the election of the tax-
6 payer, the useful life of property described in paragraph
7 (2) shall, for purposes of this section other than for
8 purposes of subsection (c), be one-half of the useful life
9 determined without regard to this subsection.

10 “(2) PROPERTY TO WHICH APPLICABLE.—Para-
11 graph (1) shall apply only to personal property which
12 is—

13 “(A) manufactured in the United States and
14 substantially all of the component parts of which are
15 manufactured in the United States, and

16 “(B) placed in service in replacement of other
17 property in order to carry out the requirements of
18 the national plan for metric conversion submitted
19 under the Metric Conversion Act of 1975.

20 “(3) ELECTION.—An election under paragraph
21 (1) with respect to any property shall be made at such
22 time and in such manner as the Secretary or his delegate
23 prescribes by regulations.

24 “(4) REGULATIONS.—The Secretary or his dele-
25 gate shall, after consultation with the Secretary of Com-

1 merce, prescribe regulations to carry out the purposes
2 of this subsection.”

3 (b) As soon as practicable after the submission of the
4 national plan for metric conversion under this Act the Secre-
5 tary of the Treasury shall submit to the Congress recom-
6 mendations for additional changes in the Federal income tax
7 laws which he considers necessary to assist in carrying out
8 the national plan. Before submitting recommendations under
9 this subsection the Secretary of the Treasury shall consult
10 with the Secretary of Commerce and the Secretary of Labor,
11 and with such other officers of the United States and such
12 private individuals and organizations as he deems desirable.

13 CONVERSION ASSISTANCE TO BUSINESS AND INDIVIDUALS

14 SEC. 18. (a) Section 7 (b) of the Small Business Act
15 is amended by adding after paragraph (7) a new para-
16 graph as follows:

17 “(8) to make such loans (either directly or in
18 cooperation with banks or other lending institutions
19 through agreements to participate on an immediate or
20 deferred basis) as the Administration, in consultation
21 with the Secretary of Commerce, determines to be
22 necessary or appropriate to assist any business con-
23 cern to make changes in its equipment, facilities, or
24 methods of operation to conform to the national plan
25 of metric conversion submitted under the Metric Con-

1 version Act of 1975, if the Administration determines
2 that such concern is likely to suffer substantial eco-
3 nomic injury without assistance under this paragraph."

4 (b) (1) The Administrator of the Small Business Ad-
5 ministration is authorized, under terms and conditions pre-
6 scribed by him, to make grants to individuals to defray
7 non-reimbursable expenses which must be incurred by
8 them for the purpose of acquiring tools or instruments which
9 are necessary to their continued employment in a trade or
10 business and are required as the result of the implementation
11 of the national plan of metric conversion submitted under
12 the Metric Conversion Act of 1975. The amount of any
13 such grant to any individual shall not exceed \$2,000.

14 (2) There are authorized to be appropriated to the
15 Small Business Administration such sums as may be neces-
16 sary to carry out this subsection.

IN THE SENATE OF THE UNITED STATES

Mr. INOUE (for himself and Mr. PEARSON) (by request) introduced the following bill; which was read twice and referred to the Committee on Commerce

To establish a national policy relating to conversion to the metric system in the United States.

SHORT TITLE

FINDINGS

11 (2) the United States was one of the original signa-

1 tories to the Convention of the Meter (20 Stat. 709),
2 which established the General Conference of Weights
3 and Measures, the International Committee of Weights
4 and Measures, and the International Bureau of Weights
5 and Measures; and

6 (3) the metric measurement standards recognized
7 and developed by the International Bureau of Weights
8 and Measures have been adopted as the fundamental
9 measurement standards of the United States and the
10 customary units of weights and measures used in the
11 United States have been since 1893 based upon such
12 metric measurement standards; and

13 (4) the Governments of Australia, Canada, United
14 Kingdom, India, Japan, New Zealand, and the Republic
15 of South Africa have determined to convert, are con-
16 verting, or have converted to the use of the metric sys-
17 tem in their respective jurisdictions; and

18 (5) the United States is the only industrially de-
19 veloped nation which has not established a national pol-
20 icy committing itself to and facilitating conversion to the
21 metric system; and

22 (6) as a result of the study to determine the ad-
23 vantages and disadvantages of increased use of the
24 metric system in the United States authorized by Public

1 Law 90-472 (82 Stat. 693), the Secretary of Com-
2 merce has found that increased use of the metric system
3 in the United States is inevitable; that maximum effi-
4 ciency will result and minimum costs to effect the con-
5 version will be incurred if it is accomplished through a
6 coordinated national program carried out, in general,
7 without Federal subsidies; that the goal for the con-
8 version should be a nation predominantly, although not
9 exclusively, metric; that a central planning and coordi-
10 nating body be established and assigned to plan and co-
11 ordinate metric conversion activities in cooperation with
12 all sectors of our society; and that immediate attention
13 be given to education of the public and to effective
14 United States participation in measurement-related in-
15 ternational standards activities.

16 STATEMENT OF POLICY

17 SEC. 3. It is therefore declared that the policy of the
18 United States shall be—

19 (1) to plan and coordinate the voluntary substitu-
20 tion of metric measurement units for customary meas-
21 urement units in education, trade, commerce, and all
22 other sectors of the economy of the United States, with
23 a view to making metric units the predominant, al-
24 though not exclusive, language of measurement, on a

1 time scale for conversion appropriate to particular sectors
2 as approved by the Congress on recommendation of the
3 United States Metric Board pursuant to section 11;

4 (2) to encourage voluntary participation of the
5 members of each affected sector and group in the Nation
6 in the activities of the Metric Board;

7 (3) to encourage efficiency and minimize overall
8 costs to society;

9 (4) to assist in the development of a broad educa-
10 tional program to be carried out in the Nation's ele-
11 mentary and secondary schools and institutions of higher
12 learning, as well as with the public at large, designed
13 to enable all Americans to become familiar with the
14 meaning and applicability of metric terms and measure-
15 ments in daily life, in a manner consistent with the pro-
16 visions of section 403 of Public Law 93-380, "the Edu-
17 cation Amendments of 1974" (88 Stat. 546; 20 U.S.C.
18 1862), relating to metric education.

19 DEFINITIONS

20 SEC. 4. For the purposes of this Act—

21 (a) The term "metric system of measurement"
22 means the International System of Units as established
23 by the General Conference of Weights and Measures in
24 1960 and interpreted or modified for the United States
25 by the Secretary of Commerce.

1 (b) The term "engineering standard" means a
2 standard which prescribes a concise set of conditions
3 and requirements to be satisfied by a material, product,
4 process, procedure, convention or test method, and the
5 physical, functional, performance, and/or conformance
6 characteristics thereof.

7 (c) The term "international standard or recom-
8 mendation" means an engineering standard or recom-
9 mendation formulated and promulgated by an interna-
10 tional organization and recommended for adoption by
11 individual nations as a national standard.

12 ESTABLISHMENT OF UNITED STATES METRIC BOARD

13 SEC. 5. There is hereby established a United States
14 Metric Board (hereinafter referred to as the "Board") to
15 implement the policy set out in this Act.

16 SEC. 6. The composition of the Board shall be as
17 follows:

18 (a) A maximum of twenty-one persons appointed
19 by the President, who shall serve at his pleasure and for
20 such terms as he shall specify, who shall be broadly
21 representative of the American society, including indus-
22 try, labor, business, and commerce, the consumer, educa-
23 tion, State and local government, science, and engineer-
24 ing. The President shall designate one of the members

1 appointed by him to serve as Chairman and another to
2 serve as Vice Chairman of the Board;

3 (b) Two Members of the House of Representatives
4 who shall not be members of the same political party,
5 and who shall be appointed by the Speaker of the House
6 of Representatives; and

7 (c) Two Members of the Senate who shall not be
8 members of the same political party, and who shall be
9 appointed by the President of the Senate.

10 SEC. 7. No vacancy on the Board shall impair the right
11 of the remaining members to exercise all the powers of the
12 Board. A simple majority of the Board membership shall
13 constitute a quorum for transaction of business.

14 SEC. 8. Unless otherwise provided by the Congress, the
15 Board shall have no compulsory powers.

16 SEC. 9. The Board shall cease to exist when the Con-
17 gress, by law, determines that its mission has been accom-
18 plished.

19 DUTIES OF THE BOARD

20 SEC. 10. It shall be the function of the Board to devise
21 and carry out a broad program of planning, coordination, and
22 public education, consistent with other national policy and
23 interests, with the aim of implementing the policy set forth
24 in this Act. In carrying out this program the Board shall—

25 (a) Consult with and take into account the interests,

1 views, and conversion costs of United States commerce
2 and industry, including small business, science, engineer-
3 ing, labor, education, consumers, government agencies
4 at the Federal, State, and local level, nationally rec-
5 ognized standards developing and coordinating orga-
6 nizations, metric conversion planning and coordinating
7 groups, and such other individuals or groups as are con-
8 sidered appropriate by the Board to the carrying out
9 of the purposes of this section. The Board will take
10 advantage of activities underway in the private sector
11 so as not to establish, within its own organization and
12 staff, provision for activities that would unnecessarily
13 duplicate those being undertaken in the private sector.

14 (b) Provide for appropriate procedures whereby
15 various groups, under the auspices of the Board, may
16 formulate and recommend to the Board specific programs
17 for coordinating conversion in each industry and seg-
18 ment thereof and for suggesting specific metric sizes,
19 shapes, and other measurements for general use, con-
20 sistent with the needs, interests, and capabilities of man-
21 ufacturers, large and small, suppliers, labor, consumers,
22 educators, and other interested groups, and further con-
23 sistent with the national interest.

24 (c) Publicize, in an appropriate manner, proposed
25 programs and provide an opportunity for interested

1 groups or individuals to submit comments on such pro-
2 grams. At the request of interested parties, the Board,
3 in its discretion, may hold hearings with regard to such
4 programs. Comments provided by public review and
5 hearings will be considered by the Board in consulta-
6 tion, when appropriate, with the sources of a program
7 in making such revision of any program as, in the
8 judgment of the Board, would be warranted.

9 (d) Encourage activities of standardization organi-
10 zations to develop or revise as rapidly as practicable
11 engineering standards to a metric measurement basis and
12 to take advantage of opportunities to promote rationali-
13 zation or simplification of relationships, improvements
14 of design, reductions of size variations, and increases in
15 economy, plus any opportunities to promote the efficient
16 use of energy and the conservation of natural resources.

17 (e) Encourage the retention, in new metric lan-
18 guage standards, of those United States engineering
19 designs, practices, and conventions that are interna-
20 tionally acceptable or embody superior technology.

21 (f) Consult and cooperate with foreign govern-
22 ments, and intergovernmental organizations, in collabora-
23 tion with the Department of State, and, through appro-
24 priate member bodies, with private international organi-
25 zations which are or become concerned with the

1 encouragement and coordination of increased use of
2 metric measurement units or engineering standards based
3 on such units, or both; such consultation shall include
4 efforts, where appropriate, to gain international recog-
5 nition for metric standards proposed by the United
6 States, and, during the United States conversion, to
7 encourage retention of equivalent customary units,
8 usually by way of dual dimensions, in international stand-
9 ards or recommendations.

10 (g) Assist the public, through information and
11 education programs, to become familiar with the mean-
12 ing and applicability of metric terms and measures in
13 daily life. Programs hereunder shall include—

14 (1) public information programs conducted by
15 the Board through the use of newspapers, maga-
16 zines, radio, television, and other media, and
17 through talks before appropriate citizens' groups and
18 public organizations;

19 (2) counseling and consultation by the Secre-
20 tary of Health, Education, and Welfare, the Secre-
21 tary of Labor, and the Director, National Science
22 Foundation, with educational associations, labor
23 education committees, apprentice training commit-
24 tees, and other interested groups, so as to assure that
25 the metric system of measurement is made a part

1 of the curriculums of the Nation's educational insti-
2 tutions and that teachers and other appropriate per-
3 sonnel are properly trained to teach the metric sys-
4 tem of measurement;

5 (3) consultation by the Secretary of Commerce
6 with the National Conference of Weights and
7 Measures so as to assure that State and local weights
8 and measures officials are appropriately involved in
9 metric conversion activities and are thus assisted in
10 their efforts to bring about timely amendments to
11 weights and measures laws; and

12 (4) such other public information programs by
13 any Federal agency in support of this Act which
14 relate to the mission of the agency.

15 (h) Collect, analyze, and publish information about
16 the extent of usage of metric measurements; evaluate the
17 costs and benefits of metric usage; and make efforts to
18 minimize any adverse effects resulting from increasing
19 metric usage.

20 (i) Conduct research, publish the results of this
21 research, and recommend in the program proposals sub-
22 mitted in accordance with section 11 (b) whatever
23 action may be appropriate to deal with any unresolved
24 problems associated with metric usage, including but
25 not limited to the impact on workers (such as costs of

1 tools and training) and on different occupations and
2 industries, possible increased costs to consumers, the
3 impact on society and the economy, effects on small
4 business, the impact on the United States international
5 trade position, the appropriateness of using Federal pro-
6 curement to effect conversion to the metric system, the
7 proper conversion or transition period in particular sec-
8 tors, and effects on national defense.

9 (j) Submit annually a report of its activities to
10 the President and to both Houses of Congress.

11 SEC. 11. (a) To carry out the provisions of this Act
12 the Board shall submit conversion programs approved by the
13 Board to the President who shall within sixty days approve
14 or disapprove the program. Upon approval, the President
15 shall forward immediately the conversion program to both
16 Houses of Congress on the same day and to each House while
17 it is in session. The Board shall implement such program
18 after sixty legislative days following the date of delivery to
19 the Congress.

20 (b) If any program is disapproved by the Congress or
21 the President, a revised program shall be submitted by the
22 Board within sixty days of such disapproval. Such revised
23 program shall be subject to the procedures set forth in sub-
24 section (a).

AUTHORITY OF THE BOARD

1
2 SEC. 12. In carrying out its duties the Board is au-
3 thorized to—

4 (a) establish an executive committee, and such
5 other committees as it deems desirable;

6 (b) establish such committees and advisory panels
7 as it deems necessary to work with the various sectors
8 of the American economy and governmental agencies in
9 the development and implementation of detailed con-
10 version plans for those sectors; and reimburse as may be
11 authorized by law the members of such committees;

12 (c) conduct hearings at such times and places as it
13 deems appropriate;

14 (d) enter into contracts in accordance with the
15 Federal Property and Administrative Services Act of
16 1949, as amended, with Federal or State agencies,
17 private firms, institutions, and individuals for the conduct
18 of research or surveys, the preparation of reports, and
19 other activities necessary to the discharge of its duties;

20 (e) delegate to the Executive Director such author-
21 ity as it deems advisable; and

22 (f) perform such other acts as may be necessary
23 to carry out the duties prescribed by this Act.

24 SEC. 13. (a) The Board is hereby authorized to accept,
25 hold, administer, and utilize gifts, donations, and bequests of

1 property, both real and personal, and personal services, for
2 the purpose of aiding or facilitating the work of the Board.
3 Gifts and bequests of money and the proceeds from sales of
4 other property received as gifts or bequests shall be de-
5 posited in the Treasury in a separate fund and shall be dis-
6 bursed upon order of the Board.

7 (b) For the purpose of Federal income, estate, and
8 gift taxes, property accepted under subsection (a) of this
9 section shall be considered as a gift or bequest to or for the
10 use of the United States.

11 (c) Upon the request of the Board, the Secretary of the
12 Treasury may invest and reinvest in securities of the United
13 States any moneys contained in the fund herein authorized.
14 Income accruing from such securities, and from any other
15 property accepted to the credit of the fund authorized herein,
16 shall be disbursed upon the order of the Board.

17 (d) Funds not expended by the Board at the time of
18 its expiration shall revert to the Treasury of the United States.

19 COMPENSATION OF THE BOARD

20 SEC. 14. Members of the Board who are not in the reg-
21 ular full-time employ of the United States shall, while at-
22 tending meetings or conferences of the Board or otherwise
23 engaged in the business of the Board, be entitled to receive
24 compensation at a rate not to exceed the daily rate currently
25 being paid grade 18 of the General Schedule under section

1 5332 of title 5, United States Code, including traveltime,
2 and, while so serving on the business of the Board away
3 from their homes or regular places of business, they may be
4 allowed travel expenses including per diem in lieu of sub-
5 sistence, as authorized by section 5703 of title 5, United
6 States Code, for persons employed intermittently in the Gov-
7 ernment service. Payments under this section shall not
8 render members of the Board employees or officials of the
9 United States for any purpose. Members of the Board who
10 are in the employ of the United States shall be entitled to
11 travel expenses when traveling on the business of the Board.

12 STAFF SERVICES

13 SEC. 15. (a) An Executive Director of the Board shall
14 be appointed by the President. The Executive Director shall
15 be responsible to the Board for carrying out the metric con-
16 version program according to the provisions of this Act and
17 the policies established by the Board.

18 (b) The Executive Director of the Board shall serve
19 full time and be subject to the provisions of chapter 51 and
20 subchapter III of chapter 53 of title 5, United States Code.
21 The annual salary of the Executive Director shall not exceed
22 the rate currently being paid grade 18 of the General
23 Schedule.

24 SEC. 16. (a) The Board is authorized to appoint and
25 fix the compensation of such staff personnel as may be neces-
26 sary to carry out the provisions of this Act in accordance

1 with the provisions of chapter 51 and subchapter III of
2 chapter 53 of title 5, United States Code.

3 (b) The Board is authorized to employ experts and
4 consultants or organizations thereof as authorized by section
5 3109 of title 5, United States Code, compensate individuals
6 so employed at rates not in excess of the rate currently being
7 paid grade 18 of the General Schedule under section 5332
8 of such title, including traveltime, and allow them, while
9 away from their homes or regular places of business, travel
10 expenses (including per diem in lieu of subsistence) as au-
11 thorized by section 5703 of said title 5 for persons in the
12 Government service employed: *Provided, however,* That con-
13 tracts for such temporary employment may be renewed
14 annually.

15 SEC. 17. Financial and administrative services (includ-
16 ing those related to budgeting, accounting, financial report-
17 ing, personnel, and procurement) and such other staff serv-
18 ices as may be requested by the Board shall be provided the
19 Board by the Secretary of Commerce, for which payment
20 shall be made in advance, or by reimbursement, from funds
21 of the Board in such amounts as may be agreed upon by the
22 Chairman of the Board and the Secretary of Commerce. In
23 performing these functions for the Board, the Secretary is
24 authorized to obtain such information and assistance from
25 other Federal agencies as may be necessary.

16

FUNDS FOR THE BOARD

1

2 SEC. 18. There are hereby authorized to be appropriated
3 such sums as may be necessary to carry out the provisions of
4 this Act. Appropriations to carry out the provisions of this
5 Act may remain available for obligation and expenditure for
6 such period or periods as may be specified in the Acts making
7 such appropriations.

94TH CONGRESS
1ST SESSION

H. R. 8674

IN THE SENATE OF THE UNITED STATES

SEPTEMBER 8, 1975

Read twice and referred to the Committee on Commerce

AN ACT

To declare a national policy of coordinating the increasing use of the metric system in the United States, and to establish a United States Metric Board to coordinate the voluntary conversion to the metric system.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 SHORT TITLE

4 SECTION 1. This Act may be cited as the "Metric
5 Conversion Act of 1975".

6 FINDINGS

7 SEC. 2. The Congress finds that—

8 (1) the use of the metric system of weights and
9 measures in the United States has been legal but not

1 mandatory as a result of the Act of July 28, 1866 (14
2 Stat. 339) ; and

3 (2) the United States was one of the original
4 signatories to the Convention of the Meter (20 Stat.
5 709), which established the General Conference of
6 Weights and Measures, the International Committee of
7 Weights and Measures, and the International Bureau of
8 Weights and Measures; and

9 (3) the metric measurement standards recognized
10 and developed by the International Bureau of Weights
11 and Measures have been adopted as the fundamental
12 measurement standards of the United States and the
13 customary units of weights and measures used in the
14 United States have been since 1893 based upon such
15 metric measurement standards; and

16 (4) the Governments of Australia, Canada, United
17 Kingdom, India, Japan, New Zealand, and the Re-
18 public of South Africa have determined to convert, are
19 converting, or have converted to the use of the metric
20 system in their respective jurisdictions; and

21 (5) the United States is the only industrially de-
22 veloped nation which has not established a national
23 policy committing itself to and facilitating conversion
24 to the metric system; and

1 (6) as a result of the study to determine the
2 advantages and disadvantages of increased use of the
3 metric system in the United States authorized by Public
4 Law 90-472 (82 Stat. 693), the Secretary of Com-
5 merce has found that increased use of the metric system
6 in the United States is inevitable; that maximum effi-
7 ciency will result and minimum costs to effect the con-
8 version will be incurred if the conversion is accomplished
9 through a coordinated national program carried out, in
10 general, without Federal subsidies; that the goal for the
11 conversion should be a nation predominantly, although
12 not exclusively, metric; that a central planning and co-
13 ordinating body be established and assigned to plan and
14 coordinate metric conversion activities in cooperation
15 with all sectors of our society; and that immediate atten-
16 tion be given to education of the public and to effective
17 United States participation in measurement-related in-
18 ternational standards activities.

19 STATEMENT OF POLICY

20 SEC. 3. It is therefore declared that the policy of the
21 United States shall be—

22 (1) to plan to coordinate the increasing use of
23 the metric system of measurement in the United States,
24 and to plan and coordinate the voluntary substitution

1 of metric measurement units for customary measurement
2 units in education, trade, commerce, and all the other
3 sectors of the economy of the United States;

4 (2) to encourage voluntary participation of the
5 members of each affected sector and group in the Nation
6 in the activities of the Metric Board;

7 (3) to encourage efficiency and minimize overall
8 costs to society; and

9 (4) to assist in the development of a broad educa-
10 tional program to be carried out in the Nation's elemen-
11 tary and secondary schools and institutions of higher
12 learning, as well as with the public at large, designed to
13 enable all Americans to become familiar with the mean-
14 ing and applicability of metric terms and measurements
15 in daily life, in a manner consistent with, but not limited
16 to, the provisions of section 403 of Public Law 93-380,
17 "The Education Amendments of 1974" (88 Stat. 546;
18 20 U.S.C. 1862), relating to metric education.

19 DEFINITIONS

20 SEC. 4. For the purposes of this Act—

21 (a) The term "metric system of measurement" means
22 the International System of Units as established by the
23 General Conference of Weights and Measures in 1960 and
24 interpreted or modified for the United States by the Secre-
25 tary of Commerce.

1 (b) The term "engineering standard" means a stand-
2 ard which prescribes a concise set of conditions and require-
3 ments to be satisfied by a material, product, process,
4 procedure, convention, or test method, and the physical,
5 functional, performance and/or conformance characteristics
6 thereof.

7 (c) The term "international standard or recommenda-
8 tion" means an engineering standard or recommendation
9 formulated and promulgated by an international organization
10 and recommended for adoption by individual nations as a
11 national standard.

12 ESTABLISHMENT OF UNITED STATES METRIC BOARD

13 SEC. 5. There is hereby established a United States
14 Metric Board, hereinafter referred to as the "Board," to
15 implement the policy set out in this Act.

16 SEC. 6. The composition of the Board shall be as follows:

17 (a) Twenty-one persons appointed by the President,
18 who shall serve at his pleasure and for such terms as he shall
19 specify, who shall be broadly representative of American
20 society, including industry, labor, business, including small
21 business, agriculture, commerce, the consumer, education,
22 State and local government, science and engineering, the
23 construction industry, and other affected groups. The Presi-
24 dent shall designate one of the members appointed by him to

1 serve as Chairman and another to serve as Vice Chairman of
2 the Board.

3 (b) Two Members of the House of Representatives who
4 shall not be members of the same political party, and who
5 shall be appointed by the Speaker of the House of
6 Representatives.

7 (c) Two members of the Senate who shall not be
8 members of the same political party, and who shall be
9 appointed by the President of the Senate.

10 SEC. 7. No vacancy on the Board shall impair the right
11 of the remaining members to exercise all the powers of the
12 Board. A simple majority of the Board membership shall
13 constitute a quorum for transaction of business.

14 SEC. 8. Unless otherwise provided by the Congress, the
15 Board shall have no compulsory powers.

16 SEC. 9. The Board shall cease to exist when the Con-
17 gress, by law, determines that its mission has been accom-
18 plished.

19 DUTIES OF THE BOARD

20 SEC. 10. It shall be the function of the Board to devise
21 and carry out a broad program of planning, coordination, and
22 public education, consistent with other national policy and
23 interests, with the aim of implementing the policy set forth
24 in this Act. In carrying out this program the Board shall—

25 (a) consult with and take into account the interests,

1 views, and conversion costs of United States commerce
2 and industry, including small business, science, engineer-
3 ing, labor, education, consumers, government agencies at
4 the Federal, State, and local level, nationally recognized
5 standards developing and coordinating organizations,
6 metric conversion planning and coordinating groups, and
7 such other individuals or groups as are considered appro-
8 priate by the Board to the carrying out of the purposes
9 of this Act. The Board will take into account activi-
10 ties underway in the private sector so as not to dupli-
11 cate unnecessarily such activities;

12 (b) provide for appropriate procedures whereby
13 various groups, under the auspices of the Board, may
14 formulate and recommend to the Board specific programs
15 for coordinating conversion in each industry and seg-
16 ment thereof and for suggesting specific dimensions and
17 configurations in the metric system and other measure-
18 ments for general use, consistent with the needs, interests,
19 and capabilities of manufacturers large and small, sup-
20 pliers, labor, consumers, educators, and other interested
21 groups, and further consistent with the national interest;

22 (c) publicize, in an appropriate manner, proposed
23 programs and provide an opportunity for interested
24 groups or individuals to submit comments on such pro-
25 grams. At the request of interested parties, the Board,

1 in its discretion, may hold hearings with regard to such
2 programs. Comments provided by public review and
3 hearings will be considered by the Board;

4 (d) encourage activities of standardization organiza-
5 tions to develop or revise as rapidly as practicable engi-
6 neering standards to a metric measurement basis and to
7 take advantage of opportunities to promote rationaliza-
8 tion or simplification of relationships, improvements of
9 design, reductions of size variations, increases in econ-
10 omy, and any opportunities to promote the efficient
11 use of energy and the conservation of natural resources;

12 (e) encourage the retention, in new metric lan-
13 guage standards, of those United States engineering de-
14 signs, practices, and conventions that are internation-
15 ally acceptable or embody superior technology;

16 (f) consult and cooperate with foreign govern-
17 ments, and intergovernmental organizations, in collab-
18 oration with the Department of State, and, through
19 appropriate member bodies, with private international
20 organizations which are or become concerned with the
21 encouragement and coordination of increased use of
22 metric measurement units or engineering standards
23 based on such units, or both. Such consultation shall in-
24 clude efforts, where appropriate, to gain international
25 recognition for metric standards proposed by the United

1 States, and, during the United States conversion, to
2 encourage retention of equivalent customary units,
3 usually by way of dual dimensions, in international
4 standards or recommendations;

5 (g) assist the public, through information and edu-
6 cation programs, to become familiar with the meaning
7 and applicability of metric terms and measures in daily
8 life. Programs hereunder shall include—

9 (1) public information programs conducted by
10 the Board through the use of newspapers, maga-
11 zines, radio, television, and other media, and
12 through talks before appropriate citizens' groups
13 and public organizations;

14 (2) counseling and consultation by the Secre-
15 tary of Health, Education, and Welfare, the Sec-
16 retary of Labor, the Administrator of the Small
17 Business Administration, and the Director of the
18 National Science Foundation, with educational as-
19 sociations, labor education committees, apprentice
20 training committees, and other interested groups, so
21 as to assure that the metric system of measurement is
22 made a part of the curriculums of the Nation's edu-
23 cational institutions and that teachers and other ap-
24 propriate personnel are properly trained to teach the
25 metric system of measurement;

1 (3) consultation by the Secretary of Commerce
2 with the National Conference of Weights and Meas-
3 ures so as to assure that State and local weights
4 and measures officials are appropriately involved in
5 metric conversion activities and are thus assisted in
6 their efforts to bring about timely amendments to
7 weights and measures laws; and

8 (4) such other public information programs by
9 any Federal agency in support of this Act as relate
10 to the mission of the agency;

11 (h) collect, analyze, and publish information about
12 the extent of usage of metric measurements; evaluate
13 the costs and benefits of metric usage; and make efforts
14 to minimize any adverse effects resulting from increasing
15 metric usage;

16 (i) conduct research including appropriate surveys,
17 publish the results of this research, and recommend to
18 the President and to the Congress whatever action may
19 be appropriate to deal with any unresolved problems
20 associated with metric usage, including but not limited
21 to the impact on workers, such as costs of tools and
22 training, and on different occupations and industries,
23 possible increased costs to consumers, the impact on
24 society and the economy, effects on small business, the
25 impact on the United States international trade posi-

1 tion, the appropriateness of using Federal procurement
2 to effect conversion to the metric system, the proper
3 conversion or transition period in particular sectors, and
4 effects on national defense; and

5 (j) submit annually to the President and to both
6 Houses of Congress a report on its activities, which
7 shall include a status report on the conversion process
8 as well as projections for the conversion process. Such
9 report may include recommendations covering any legis-
10 lation or executive action needed to implement the pro-
11 grams of conversion accepted by the Board.

12 AUTHORITY OF THE BOARD

13 SEC. 11. In carrying out its duties the Board is author-
14 ized to—

15 (a) establish an Executive Committee, and such
16 other committees as it deems desirable;

17 (b) establish such committees and advisory panels
18 as it deems necessary to work with the various sectors
19 of the American economy and governmental agencies in
20 the development and implementation of detailed conver-
21 sion plans for those sectors; and reimburse as may be
22 authorized by law the members of such committees;

23 (c) conduct hearings at such times and places as it
24 deems appropriate;

25 (d) enter into contracts in accordance with the

1 Federal Property and Administrative Services Act of
2 1949, as amended, with Federal or State agencies,
3 private firms, institutions, and individuals for the con-
4 duct of research or surveys, the preparation of reports,
5 and other activities necessary to the discharge of its
6 duties;

7 (e) delegate to the Executive Director such author-
8 ity as it deems advisable; and

9 (f) perform such other acts as may be necessary
10 to carry out the duties prescribed by this Act.

11 SEC. 12. (a) The Board is hereby authorized to accept,
12 hold, administer, and utilize gifts, donations, and bequests of
13 property, both real and personal, and personal services, for
14 the purpose of aiding or facilitating the work of the Board.
15 Gifts and bequests of money and the proceeds from sales of
16 other property received as gifts or bequests shall be deposited
17 in the Treasury in a separate fund and shall be disbursed
18 upon order of the Board.

19 (b) For purpose of Federal income, estate, and gift
20 taxes, property accepted under subsection (a) of this section
21 shall be considered as a gift or bequest to or for the use of
22 the United States.

23 (c) Upon the request of the Board, the Secretary of the
24 Treasury may invest and reinvest in securities of the United
25 States any moneys contained in the fund herein authorized.
26 Income accruing from such securities, and from any other

1 property accepted to the credit of the fund authorized herein,
2 shall be disbursed upon the order of the Board.

3 (d) Funds not expended by the Board at the time of
4 its expiration shall revert to the Treasury of the United
5 States.

6 COMPENSATION OF THE BOARD

7 SEC. 13. Members of the Board who are not in the
8 regular full-time employ of the United States shall, while
9 attending meetings or conferences of the Board or otherwise
10 engaged in the business of the Board, be entitled to receive
11 compensation at a rate not to exceed the daily rate currently
12 being paid grade 18 of the General Schedule under section
13 5332 of title 5, United States Code, including traveltime.
14 While so serving on the business of the Board away
15 from their homes or regular places of business, members of
16 the Board may be allowed travel expenses including per diem
17 in lieu of subsistence, as authorized by section 5703 of title 5,
18 United States Code, for persons employed intermittently in
19 the Government service. Payments under this section shall
20 not render members of the Board employees or officials of the
21 United States for any purpose. Members of the Board who
22 are in the employ of the United States shall be entitled to
23 travel expenses when traveling on the business of the Board.

24 STAFF SERVICES

25 SEC. 14. (a) An Executive Director of the Board shall
26 be appointed by the President. The Executive Director shall

1 be responsible to the Board for carrying out the metric
2 conversion program according to the provisions of this Act
3 and the policies established by the Board.

4 (b) The Executive Director of the Board shall serve full
5 time and be subject to the provisions of chapter 51 and sub-
6 chapter III of chapter 53 of title 5, United States Code. The
7 annual salary of the Executive Director shall not exceed level
8 III of the Executive Schedule under section 5314 of such
9 title.

10 SEC. 15. (a) The Board is authorized to appoint and fix
11 the compensation of such staff personnel as may be necessary
12 to carry out the provisions of this Act in accordance with the
13 provisions of chapter 51 and subchapter III of chapter 53
14 of title 5, United States Code.

15 (b) The Board is authorized to employ experts and
16 consultants or organizations thereof as authorized by section
17 3109 of title 5, United States Code, compensate individuals
18 so employed at rates not in excess of the rate currently being
19 paid grade 18 of the General Schedule under section 5332 of
20 such title, including traveltime, and allow them, while away
21 from their homes or regular places of business, travel ex-
22 penses (including per diem in lieu of subsistence) as au-
23 thorized by section 5703 of said title 5 for persons in the
24 Government service employed: *Provided, however, That*
25 contracts for such temporary employment may be renewed
26 annually.

FUNDS FOR THE BOARD

Clerk.

GENERAL SERVICES ADMINISTRATION,
Washington, D.C., September 19, 1975.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate,
Washington, D.C.

DEAR MR. CHAIRMAN: Your letter of February 17, 1975, requested the views of the General Services Administration on S. 100, a bill "To provide a national program in order to make the international metric system the predominant but not exclusive system of measurement in the United States and to provide for converting to the general use of such system within ten years."

It is the stated purpose of the bill to provide for the formulation and initial effectuation of a plan for conversion to the metric system; to establish a National Metric Conversion Board to develop and implement a metric conversion plan for the United States; to provide limited assistance to businesses and individuals, substantially affected by metric conversion, in bearing the cost of such conversion; and to provide for the establishment of a national information program about metric conversion.

Within 18 months the Board would submit its plan to the President and the Congress, and would begin implementation of the plan unless the President disapproved it or either House passed a resolution of disapproval within 60 calendar days of continuous session.

GSA endorses the concept of metrication as consistent with sound management principles and essential to remaining competitive in international commerce. However, we defer to the Department of Commerce as to the exact form which a metric conversion bill should take.

We estimate that the cost to GSA would be approximately \$1.4 million during the transition period, and if the conversion included metric based engineering standards as well as metric measurement units, there would be an annual cost of \$100,000 for an indefinite period after the transition period, due to the need for dual inventories of replacement parts and equipment.

The Office of Management and Budget has advised that, from the standpoint of the Administration's program, there is no objection to the submission of this report to your Committee.

Sincerely,

ROBERT J. YOCK,
Acting Assistant Administrator.

GENERAL COUNSEL OF THE DEPARTMENT OF DEFENSE,
Washington, D.C., October 15, 1975.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate,
Washington, D.C.

DEAR MR. CHAIRMAN: Reference is made to your request to the Secretary of Defense for the views of the Department of Defense with respect to S. 1882, 94th Congress, a bill "To establish a national policy relating to conversion to the metric system in the United States."

The Department of Defense has no objection to this bill.

The Office of Management and Budget has advised that, from the standpoint of the Administration's program, there is no objection to the submission of this report for the consideration of the Committee.

Sincerely,

L. NIEDERLEHNER,
Acting General Counsel.

DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D.C., October 21, 1975.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This is in response to your letter of September 12, 1975 to Secretary Butz requesting views of the Department of Agriculture regarding H.R. 8674, a bill "To establish a United States Metric Board to coordinate the voluntary conversion to the metric system."

The Department of Agriculture supports the enactment of H.R. 8674.

H.R. 8674 would establish a Metric Board to coordinate the voluntary conversion to the metric system.

Enactment of H.R. 8674, by emphasizing the implementation of the metric system of measurement in the United States on a voluntary basis through planning, coordination, and education is in basic accord with the position of this Department.

The Office of Management and Budget advises that there is no objection to the presentation of this report from the standpoint of the administration's program, and that enactment of H.R. 8674 would be in accord with the program of the President.

Sincerely,

J. PHIL CAMPBELL,
Under Secretary.

Senator INOUE. If Congress enacts a metric conversion bill, credit for the achievement should be given to Representatives Symington and Teague, who skillfully guided H.R. 8674 through the House. Former Representative George Miller, Chairman Teague's predecessor, was a lifelong champion of metric conversion.

Above all, however, I think that advocates of metrication owe their thanks to our first witness this morning. He originated the Metric Study Act in 1968, which culminated in the 1971 report "A Metric America." He fostered the idea when it stood no chance of enactment and has pursued this cause diligently for many years. In this subject and in many others, he has provided visionary and vigorous leadership.

On behalf of the committee, I am pleased to welcome the Honorable Claiborne Pell of Rhode Island.

STATEMENT OF HON. CLAIBORNE PELL, U.S. SENATOR FROM RHODE ISLAND

Senator PELL. Thank you very much, Mr. Chairman, and thank you for your very nice words. They are much appreciated.

I appreciate this opportunity to present my views once again in support of legislation providing for American conversion to the international metric system, and I, in turn, want to express my very heartfelt thanks to you, Mr. Chairman, for your own attention to this problem and to the idea of metrication in this country.

I realize there has not been any overwhelming pattern of support for this idea in past years, and it is because of you and your work in the Commerce Committee that we have been able to move as far as we have. So I thank you and your staff, Mr. Lee, and all those who helped bring us along this road.

I come before this committee with great hopes that at long last this will be the metric year. The prospects appear brighter than ever before because, as you pointed out, thanks to Congressman Teague, we have had favorable action in the House of Representatives on H.R. 8674.

It has been my honor to work on this effort for some 15 years. With your help and this committee's initial support, a metric conversion study was conducted by the National Bureau of Standards recommending that the United States adopt the international system of units as the primary system of weights and measures. This report spurred further congressional action. Again, with your help in 1972, the Senate passed a metric bill, although it did not carry the magic number

of today's S. 100, that I am supporting, as well as the general concept of metrication.

In introducing S. 100 once again, I thought perhaps that its significant number might increase the chances of success. This bill calls for a 10-year mandatory conversion period with assistance to small businesses and craftsmen who might face financial hardship in the conversion process. My own view is that I consider this approach the optimal metrication solution; however, I am not unmindful that the House-passed bill steers a different course through the conversion waters.

Mr. Chairman, previous efforts to enact metric conversion legislation have foundered on conflicts over mandatory versus voluntary conversion, and over the question of compensation for conversion costs, at least in hardship cases, versus the principle of letting conversion costs lie where they fall. The two issues are closely linked. The case for some Government compensation in cases of hardship is obviously much stronger when the Government mandates conversion action.

To a great extent, however, these disputes have been overrun by events. As you pointed out, Mr. Chairman, metric conversion is going forward at an accelerating pace in the United States, on a voluntary basis.

Indeed, metric conversion is moving ahead so rapidly now that the critical need is for Government action to provide essential mechanisms for coordination, planning, and information among Government agencies, among industrial groups, and between industry, Government, and labor.

The legislation passed by the House of Representatives meets this essential, priority need. I am confident that the Metric Conversion Board to be established under the act will be able to resolve many of the questions the House approach leaves open.

This process calls for a unified effort on the part of all segments of society and I, for one, Mr. Chairman, want to lend my full support to that effort.

The time is long overdue for us to join our fellow nations in officially adopting the simplest, most logical system of weights and measures presently known. Catching up with other nations will not be easy. We are already at a disadvantage because of our late entry into this group of nations. Private industry and citizens have been struggling to make up for the Government's lack of participation, coordination, and guidance.

Many in Congress, the press, and the public are often critical of the slow pace at which the legislative process moves in responding to our Nation's needs. Frequently, this criticism is justified. I know our own view, that in Congress the views are usually several years behind those of the people. Many of our accomplishments are long overdue. This deliberate pace exemplifies the constitutional process at work, a masterful confluence of forces drafted by our Founding Fathers, a system balancing delicately our society's competing interests.

Yet, even the strongest proponents of methodical and reasoned debate would be troubled by the thought that it has taken 160 years for a meritorious piece of legislation to emerge from Congress. Such has been the fate of metric conversion in our Nation.

Article I, section 8, of the Constitution authorizes Congress to coin money and fix the standard of weights and measures. We attended to the first part of this directive immediately, but have not to this day dealt satisfactorily with weights and measures.

As far back as 1816, President Madison asked the Congress to recommend a uniform system of weights and measures. Congressional reluctance killed this desire and we lurched along without direction in this vital area.

Congress has faced the issue of metric conversion off and on since those days, never reaching a decision to convert. Even the cogent arguments of Dr. Alexander Graham Bell, testifying about 70 years ago before the House Committee on Coinage, Weights, and Measures in support of conversion legislation, were ignored.

If, since that time, Congress has not had the good sense to admire the simplicity and logic of the metric system of weights and measures, our citizens have, in growing numbers, been won over to its side. Likewise, the necessity of being able to transact business with an increasingly metric world has led many of our industries to convert, even without the blessing and assistance of their Federal Government.

The issue is whether we shall have costly and chaotic conversion rather than coordinated, comprehensive conversion. Congress finally is getting the United States on the metric track, as we can see by this distinguished and hard-working committee's deliberations.

Having come close in recent years, we must not let this opportunity escape us. The cost of further hesitation to our citizens, our country, and our Treasury, would be great.

Senator INOUE. I shall do my utmost to have this legislation considered by full committee and, hopefully, to have the full Senate discuss and debate it.

From your testimony, may I presume that you support the bill?

Senator PELL. I support it. Certainly, it would be better to pass the House bill than to pass no bill at all, although I would hope, as a matter of public relations, that the magic number, "S. 100," might appear on it. It would seem like a nice number.

Senator INOUE. That is a nice round metric number.

Senator PELL. Exactly.

Senator INOUE. We will do our best to accommodate you, sir. Thank you very much.

Senator PELL. Thank you very much. Thank you for all your help in what is a most pressing subject, but without your help we would not have got it through several years ago, and we would not be where we are today.

Senator INOUE. Thank you.

Our next witness is the Acting Director of the Bureau of Standards, Department of Commerce, Dr. Ernest Ambler.

Welcome, Dr. Ambler.

STATEMENT OF DR. ERNEST AMBLER, ACTING DIRECTOR OF THE NATIONAL BUREAU OF STANDARDS, DEPARTMENT OF COMMERCE; ACCOMPANIED BY ROBERT B. ELLERT, ASSISTANT GENERAL COUNSEL FOR SCIENCE AND TECHNOLOGY; AND JEFFREY ODOM, CHIEF, METRIC INFORMATION OFFICE, NATIONAL BUREAU OF STANDARDS

Dr. AMBLER. I would like to introduce to you the gentlemen who accompany me today.

On my left is Mr. Robert B. Ellert, Assistant General Counsel for Science and Technology, Department of Commerce.

On my right is Jeffrey Odom, Chief of the Metric Information Office at the National Bureau of Standards.

Senator INOUE. Welcome, gentlemen.

Dr. AMBLER. Mr. Chairman, I appreciate this opportunity to present the views of the National Bureau of Standards regarding the need for metric legislation.

My testimony will show that the United States is continuing its swing to metric, but that legislation is needed to provide national guidance and assure that this changeover is efficient, effective, and economically sound.

Many U.S. corporations, driven by the demands of international competition and of internal operating efficiency, are switching to the use of the metric system. As a result, several of our largest industries—namely, automobiles, computers, and farm and construction equipment—are well on the way to metric conversion.

Our education system is expanding its teaching of the metric system to both adults and children. Education is especially important. With the industrial changeover, consumers will increasingly need to understand and use metric measures.

Mr. Chairman, to me this is a historic moment. The Nation needs the leadership of the Congress to secure an orderly and calm transition. For, while some are already adopting to metric, others are hesitating—waiting for the Congress to indicate that this is the national intent.

The need for a firm national commitment was emphasized in the report "A Metric America," prepared by the National Bureau of Standards, and is demonstrated by the experiences of the United Kingdom, Australia, Canada, and South Africa.

Indeed, it is probably the most important element in a successful, minimally disruptive metric changeover. It was for this reason that the administration proposed S. 1882, the Metric Conversion Act of 1975.

Before commenting on the bills before you, I would like to summarize the present status of the U.S. change to metric, as we at NBS see it. The most recent and significant event is passage by the House of

Representatives of the Metric Conversion Act of 1975. This was done, Mr. Chairman, by an impressive margin on the 5th of September.

With regard to other actions, I am submitting, as an attachment to this testimony, six tables that chart the progress toward metric in the following areas—

Senator INOUE. Without objection, these tables will be made a part of the record.

[The tables follows:]

TABLE 1.—COMPANIES COMMITTED TO METRIC

	Rank (1975 Fortune 500)	Sales (millions)
A. B. Dick (office and computing machines)		\$50
Allis Chalmers	158	1,262
Armco Steel	51	3,190
Brown & Sharpe (machine tools)		57
Caterpillar Tractor	36	4,082
Chrysler	11	10,971
Clark Equipment (industrial equipment)	148	1,370
Dow Corning (synthetics, plastics)		40
Edgcomb Steel		14
Exxon Research & Engineering Co.		NA
Fireland Community Bank (Huron, Ohio)		NA
Ford Motor Co.	3	23,620
General Motors	2	31,549
Grumman Aerospace Corp.	175	1,112
Hewlett-Packard	225	884
Honeywell	68	2,625
Hughes Aircraft Co.		400
IBM	9	12,675
Eastman Kodak ¹	32	4,583
International Harvester	26	4,965
John Deere	75	2,495
Lamson & Sessions (threaded fasteners)		75
Eli Lilly ¹	176	1,111
Mack Trucks		NA
Merck	152	1,329
Minnesota Mining & Manufacturing (3M)	59	2,936
Montgomery Ward (Marcor)		2,804
New England Medical Center Hospital		NA
Otis Elevator	179	1,108
Regal Beloit (tools)		11
Rockwell International	35	4,408
Sears, Roebuck & Co.		9,379
Seven-Up Co.		100
Squibb ¹	201	1,004
Sterling Drug ¹	229	870
Travelers Insurance		4,709
Xerox	41	3,576

¹ Already predominantly metric.

Sources: Metric Information Office, NBS; Fortune, May 1975 (for rank, sales); Newsfront, 25,000 leading U.S. corporations (sales).

TABLE 2. EXAMPLES OF STATE METRIC EDUCATION ACTIVITIES

School Board or Commissioner Actions—"Go Metric" Resolution

Alabama, Alaska, Arizona, California, Connecticut, Delaware, Idaho, Illinois, Kentucky, Maine, Maryland, Michigan, Nevada, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, Virginia, Vermont, West Virginia, Wisconsin, and Wyoming.

Legislative action

Colorado, Hawaii, Louisiana, Minnesota, New Mexico, Utah, and Virginia.

Workshops

Alabama, Arkansas, Colorado, Connecticut, Delaware, Idaho, Illinois, Indiana, Kentucky, Louisiana, Maryland, Minnesota, Mississippi, Nebraska, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Texas, Vermont, West Virginia, and Wyoming.

Educational TV or other materials

Arkansas, California, Connecticut, Florida, Hawaii, Indiana, Kansas, Kentucky, Maryland, Mississippi, Nebraska, New Jersey, North Dakota, South Dakota, Washington, and Wisconsin.

Metric Committees Formed

Alaska, Georgia, Louisiana, Massachusetts, Maine, Maryland, Michigan, Missouri, Montana, Nevada, New York, Oregon, Virginia, and Washington.

TABLE 3. OTHER STATE AND LOCAL GOVERNMENT ACTIVITY

States with Some Metric Road Signs

Alabama, Arizona, California, Florida, Maryland, Michigan, Minnesota, New York, Ohio, Pennsylvania, Virginia, Vermont, and Washington.

States with Metric Committees

California (expected momentarily), Georgia, and Maine.

State Agencies Having Switched to Metric

California Division of Oil and Gas.

Metric Bills Introduced in State Legislatures

Connecticut, Florida, Hawaii, Illinois, Kansas (enacted), Maryland, Massachusetts (enacted), Mississippi, Minnesota (enacted), Montana, Nevada, New Jersey, New Mexico, New York, North Dakota (enacted), Virginia, Wisconsin, and Wyoming.

State Tests of Public Reaction

Ohio Department of Transportation (distance signs on interstate highway).
Pennsylvania Bureau of Standard Weights and Measures (sale of gasoline by liter).

City Actions

Boone, N.C.—calls itself “the kilometer high city”.
Huntsville, Ala.—erected metric road signs.
Sunrise, Fla.—resolution (January 1975) proclaiming metric the city's official system of weights and measures.

TABLE 4. FEDERAL AGENCY METRIC ACTIVITIES

Interagency Committee on Standards Policy

Established a Metrication Subcommittee to serve as focal point for coordinating Federal agency metric activities.

Department of Agriculture

Issuing crop yield data in metric units.
Forest Service: Adding metric units to information signs.

Department of Commerce

Maritime Administration: Funded two-year study on metrication of maritime industry. Circulating for comment new minimum standard specification for tankers with dimensions in metric followed by customary equivalents.

National Bureau of Standards: Provides information on metric system through Metric Information Office. Acquainting employees with metric for everyday activities. Adapting machinery in Instrument Shops for metric fabrication.

National Weather Service: Developed plan for metrication of weather forecast data. Established liaison with Canadian metrication counterparts. Handling Canadian weather data in metric, without conversion.

Patent and Trademark Office: Urges use of dual measurements or metric only in applications.

Department of Defense

Established metrication panel to assist Defense Material Specifications Board in planning.

Departmental plan and policy statement issued by Secretary's Office; directs the use of the metric system consistent with operational, economical, technical and safety considerations.

Department of Health, Education, and Welfare

Consumer Newsletter expressing measurements in both customary and metric.
 U.S. Office of Education: Funded project to prepare materials for teacher training in vocational education.

Funded Interstate Consortium on Metric Education, to develop guidelines for implementing in education.

Developing program to implement Public Law 93-380, Sec. 403, Education For the Use of the Metric System of Measurement. Funded in fiscal year 1976 for \$2 million.

National Institute of Education: Funded project to study metric education experience in other English-speaking nations.

Department of the Interior

Has comprehensive metric planning study underway; is assuring metric by 1980 for planning purposes.

National Park Service: Adding metric to informational signs.

Department of Transportation

Federal Aviation Administration: Addresses metric conversion in new ten-year plan.

Federal Highway Administration: Established metric committee. Advised states that metric distance markers are allowable, but not speed limits (at present).

Department of Treasury

Bureau of Alcohol, Tobacco, and Firearms: Issued, at initiative of U.S. wine industry, new standards to fill for wine limited to six metric (liter) sizes, effective January 1979. Similar standards for the distilled spirits industry are forthcoming.

Environmental Protection Agency

New standards and regulations to be expressed in metric units.

General Services Administration

Every major branch has metric task force, to assess impacts on their activities.

National Aeronautics and Space Administration

Established (1970) policy requiring all measurement values in reports and publications be expressed in metric.

TABLE 5. METRIC PROGRESS IN MAJOR ENGLISH-SPEAKING NATIONS

GREAT BRITAIN

Industry began changeover: 1965.

Metriation Board formed: 1969.

White paper on metric conversion issued: 1971.

Original target for essential completion: 1975.

Present status: Industrial materials: mostly metric. Engineering: behind target (of 75 percent metric by end of 1975). Transport: essentially converted. Construction: essentially completed. Consumer goods and foodstuffs: still in early implementation.

SOUTH AFRICA

Decision announced: 1966.

Metriation Department established (in South Africa Bureau of Standards): 1968.

Target date for completion: 1976.

Now essentially metric.

Trade in nonmetric units illegal since January 1, 1973.

All Acts, ordinances, regulations, Government notices, and other official documents use metric units exclusively.

For reasons of economy, road signs for speed and distance being replaced gradually.

NEW ZEALAND

Decision announced: 1969.

Metric Advisory Board established: 1970.

Target date: 1977.

Changeover progressing on schedule.

Most consumer products sold by metric form : 1974.

Substantial completion expected by : 1976.

AUSTRALIA

Decision announced : 1970.

Metric Conversion Board established : 1970.

Target date : 1980.

Currently moving rapidly toward a strongly metric environment—more quickly and easily than had been expected.

CANADA

White paper (decision in principle issued) : 1970.

No deadline set for completion.

Metric Commission established : 1971.

Commission working toward unofficial goal of : 1980.

Four-phase approach being followed: Investigation (determination of best overall approach)—completed 1972. Planning (developing detailed scheme of changeover moves)—now underway. Scheduling (setting individual sector target dates)—1976. Implementation—expected to be well underway this year.

Metric Commission submitted to Parliament a general implementation schedule (without dates)—February 14, 1975.

TABLE 6.—COMPARISON OF MAJOR PROVISIONS OF MAJOR METRIC LEGISLATION

Feature compared	H.R. 8674 (House bill)	S. 1882 (administration)	S. 100 (Pell bill)
Purpose:			
Policy.....	To declare a national policy of coordinating increasing use of metric system.	To declare a national policy of of converting to the metric system.	To provide a national program to make metric system predominant but not exclusive system.
To establish Board or Commission to coordinate conversion.	With 25 members, 2 Senators, 2 Representatives.	Same as H.R. 8674.....	With 11 members, 1 Senator, 1 Representative.
Transition time.....	No time limit, to be predominant when each sector is ready.	No time limit, to be predominant system if and when reasonable for each sector.	10 years, to be sole system of measurement, provides for exceptions.
Conversion plan.....	Voluntary, separate plan for each sector to be developed by Board and improved annually.	Voluntary, separate plan for each sector to be developed by Board and submitted to President and Congress for approval.	Semimandatory, Board submit overall plan to President and Congress; provides for use of Federal procurement.
Tax assistance.....	None.....	Same as H.R. 8674.....	Accelerate depreciation of U.S. made equipment.
Subsidies:			
Small business.....	None, based on findings, Board can recommend.	do.....	Grants and loans.
Individuals.....			Do.
Appropriations authorized	Such sums as may be necessary.	Same as H.R. 8674.....	\$3,000,000 fiscal year 1975, \$4,000,000 fiscal year 1976, \$4,500,000 for following 3 fiscal years.

Dr. AMBLER. Industry continues to set the pace for U.S. metric changeover. Thirty-seven corporations have announced policies of adopting the use of metric measures. The total sales of these companies is in excess of \$130 billion, and 4 out of the Nation's 11 largest corporations are included.

A recent and noteworthy shift in the nature of these companies has appeared. Earlier, most change was in manufacturing. Now, the list includes two of America's largest retailers: Sears, Roebuck & Co. and Montgomery Ward & Co. A most important result of this development will be the availability of aids designed to educate consumers about the metric measures of the products they buy and use.

Education of all kinds and at all levels is an important part of a successful and smooth national metrication effort. The Education

Amendments of 1974, Public Law 93-380, authorized a metric education program to be managed by the U.S. Office of Education.

Slightly more than \$2 million has been appropriated for this program by the fiscal year 1976 Education Appropriations Act, Public Law 94-94. These funds are intended to support model and demonstration projects that will contribute to improving the quality and the extent of metric education throughout the United States.

In all 50 States, State-level efforts in metric education are now underway. This figure is up from 40 just 4 months ago. Examples of such activities include making metric workshops available to every teacher, providing guidelines for metric training of teachers, producing educational television lessons about metric measure, and specifying the use of metric as the primary measurement language in new textbook purchases.

In 31 of the States, the go metric activity is reinforced by State legislation or State school board action.

Mr. Chairman, I think it is safe to say that, in this school year, more students are learning about the metric system than ever before.

Senator INOUE. Doctor, may I interrupt? What has the Department of Education done with the appropriations?

Dr. AMBLER. I am not exactly sure of that answer, Mr. Chairman. I would like to submit that answer for the record, if I may.

Senator INOUE. I would appreciate it. I have been advised that although funds have been authorized and appropriated, very little has been done with the funds.

I would like to get some additional information through your office, sir.

Dr. AMBLER. Yes, sir. We will provide that.

[The following information was subsequently received for the record:]

Question. Could you tell me how the U.S. Office of Education is spending the money it was authorized for metric education under Public Law 93-380?

Answer. The U.S. Office of Education, in Public Law 93-380, was authorized to carry out a program of grants, and contracts with, institutions of higher education, State and local educational agencies, and other public and private nonprofit organizations. These grants and contracts are for the purpose of encouraging more and better metric education at all levels.

Public Law 93-380 authorized the appropriation of \$10 million for this program of grants and contracts in each of the fiscal years 1976, 1977, and 1978. In early September 1975, the first funds—slightly more than \$2 million—were appropriated, under Public Law 94-94, for this effort for FY76.

Shortly after the approval of Public Law 93-380, USOE appointed a program manager for metric education, Dr. Floyd Davis, and he carried out much preliminary work for the implementation of this program. As a result of these efforts, USOE was ready to move rapidly once funds were made available.

I am advised by USOE that final regulations for proposals for grants and contracts were published in the Federal Register on October 8, 1975. This notice specifies that such proposals must reach USOE on or before November 24, 1975.

They expect that the proposals will be evaluated early in December and that the awards will be made soon after January 1, 1976.

Senator INOUE. I appreciate it. Thank you.

Dr. AMBLER. Table 3 shows that a number of our States have taken action outside the area of education to encourage or facilitate the spread of metric usage. In the last 4 months, bills have been considered in four State legislatures: Illinois is considering a State conversion plan, Wyoming is considering instituting a State metric commission,

Kansas has legislated metric highway signs, and North Dakota has adopted metric signs for its State parks.

State and local weights and measures officials through their organization, the National Conference of Weights and Measures, have begun considering and planning for the effects of metric changeover on commercial weights and measures. The NBS through its Office of Weights and Measures, is proud to provide the secretariat and facilities for this conference. Working with the group, the Bureau has already equipped each State with a set of metric standards and laboratory instruments that are National Bureau of Standards certified as to accuracy.

The NBS Metric Information Office is responding to a growing demand for information about the metric system. Since April 1975, NBS has answered about 20,000 letter requests and 1,000 telephone requests. To date, about 100,000 NBS metric kits have been distributed by NBS and directly from the Government Printing Office. The Metric Information Office is now forming a national speakers' bureau to help meet the many requests for information from civic, home-maker, PTA, and other groups.

The DOD, in June 1975, issued a policy statement that DOD will "use the international metric system in all of its activities consistent with operational, economical, technical, and safety considerations." Thus, the DOD is following the same common sense rule as is industry; that is, increase the use of metric when feasible, practical, and efficient.

The Department of the Treasury has, at the request of the industry, held hearings on new regulations that would specify metric-sized bottles for distilled spirits. No opposition to these regulations was presented.

The Interagency Committee on Standards Policy, which is chaired by the Department of Commerce, has established a Metrication Subcommittee to help coordinate Federal agency metric activities. As one of its first tasks, this group is compiling a directory of Federal metric activities and of the key people involved in them. When the changeover to metric is endorsed by the Congress, this subcommittee will be ready to assist the Metric Board that will be established by the legislation now under consideration.

Table 5 summarizes the metric situation in the other major English-speaking nations. Each of these countries is moving toward completion of metric changeover.

The case of Australia is particularly noteworthy owing to their rapid and efficient conversion. There are many lessons we can learn from their experience; not the least of these is the need for Government commitment.

Except for Brunei, Burma, Liberia, and Yemen, the United States is the only nation in the world without a firm commitment to metric.

Senator INOUYE. Would you briefly describe the Australian experience for the record?

Dr. AMBLER. The strongest thing I think we can learn from the Australian experience is that a very firm commitment was made through national legislation.

In carrying out their program, they have followed the procedure of planning each sector separately, coordinating the changeover in each

sector, and have made detailed and effective plans, I think, for over 140 different sectors.

They have taken great pains to emphasize education. Not only education with regard to the technical details of the metric system, but also with regard to the public information aspect of the conversion. They have taken great pains to tell the public what is happening, when it is happening, and why it is happening.

So the public information aspects have been an important factor.

I would say that these are the main features of the Australian experience and plan that we might well emulate. Mr. Chairman.

Senator INOUE. Was it mandatory or voluntary?

Dr. AMBLER. It was voluntary, certainly, Mr. Chairman; voluntary, but well coordinated and managed.

Senator INOUE. Did the Australian experience provide for compensation?

Dr. AMBLER. I do not believe that it did, Mr. Chairman.

Senator INOUE. Then those who may have suffered from conversion did not receive any special compensation.

Dr. AMBLER. I am not aware that the need for such compensation has arisen in the Australian experience.

Senator INOUE. How long did the Australian conversion take?

Dr. AMBLER. They have been in the process of converting since about 1970, and I think they expect to be essentially finished in 1978.

Senator INOUE. Five years.

Dr. AMBLER. Yes.

Senator INOUE. I am certain you studied the House-passed measure. Would it, if it becomes law, provide the necessary foundation for the United States to carry out a program similar to that carried out in Australia?

Dr. AMBLER. Yes, sir. I believe it will.

Senator INOUE. Have you considered the cost it would involve?

Dr. AMBLER. We did make very rough estimates several months ago, Mr. Chairman, yes.

Senator INOUE. What would be the price tag, sir?

Dr. AMBLER. Considering the cost of the staff and the various consultations, travel, information activities, roughly about \$3.5 million for the first year, and a staffing level of around 80, is our best estimate, sir.

Senator INOUE. Does this include public information, advertising, et cetera?

Dr. AMBLER. Yes, sir. It includes all aspects needed to carry out the program.

Senator INOUE. Three and one-half million.

Dr. AMBLER. Roughly, yes, sir.

Senator INOUE. Have you made any estimates as to the amounts of money industry or the United States may have lost because of our failure to convert? It has been suggested that the need to change measurements in order to export to certain countries is tantamount to a nontariff barrier for many of our manufacturers.

Dr. AMBLER. Yes, sir. That is the very strong feeling of many people. However, we have not tried to make a quantitative estimate of what that loss might be.

Senator INOUE. The study that was completed in 1971 suggested that it was in excess of \$600 million. I thought maybe you could have updated that.

Dr. AMBLER. No, sir. We have no later information.

Senator INOUE. Please proceed, sir.

Dr. AMBLER. I would like now to comment on the two bills, S. 1882 and H.R. 8674.

I have summarized the main provisions of the bills pending before your committee in table 6. As you can see, the differences between H.R. 8674 and S. 1882 are minor. The administration has, in fact, no objection to H.R. 8674 as the bill incorporates nearly all of the substantive provisions of S. 1882.

The essential difference between S. 1882 and H.R. 8674, concerns the handling of the conversion programs developed under the auspices of the Metric Board. S. 1882 specifies that such programs must go to the President and Congress for approval. On the other hand, H.R. 8674 provides that programs will be accepted by the Board without submission to the President and Congress.

The bills are similar in the following respects:

Both bills call for voluntary changeover to metric. They include no authority to compel firms or individuals to go metric against their interests.

Both would establish a U.S. Metric Board to coordinate metric changeover.

Both require the Board to conduct research into any unresolved problems associated with metric issues, including impact on workers or small businesses, and in such cases to make appropriate recommendations to the President and to Congress for resolving such problems.

Both bills do not specify a fixed period for the changeover. They direct the U.S. Metric Board to assist in the development of plans and timetables suitable to each individual economic sector.

This last provision has evoked considerable discussion, so I feel I should comment in more detail on the omission of a specified changeover period.

Further consideration of the metric changeover process and of the experience of other countries has convinced us of several points: The Board should work with each economic sector individually to determine the best plan and schedule for that sector or industry. It seems inadvisable to specify a completion date for changeover before the Board has determined the appropriate schedule for each sector. Many sectors will be able to adopt metric and begin reaping the benefits of its use in a short time. The existence of a "target date" rather far in the future could well encourage them to delay changeover unnecessarily. We think the open-ended time frame can and ought to be used to encourage people to "get on with the job."

Australia set a goal, namely 10 years, and is ahead of schedule; the United Kingdom also had a 10-year goal and is behind schedule. Thus, a time deadline does not guarantee success. Rather, we believe that a firm Government commitment is the most important element in a successful changeover.

The Canadian experience reinforces this belief; their conversion is progressing smoothly without a final, overall deadline, but with firm Government commitment.

To summarize the key point, Mr. Chairman, scheduling throughout the process is to be on a sector-by-sector basis and should be governed by just two criteria: economy and minimal disruption—not by an arbitrary time factor.

Senator INOUE. Dr. Ambler, in S. 1882 and H.R. 8674 the conversion would be voluntary. In the Australian one, I believe it was compulsory at the Federal level, wasn't it?

Dr. AMBLER. Mr. Chairman, may I refer that question to Mr. Odom?

Senator INOUE. Please.

Mr. ODOM. It was not stated that they had to go metric in the Government, but I think it had the effect of being that way because it was approved by Federal legislation.

Senator INOUE. I note that we have an Interagency Committee on metric conversion. Would this committee be sufficiently strong enough to convince all Federal agencies to convert in a timely fashion?

Dr. AMBLER. Yes, sir. I hope that it will, and as the U.S. Metric Board comes into operation, this Interagency Committee will work closely with the Board to coordinate the changeover as far as the Federal sector is concerned.

Senator INOUE. Thank you, sir.

Dr. AMBLER. I would like to turn now to the amendment that has been proposed by the American Bar Association, Mr. Chairman.

We have studied the report by the American Bar Association and their proposed amendment to this legislation. The issue they raise is the need for coordinating adaptation of the many interrelated laws and regulations—at Federal, State, and local levels—that may otherwise impede conversion, particularly of regulated activities or products.

The concern arises from their study of the experience of other countries, particularly the United Kingdom and Australia. It has been difficult in the United Kingdom to obtain coordinated amendment in a timely fashion by responsible authorities of rules governing sales and measurement in metric units.

Australia also encountered problems in achieving necessary adaptation of weights and measures regulations to metric. At the North American-Australian Metric Conference this past spring, a model law that had been enacted by the State of Victoria as a temporary measure was commended to the North American delegates as a very successful way to deal with the problem. This measure provides authority, after a given sector program has been accepted, for temporary adaptation to metric of those laws and regulations which affect measurement practice in the sector.

The ABA states that the amendment they propose is an adaptation of the model law.

With regard to our assessment of this proposal, it is clear that the problem addressed by the American Bar Association is an important one. However, I feel that it would be premature to include this amendment in the proposed metric legislation at this time. Nevertheless, the issue raised by the ABA warrants careful study and recommendations by the Metric Board.

Accordingly, I would recommend that section 10(i) of S. 1882 be amended to authorize the Board to study the problem and make recommendations as how best to coordinate the many interrelated Federal, State, and local regulations affected by the changeover to metric.

Senator INOUE. Is it your view that the ABA amendment will not bring about the necessary coordination?

Dr. AMBLER. Not so much that, Mr. Chairman, as a feeling that there are perhaps alternative and equally satisfactory, if not better, ways of accomplishing the same end. That is, it would be more appropriate to have the question addressed by the U.S. Metric Board, certainly in cooperation with the American Bar Association, and to resolve this issue in that manner, rather than to include it as a specific part of this legislation.

Senator INOUE. Has your office considered this problem, and is your office prepared now to present some alternative plan?

Dr. AMBLER. We have certainly considered this problem and some of the legal aspects. I have, as I introduced, Mr. Ellert with me this morning, who is the assistant general counsel for science and technology of the Department of Commerce, who could add some words on this legal aspect, if you wish, Mr. Chairman.

Mr. ELLERT. Mr. Chairman, when we drafted the administration's bill, we were very cognizant that this problem would arise.

In the procedures, for example, section 10(b) of S. 1882, where we dealt with the functions of the Board, we intended that it would study this problem. As it would be a cross-section of the whole Nation, we would be able to get a consensus of what would be the best way to handle this.

For example, as Dr. Ambler pointed out earlier, we already are making considerable progress on a voluntary basis with the National Conference of Weights and Measurements. If all the States get together and draw up a model law, this could be the solution.

We feel there are several possible ways of handling the problem. We are a little concerned that we should adopt a way immediately, which we are not entirely sure is the right way to go.

Senator INOUE. Apparently your office did not anticipate the full growth of this problem until the ABA pointed it out, because you are now proposing an amendment to the legislation.

What if the Metric Board failed to address itself and resolve that problem? What do we do then?

Mr. ELLERT. Well, it seems to me that the Board, in following out the functions prescribed in the law, would necessarily have to address the problem.

The fabric of metrication in the United States will affect the various sectors in different ways and the Board would necessarily have to think about this.

Also, we have to consider the democratic basis for a consensus. We don't know what the American Bar Association Amendment means by "consensus." Do they mean 40 of the 50 States? We would like to study it more and get a better feel before we start preempting the State law in this sphere.

Senator INOUE. Thank you.

Dr. AMBLER. Mr. Chairman, in summary, our Nation is changing now to the use of metric measures. Our objectives should be that the transition be orderly and without needless disruptions, and that it take place without generating economic inequities.

The legislation before you will help us achieve these goals.

It is especially fitting that our Nation officially move toward metric usage this year, for it was exactly 100 years ago that the United States was a signatory nation to the Treaty of the Meter that established the metric system as the international language of measurement.

I sincerely hope that if I am given an opportunity to testify on this subject in the future, it will be to give you a progress report on the implementation of the Metric Conversion Act of 1975.

Thank you, Mr. Chairman.

Senator INOUE. I quite agree with you, sir. A hundred years of discussion and debate is enough. I think it is about time we decided on something.

Thank you very much.

We would like to submit to your office a set of questions for your response for the record.

[The following information was subsequently received for the record:]

U.S. DEPARTMENT OF COMMERCE,
NATIONAL BUREAU OF STANDARDS,
OFFICE OF THE DIRECTOR,
Washington, D.C. November 13, 1975.

Hon. DANIEL K. INOUE,
Committee on Commerce,
U.S. Senate,
Washington, D.C.

DEAR SENATOR INOUE: Enclosed please find the written answers to the additional questions submitted by you pursuant to my October 8 testimony on the subject of metrication. I hope that this material will be of use to you in your deliberations concerning this important matter.

Sincerely,

ERNEST AMBLER,
Acting Director.

Enclosure.

ADDITIONAL QUESTIONS FOR THE RECORD

Question 1. Many advocates of metrication have cited advantages in conversion, for example, in international trade. What do you believe the benefits of metrication will be? Would you say that the primary argument for metrication lies in adverse consequences if we do not convert as opposed to the actual benefits of metrication?

Answer. First I would point out that the issue is not metrication or no metrication. That question is being answered by actions already being taken every day by firms, organizations, State and local governments all across our Nation. The issue before us is whether the measurement language changeover already underway is going to proceed in an orderly and economical fashion or whether it will lead to growing confusion and disruption.

As to the benefits of metric changeover, the chief direct economic beneficiaries will be our manufacturers who want to export. These firms will benefit by the increased sales and/or lowered costs of manufacturing attributable to improved exportability of America manufactured goods and wider availability of standard parts and materials. Further, this broadened interchangeability of standard parts will also bring the benefit of lowered costs of production to all participating manufacturers—even to those who are producing solely for our domestic market. Consumers should also benefit, since the lowered costs of production will be a factor in the marketplace favoring lowered prices.

Although it is obviously impossible to appraise them in dollar terms, there are intrinsic benefits for everyone who uses the simpler, more rational, metric measurement language. Examples are: It is decimal, with a simple, regular relationship between larger and smaller units; the volume unit is simply the cube of a length unit—instead of some arbitrary amount, such as the gallon or pint; grams and kilograms are always weight (or mass), in contrast to our "ounces" that can be weight or volume and our pints and quarts that differ in size depending on whether they are "dry" or "liquid." With metric we will be getting a

measurement language that, in addition to being readily understood throughout the world, will eliminate the many confusions of terminology and usage that we now have to deal with in our everyday measurement activities.

Question 2. Would you agree that it would be desirable to avoid a self-perpetuating bureaucracy within the Federal Government? How would you avoid the continuation of a Metric Board which outlives its usefulness?

It has been suggested that there be a time limit in the bill for the Board, which would terminate after a certain period of time unless otherwise extended by the Congress. Please comment.

Answer. We certainly agree that we do not want the U.S. Metric Board to become a self-perpetuating bureaucracy. That is why S. 1882, the Administration bill, in Sec. 9, states "The Board shall cease to exist when the Congress, by law, determines that its mission has been accomplished."

There has been concern that the need for positive action to end the Board may be less effective in achieving this objective than requiring a positive action to maintain the Board. I would support the proposal put forth in his testimony by Donald L. Peyton of the American National Standards Institute. He has suggested that the Congress be directed by this law to review and evaluate the Board's mission at the end of five years, and annually thereafter.

Question 3. The metric system is but one of many possible systems of measurement. There have been suggestions that a more scientific system is possible and would be preferable. Please comment.

Answer. Our country is converting to the metric system primarily because it is truly the international system of measurement, and secondarily because it is a better system. Even if there were at hand a measurement system that is more practical for everyday use than the metric system (which is not the case), we would not be changing to that "better" system unless the rest of the world would do likewise—a most unlikely eventuality. Stated somewhat differently, we are changing to the metric system because of the economic necessity of our using the international system of measurement.

There exist systems of physical dimensions that are created by setting particular physical constants such as the velocity of light to arbitrary numbers. These have an advantage, and are used in connection with, certain specialized theoretical scientific subjects, but these systems have no advantage for practical everyday use in commerce and industry and should not be considered in any way as competitors to the metric system.

Question 4. Do you think that the retail industry should have a position on the Board?

Answer. Most definitely. S. 1882 specifies that the Board will consist of "twenty-one persons * * * who shall be broadly representative of the American Society." The retail sector is a most important part of our society and as such should be represented.

Question 5. The House made several amendments in the Administration-proposed metric conversion legislation. You state in your presentation that the bill as passed would be welcomed by the Administration. Are there, nevertheless, certain provisions which the National Bureau of Standards would prefer, notwithstanding the lack of serious objections to the changes made in the House?

Answer. The changes made by the House in passing H.R. 8674, were constructive. Hence, as stated by Dr. Ambler in his testimony, "The Administration has, in fact, no objection to H.R. 8674 as the bill incorporates nearly all of the substantive provisions of S. 1882."

Question 6. There has been concern in the past that metric conversion would result in opening up the U.S. market to increased foreign competition. Please comment.

Answer. I believe that the change to the metric system will have a negligible impact on imports to the United States. This belief rests on the fact that the U.S. is such a large market that it is clearly well worth the effort for foreign manufacturers to tailor-make any item to U.S. standards.

We know of no instance when a prospective exporter to the U.S. has been deferred by our lack of metric usage. The large number of imported items now for sale in our country demonstrates the fact that there is indeed little hesitation now, on the part of foreign suppliers, to produce products to our standards.

This measurement usage changeover will have a far greater effect in opening up foreign markets to the products of our manufacturers. The U.S. Metric Study survey of international trade effects reported that the increase of U.S. exports

expected to result from our adopting the international measurement language would far outweigh any discernible effect on imports.

Question 7. Concern has been expressed by some that there might be a lack of standardized expression in such basic areas as spelling, for example. It has been pointed out that the National Bureau of Standards has issued differing suggestions in the past. How does the National Bureau of Standards intend to deal with this issue?

Answer. The Department of Commerce has now directed all agencies of the Department to use the "meter" spelling exclusively. It is, however, evident and we should all recognize that both spelling forms are acceptable. In the long run, general usage will determine which spelling prevails in the United States.

Question 8. You state in your presentation, on page 8, that coordination of conversion efforts, particularly in those instances where measurements have been imbedded in statutes or regulations, might be a problem. Why do you therefore believe that the Metric Board would be better able to resolve these issues later, rather than the Congress now—particularly if they have a political connotation?

Answer. I do not suggest that the Metric Board will necessarily be able to resolve all of the potential issues in this area. However, I believe that it would be premature to add to our national metric legislation a broad provision, that appears to depart from a voluntary changeover policy and raises major legal and jurisdictional issues.

We have another alternative, which is to direct the Board to keep a sharp eye on these potentially troublesome areas, and if it sees a need for national action to make an official proposal for such action. Meanwhile, I think we can go far toward resolving these matters through cooperative, consensus-seeking efforts of the U.S. Metric Board, the American Bar Association, the American National Metric Council and the associations of State and local governments. I think that through such a voluntary approach we can work to convince the responsible legislative and regulatory authorities of the need for timely amendment of laws and regulations, in the interest of permitting our metric changeover to progress in a smooth and economical manner.

Senator INOUE. Our next two witnesses, Mr. Ken Peterson of the AFL-CIO and Mr. Thomas Hannigan of the International Brotherhood of Electrical Workers, will appear together.

Gentlemen, welcome. Mr. Peterson, would you like to introduce your colleagues?

STATEMENT OF KENNETH PETERSON, AFL-CIO; ACCOMPANIED BY NICHOLAS R. LOOPE, UNITED BROTHERHOOD OF CARPENTERS & JOINERS OF AMERICA; M. J. BOYLE, INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS; WILLIAM H. RYAN, INTERNATIONAL ASSOCIATION OF MACHINISTS & AEROSPACE WORKERS; AND THOMAS HANNIGAN, INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS

Mr. PETERSON. Yes; I would. On the extreme left is Nick Loope of the Carpenters, Mr. Boyle of the Electricians, Tom Hannigan, the Electricians, and Bill Ryan from the Machinists' union.

I am Ken Peterson of the AFL-CIO.

We passed a new resolution on metric conversion just Monday at our convention, and I would like to submit that, too, along with my statement.

Senator INOUE. Without objection your resolution will be made part of the record, sir.

[The resolution follows:]

METRIC CONVERSION

Resolution No. 199.—By Delegate Robert A. Georgine, Building & Construction Trades Department.

Whereas, On September 5, 1975, the U.S. House of Representatives passed on a vote of 300 to 63 metric legislation (HR-8674) which complies with the principles of the 1973 AFL-CIO Convention resolution on metric conversion, and

Whereas, HR8674 establishes an independent, twenty-five member U.S. Metric Board to plan and coordinate the increasing use of the metric system; to encourage voluntary participation of affected sectors and groups; to encourage efficiency and minimize costs to society and to assist in developing a broad educational program, which will assist all Americans in becoming familiar with the metric system, and

Whereas, Equally important HR8674 does not establish as national policy conversion to the metric system; it does not adopt as a national goal, predominant usage of the metric system within a ten-year period and it does not endorse letting the costs "lie where they fall," and

Whereas, The U.S. Senate has scheduled hearings on similar legislation for October 8 and 10, 1975 and quick passage by the U.S. Senate is expected, and

Whereas, The Ford Administration has expressed support for this type of metric legislation, it is very likely a bill will be signed into law before the end of the year, and

Whereas, HR 8674 provides for the establishment of a United States Metric Board and specifically requires labor representation, and

Whereas, HR8674 specifically requires that labor be involved in the consultative process and in the formulating or development of various conversion programs, and

Whereas, HR8674 directs the United States Metric Board to conduct research and recommend whatever action may be appropriate to deal with unresolved problems associated with metric usage, including, but not limited to the impact on workers (such as costs of tools and training) and on different occupations and industries, possible increased costs to consumers, the impact on society and the economy, effects on small business, the impact on United States international trade position, the appropriateness of using Federal procurement to effect conversion to the metric system, and proper conversion or transition period in particular sectors, and effects on national defense, and

Whereas, HR8675 provides that public education programs include counseling and consultation by the Secretary of Health, Education and Welfare, the Secretary of Labor, the Administrator of the Small Business Administration, and the National Science Foundation with education associations, labor education committees, apprentice training committees, and other interested groups so as to assure that the metric system of measurement is made part of the curriculum of the nation's educational institutions and that teachers and other appropriate personnel are properly trained to teach the metric system of measurement; therefore, be it

Resolved, That this Convention of the AFL-CIO in order to maximize organized labor's contributions to the decision making process, to encourage labor union participation in the metric conversion activities of commerce, industry, federal, state and local governments, nationally recognized standards developing and coordinating organizations, metric conversion planning and coordinating groups plus other groups and other organizations as may be appropriate, and be it further

Resolved, That the convention call on AFL-CIO trade and industrial departments, state and local central bodies or councils plus affiliated national and international unions to form Metric Coordinating Committees, to collect and analyze information to develop positions consistent with the well being of their members and national interests, to advise and assist affiliates to effectively participate in the activities of the U.S. Metric Board and the Canadian Metric Commission and other responsible coordinating bodies.

Mr. PETERSON. On behalf of the AFL-CIO, I appreciate this opportunity to present the views of the AFL-CIO on metric legislation.

As you know, the House of Representatives has approved H.R. 8674, a bill to declare a national policy of coordinating the increasing use of the metric system in the United States and to establish a U.S. Metric Board to coordinate the voluntary conversion to the metric system. The House-passed bill is generally in line with the position of the AFL-CIO.

It is premature, therefore, for Congress to pass any legislation which would commit the Federal Government to any official policy of facilitating or encouraging metric conversion. Conversion must not be compulsory. We believe conversion to the metric system must be entirely voluntary.

I see you have several more witnesses, Mr. Chairman, and I thought I would like to highlight the main points.

Senator INOUE. Fine, sir. Without objection, your full statement will be made a part of the record.

Mr. PETERSON. We want to reiterate our position on reimbursement for tools, Mr. Chairman. This has been our position, and we feel that the American workers must be dealt with fairly and that this is a fair requirement. And we are totally opposed to letting the costs fall where they may.

Senator INOUE. Even if this is a voluntary program?

Mr. PETERSON. Well, you see, to the worker, then, sir, it may not be voluntary. He may be obligated to purchase new tools, if this company voluntarily goes metric.

Senator INOUE. At the present time, many industries and companies are converting voluntarily without any law or any national policy. I would presume that in those companies, workers are called upon to acquire new tools.

Mr. PETERSON. Yes, sir.

Senator INOUE. Are you suggesting that Congress reimburse those workers also?

Mr. PETERSON. Where the workers have to buy their own tools, yes, sir.

Senator INOUE. We have no law even suggesting voluntary conversion at this point, but as you know, at the present time, many companies are converting and in the process are requiring some of their employees to use metric tools. This has come about voluntarily. These companies were not forced to do this. The bill before us calls for voluntary conversion also. They are not forced to do this. It is just an educational method.

Mr. PETERSON. Sir, if the DOD starts to order in the metric system, it is no longer voluntary on the part of the companies then to go metric. It is an obligation, if they want to stay in business, if they are doing business with the DOD or another agency of the Government.

Senator INOUE. Well, I am pursuing this line of questioning for the record, sir. The Government has been active in standardization for many years now. For example, recently the Government established standards for containers. We have thousands upon thousands of containers to ship goods to and from the United States. Assuming that those companies which now have, say, the 40-foot container, must purchase some other size, resulting in a full inventory loss, would you suggest that these companies be compensated?

Mr. PETERSON. Well, I think, sir this example does show that this is a very complex problem and must be looked at individually. As a representative of the employee, you recognize when it comes down to him, he has no choice.

Senator INOUE. Just recently the U.S. Treasury, Department of the Treasury, held hearings on proposed changes of bottle sizes to

metric units. No one opposed the changes. Was labor aware of these hearings?

Mr. PETERSON. We are aware of this change.

Senator INOUE. Were you opposed to this change?

Mr. PETERSON. We were not aware of any hearings or anything of that sort. We read of it, you know, and we are not certain of just how it affected the workers in the changing of the measurement on the beverages. Whereas, in the tools the worker uses with his hands, we know here he is definitely affected and needs new tools.

Senator INOUE. Please proceed, sir. While you are looking for the new section, sir, may I bring to your attention the statement which was made by Mr. Alexander Tyrell of the Canadian Labor Congress, the Canadian counterpart of the AFL-CIO, before the House Science Committee hearing on metrication. At this hearing Mr. Tyrell said the following:

Labor in Canada is not opposed to the principle of metric conversion. It welcomes the change under all the circumstances as a realistic move in the proper direction. Labor in Canada is not unduly concerned about other matters affecting workers at their work place. It feels it has sufficient ability to negotiate such matters as training, restraining, job security programs, et cetera, which might become contentions because of the metric conversion.

Would that be your position, sir?

Mr. HANNIGAN. Senator, our concern is much broader. We are trying to represent our members broader interests. Our members are taxpayers, consumers. In most cases, where we represent the workers of a large corporation, whether RCA or Westinghouse, the collective-bargaining process will provide an answer to metric conversion. Collective bargaining does not respond to the needs of taxpayers and consumers. We also have an overall interest in the impact of metric conversion on the economic well-being of this country.

Mr. PETERSON. Another thing, an employer, has so much money that is going to be available for negotiations. We don't want to add the metric as a part of our collective-bargaining procedure. We are looking for real economic improvement.

Senator INOUE. Mr. Hannigan, is it your view that the consumers of the United States would suffer from metric conversion?

Mr. HANNIGAN. Yes, sir. In convenience and costwise.

Senator INOUE. When we are just one of five in this world?

Mr. HANNIGAN. We probably make up over half of the total production of this world.

Senator INOUE. It has been suggested by some that because of our refusal to convert to the metric system, we are losing a large amount of exports.

Mr. HANNIGAN. Sir, I disagree. I think one of the findings I agreed with in the U.S. metric study stated in most cases the system of measurement was not significant in loss of trade. Right now, we are finding out that lower imports are the result of a depressed market in the United States. When the United States is in a recession, U.S. exports increase and foreign imports decrease. We are improving our balance of payments now, because of our recession, which I don't think is a viable answer.

In all the factors involved in international trade, measurement is probably one of the least significant. The key to international trade is

the existence of a U.S. market. The workers in Manila or Hong Kong don't buy color television sets. They might be produced there, but they aren't sold there.

Senator INOUE. Are you suggesting that in this huge world of over 4 billion people, we 200 million know better than the rest?

Mr. HANNIGAN. No, sir. I am not saying that. The facts are we have the biggest market, greatest production capacity and probably consume most of the world's energy and production.

Senator INOUE. We have heard from educators who suggest that the metric system is much easier to learn and understand than the English standard.

Mr. HANNIGAN. Again, I think that is a subject that can be debated among educators themselves. The customary system is a binary system which divides halves and thus is more rational and easier to conceptualize. I think it would be more difficult for a child to conceptualize a millimeter as opposed to an inch.

In the era of computers and calculators, some of the decimal advantages are greatly reduced, because everybody has the reasonably cheap calculators. The whole decimalization aspect of metric conversion is greatly overemphasized. Our system of computers and calculators has changed that.

Senator INOUE. Am I to conclude that you are totally against metric conversion?

Mr. HANNIGAN. No, sir. We believe metric conversion is in some cases in the interest of this country. The organizations involved in converting, should proceed and they should proceed through a coordinated process. We should defer commitment to any policy of national conversion because of the scarcity of information regarding its impact.

Senator INOUE. If you feel that the consumers will be hurt and that the people of the United States would be inconvenienced, would you say that conversion would be against our national interest?

Mr. HANNIGAN. I didn't say there were none. I am sure General Motors has found some. Hopefully, someday it could reduce car prices or stabilize car prices. I haven't seen that yet. Their commitment to metric conversion, I don't see as a problem right now.

Senator INOUE. Please proceed.

Mr. PETERSON. Our first urgent recommendation for change, S. 1882, relates to the title. We believe the title should convey more accurately the purpose of the legislation and we much prefer the title approved by the House of Representatives as follows: "To declare a national policy of coordinating the increasing use of the metric system in the United States, and to establish a U.S. Metric Board to coordinate the voluntary conversion to the metric system." We also recommend, we prefer the language of the House-passed bill in section 3, subsection (1) which says the policy of the United States shall be to plan and coordinate the increasing use of the metric system in the United States and to plan and coordinate the voluntary substitution of metric measurement units for customary units in education, trade, commerce, and all the other sectors of the economy of the United States.

We ask this committee to adopt this language to replace the present language in section 3, subsection (1). We want to strike out the present language of S. 1882 which makes reference to making metric units the

predominant, although not exclusive, language of measurement, on a time scale for conversion appropriate to particular sectors as approved by the Congress on recommendation of the United States Metric Board, pursuant to section 11.

Our third urgent recommendation is to strike section 11 out of S. 1882 and thus to make S. 1882 conform to the House-passed bill, H.R. 8674, which does not contain such specific provision for compulsory Metric Board conversion programs and for compulsory conversion timetables. This is a third recommendation in which we prefer the approach taken in the House-passed bill. We believe the present language in section 10 of both bills is entirely satisfactory and sufficient for implementing the purpose of this legislation. Therefore, we urge this committee to strike section 11 out of S. 1882.

As you can see, our second and third recommendations are related in part. The language in section 3, subsection (1) of S. 1882 goes beyond the House-passed bill in its effort to make the metric system predominant, although not exclusive. We say that such language is contrary to the voluntary, noncompulsory approach on which there is general agreement, and we say such language should be struck out of the bill.

Senator INOUE. Mr. Peterson, are you that deeply concerned that these words would imply a policy of compulsory conversion?

Mr. PETERSON. Yes, sir.

Senator INOUE. Please proceed.

Mr. PETERSON. In a similar spirit, we see the present section 11 of S. 1882 as adding an unnecessary and unjustified compulsory procedure to the voluntary, noncompulsory Metric Board programs of planning, coordination, and public education as set forth in section 10. We urge this committee to maintain the voluntary, noncompulsory character of any metric legislation you approve.

Our fourth urgent recommendation is that Congress retain some authority over the Metric Board by requiring Senate confirmation of the individual named by the President to serve as **chairman of the** Metric Board and Senate confirmation of the individual names by the President to serve as Executive Director of the Metric Board.

Senator INOUE. That is a good idea.

Mr. PETERSON. Our fifth recommendation is that Congress give explicit recognition to the independence status of the Metric Board. One place this could be done is by inserting the word "independent" in section 5 before the words "United States Metric Board."

Also, we suggest that in section 17 you include language to make clear that financial and administrative services shall be provided to the Metric Board by the Secretary of Commerce "or other appropriate sources in the Federal Government." Adding this language about "other appropriate sources in the Federal Government" would bring this section in line with the language in the House-passed bill. We urge you to make these changes, because we believe there may be a tendency for the Commerce Department, as a result of pressures at the NBS, to try to dominate the work of the Metric Board.

I would like to reemphasize our position of reimbursement to workers associated with metric usage, and we look for full reimbursement.

And I would like to conclude by quoting Congressman Symington, the chairman of the Subcommittee on Science, Research, and Technology of the House Committee on Science and Technology, made the following clarifying remarks (Congressional Record, September 5, 1974, page 8380) on the intent of H.R. 8674:

Does the policy of H.R. 8674 mandate a change to the metric system?

The answer is that rather than mandating a change to the metric system, the policy of H.R. 8674 responds to the problems associated with the increasing use of the metric system. The bill would do this by establishing a mechanism to coordinate the metric conversion activities, by studying the associated problems, and by educating the public on the usage of the metric system.

In fact, one of the reasons for changing the title of the bill is to place the chief emphasis on the voluntary nature of the adoption of the metric system, and emphasizing the coordination function of the government's role, we expect to make it clear that the bill does not mandate the change, but only aims at providing coordination based on voluntary participation.

When the words "change" or "conversion" to the metric system appear in the bill or the report, does this mean a total changeover to the metric system?

The Committee views the words "change" or "conversion" as describing the ongoing nature of the increasing usage of the metric system. The Committee recognizes that some sectors of the national community may move rapidly to metric, while others will move more slowly and yet others may elect not to make the change.

The Committee feels strongly that in any sector, the marketplace—not the Congress or the Metric Board—should provide the impetus in deciding whether, when and how metric conversion activities should proceed.

How do the provisions of H.R. 8674 reflect the results of the Department of Commerce study "A Metric America"?

The study served to focus the Committee's and the Congress' attention on the fact that the metric system would be used more widely on the United States. It is certainly a fact that today we are seeing more metric measurements in our everyday lives than we were in 1971. However, the country has changed drastically in other ways in the last five years, and those changes are primarily economic.

The Committee feels that the projections of 1971 would not be the projections of today. With this in mind the Committee felt that it was unwise to mandate a conversion to the metric system within a specified time frame and to make it a goal for the conversion that the country become predominantly metric within that time period.

Therefore, these recommendations of the Metric Study were not adopted. Although the bill refers to these and other recommendations in the section on findings, they have not been included in the policy section or in the section setting forth the duties of the Metric Board.

Mr. Chairman, we strongly agree with these important clarifying remarks and we urge this committee to incorporate such language in your committee report on metric legislation.

If these changes we propose in S. 1882 are made, and if this clarifying language on the intent of metric legislation is included in the committee report, we believe this legislation will be generally in line with the position of the AFL-CIO.

Mr. Chairman, this concludes my prepared remarks, and we appreciate the opportunity to testify before you.

Senator INOUE. Thank you. What do you estimate to be the price tag for the reimbursement for equipment, instruments and tools?

Mr. PETERSON. I would like to turn this over to Bill Ryan, who has made a study of this.

Mr. RYAN. Mr. Chairman, in response to your question, I am going to have to quote figures that were secured in 1973, June of 1973.

Now, first of all, I want to make it clear that the extent to which

a tool and diemaker or machinist or auto mechanic or an aircraft mechanic is required to supply his own tools, will differ from firm to firm, depending upon policy of the company. Some companies require a mechanic, tool and die maker to have a rather complete set of measuring instruments and tools.

Now, this policy will change from company to company. Now, in 1971—

Senator INOUE. Excuse me, may I interrupt at this moment?

What is happening now to the workers involved in conversions?

Mr. RYAN. Well, in some cases we have negotiated collective-bargaining clauses, where the employer obligates himself to purchase the tools, the conversion tools or instruments.

Now, needless to say, when the employer agrees to do that, that comes out of the package that he has got on the table. In other words, this money actually comes out of the workers' pockets. Now, in some cases, the larger firms will supply all the tools. It doesn't even become a matter of negotiations. They absorb the cost and pass it on to the consumer in some way.

But in 1973 tool replacement costs were \$3,215.20 for a machinist or tool and die maker. Now for an aircraft mechanic it was \$1,076.99. For auto mechanic, \$404.68.

I apprenticed, Mr. Chairman, as a tool and die maker over 40 years ago and I worked for a firm that did not supply the kit of tools and I had to go out to a loan company and borrow \$1 thousand, with my parents cosigning, and I spent all but about 40-some dollars of the \$1 thousand for a kit of tools. This was over 42 years ago.

I respectfully suggest: What do you think that tool kit would cost today?

Senator INOUE. I am certain it is much more. What would you consider to be the national price tag?

Mr. RYAN. Well, if it going to be the national policy to encourage the conversion to the metric system, we as representatives of the workers don't feel that the worker should subsidize this movement. We think that if this is going to be a national policy, if it is going to be encouraged by the Federal Government, if there is going to be any cost involved you have got to give the worker some relief for the cost of the conversion.

However, you do it, we don't care but it has got to be done somehow.

Senator INOUE. I am trying to find out what you estimate to be the national cost.

Mr. RYAN. Well, I don't have the resources to give you a figure like that, sir. I don't know. I don't know what the national cost would be. I have just given you three examples, and as I said earlier, this would be different from firm to firm, depending upon their policy.

Senator INOUE. Thank you very much, sir.

What is your response to the proposal made by the American Bar Association? I don't know if you have time to study this, but we would like to have your views on it.

Mr. PETERSON. We do. We would like to submit an answer in writing. As you know, our people are in San Francisco now at the convention.

Senator INOUE. If you could in the meantime come up with rough estimates which could serve as a guideline to the committee on what the national cost might be, I believe it would be helpful.

Mr. PETERSON. I will certainly ask the research department to do that.

Senator INOUE. I would also appreciate it if you could also give the committee some idea as to what it has or may have cost the workers in the present conversion programs being carried out in the United States.

Mr. PETERSON. All right. I would be happy to respond, Mr. Chairman.

Senator INOUE. Do you have any situation where the worker has had to pay for the tools directly out of his pocket?

Mr. RYAN. Well, we have had situations like I told you just a moment ago. In some cases we have bargained for protection in our agreements. When we do that, sir, we take it out of the employee's pockets. Because that employer, sitting on the other side of the table, has a number of pennies and is willing to go just so far. If we take the cost of those tools out of those pennies he has on the other side of the table, we are taking it out of the workers' pockets. That is what we are doing. We want to stop that. We don't think it is right.

Senator INOUE. But you are not suggesting that the Federal Government compensate the worker for that conversion?

Mr. RYAN. I am suggesting, sir, that the Federal Government if it is going to be the policy to encourage conversion, then the Federal Government should not expect the workingman or the workingwoman to subsidize the cost of this. If it is going to be the Federal Government's policy to push this thing, then let the Federal Government pay for it.

Senator INOUE. But as long as the bill has not become law, then you are willing to pick up the tab?

Mr. RYAN. Look, if we don't get the cost of conversion from the Federal Government we are going to try to get it out of the employer, and this is going to be one more thing we are going to be fighting about when we sit at the bargaining table. When you are talking about \$3,000, Mr. Chairman, that is a big piece of money, for one person.

Senator INOUE. Gentlemen, I thank you very much. You have been most helpful.

Mr. PETERSON. Mr. Hannigan has a statement.

Senator INOUE. Please.

Mr. HANNIGAN. Before I read my prepared comments, I think on the discussion of tools one large group has been omitted; a growing group, the unemployed. In some cases they don't belong to unions, in some cases they do. They definitely have to work.

At a certain point in the conversion process, in order for them to get back into the work force, they will have to acquire metric tools.

Therefore, due consideration should be given to that. We have around 8½ million people right now not working. They won't be available for training or retooling.

Mr. Chairman, Senators, the IBEW again welcomes this opportunity to express our views on metric conversion. We testified before this committee on March 1, 1972, and again on November 2, 1973.

Since this testimony is still relevant, I suggest this committee review our previous testimony, especially that of November 2, 1973. You will note that throughout this period, the AFL-CIO has been entirely consistent in its position regarding metric legislation.

As a result of our efforts to assure the drafting of reasonable and practical metric legislation, we have frequently been accused of self-interest regarding tools and training, but actually we feel our past testimony well documents the fact that we have repeatedly expressed our deep concern regarding the impact of metric conversion on all of society and the general economic well being of the entire Nation.

I was very pleased that the AFL-CIO Convention passed a metric resolution reinforcing labor's commitment to the policy of H.R. 8674, plus directing the AFL-CIO to encourage labor participation in all appropriate metric conversion activities and to form metric coordinating committees in order to effectively participate in the activities of the U.S. Metric Board and the Canadian Metric Commission, plus other responsible coordinating bodies.

We feel that presently there is no pressing need to establish a national policy of conversion to the metric system and there are simply too many unanswered questions regarding the impact on the U.S. economy. Most of the arguments in support of metric conversion are based on the U.S. Department of Commerce study, "A Metric America," completed in 1971.

This study, which the AFL-CIO severely critized as biased, is not totally outdated in view of today's enormous social and economic problems. In 1969, it was impossible to anticipate the extent of the economic, energy, and environmental problems now challenging our Nation.

In short, now is not the time for this deeply troubled Nation to adopt an irreversible policy of encouraging metric conversion which could complicate economic recovery and further delay essential energy and environmental projects.

We must have a better understanding of its impact. Flexibility is essential. We must maximize our options if we are to minimize the social disruptions and economic dislocations associated with conversion.

The AFL-CIO is concerned about the impact of metric conversion on its members as workers, as consumers, and as taxpayers.

First and foremost, we are concerned that metric conversion will accelerate the deindustrialization of the United States, thus cause soaring unemployment.

Senator INOUE. If the Senate should adopt the House-passed measure, do you believe soaring unemployment will result?

Mr. HANNIGAN. I don't see the linkage of passing the bill with the industrialization process. If I did, we would oppose S. 8674.

Senator INOUE. You are saying that conversion will accelerate deindustrialization, thus causing soaring unemployment?

My question is if we pass H.R. 8674, would this occur?

Mr. HANNIGAN. The purpose of 8674 is to plan and coordinate the increasing use of the metric system, not to encourage or promote it. It is voluntary.

Senator INOUE. We are not suggesting mandatory conversion.

Mr. HANNIGAN. That term is used loosely. I will cover what "voluntary" means, later.

Senator INOUE. When you speak of the metric conversion, what bill are you speaking of?

Mr. HANNIGAN. Well, we can say S. 100 would be the bill that would accelerate the deindustrialization in the United States. I think S. 1882 would, unless corrected.

Senator INOUE. What about H.R. 8674?

Mr. HANNIGAN. That would respond to the natural phenomenon going on in this country, not really increase it.

Senator INOUE. I just wanted to make it clear for the record. It was not clear which bill you were speaking of.

Mr. HANNIGAN. We are concerned with the possibility of a major increase in temporary layoffs, due to shortages and scheduling difficulties.

We are also concerned about the impact of metric conversion on the stability of our collective bargaining process and on our collective bargaining agreements.

Collective bargaining, as always, will be an effective instrument in protecting the interests of our members. I strongly suggest that employers planning metric conversion work very closely with the unions that represent their employees. They understand the workers' problems and have existing training and education structures which can do much to facilitate transition and minimize the impact.

The AFL-CIO will also be a key factor to any successful conversion effort. Its service and industrial department, plus its State federations and central bodies are structured to reach millions of American workers with information and programs that they feel will promote the interest and well-being of its membership.

In short, organized labor has much to contribute. History has proven that labor will cooperate if the program is reasonable and practical and in the interest of both our members and our great Nation.

The effects of metric conversion are much too broad and far reaching to resolve by collective bargaining alone. Labor looks to Congress to assure that legislation is responsive to the needs of Americans as working men and women.

Today's hearings have been scheduled to consider S. 100, 1882, and H.R. 8674. On September 5, 1975, the U.S. House of Representatives passed metric legislation H.R. 8674 by a vote of 300 to 63. This bill is in compliance with the 1973 AFL-CIO convention resolution on metric conversion.

Senator INOUE. Am I to conclude you would be happy if we passed H.R. 8674 without amendment? Just pass it?

Mr. HANNIGAN. Yes, Mr. Chairman.

We have one amendment later on in my text.

Senator INOUE. I am asking this because Mr. Peterson suggested four amendments.

Mr. HANNIGAN. Those would be very useful.

Mr. PETERSON. These were amendments—

Mr. HANNIGAN. As I proceed in my text, you will see similar amendments.

Mr. PETERSON. These were amendments to the Senate bill.

Senator INOUE. Thank you for clarifying that point.

Mr. HANNIGAN. Okay?

We strongly oppose S. 100 as a flagrant violation of the 1973 AFL-CIO metric resolution. The basis for this opposition is clear in our earlier testimony.

We are pleased to see that S. 1882 is responsive to many of the provisions of the 1973 AFL-CIO metric resolution. It provides for labor representation in all the activities of the Board and contains provisions to recommend whatever action is appropriate to deal with unresolved problems.

Equally important, it does not establish a national policy of conversion to the metric system. It does not provide for a 10-year conversion schedule and it does not support letting the costs lie where they fall.

However, we also must oppose S. 1882 since it still contains several major shortcomings. First, in section 3(1) it adopts the goal that metric units be the predominant language of measurement in the United States.

We see no reason for, or need to make, such an extremely important and, I stress, irreversible decision. Also, the adoption of this goal defeats a primary purpose of the bill, which is to conduct research necessary for the development of practical and workable national policy regarding metric conversion.

S. 1882 would comply with the policy of the AFL-CIO on this subject, if this committee would adopt the language of H.R. 8674, section 3, subsection 1.

Second, the 1973 AFL-CIO metric resolution explicitly requires the board to be independent, yet as I interpret S. 1882, primary responsibility for the metric board is assigned to the Secretary of Commerce.

Section 17 stipulates that financial, administrative and other staff services be provided by the Secretary of Commerce. It also authorizes him to obtain information and assistance from Federal agencies.

Section 4 assigns him the responsibility for interpreting and modifying the international system of units as established by the General Conference of Weights and Measures in 1960. The AFL-CIO feels an independent board with the prestige of the executive office or an independent agency, free from the intra- and interagency competition would be much more efficient and effective in carrying out its extremely difficult and important mission.

Further, the traditional enthusiasm of the U.S. Department of Commerce and the National Bureau of Standards for metric conversion, still fresh in our memory, was presented in our testimony before this committee on March 1, 1972.

We feel the proper role for the board and therefore its staff is to remain neutral, maximize options and avoid irreversible decisions pending future information and developments. We suggest that the committee adopt the language of H.R. 8674, section 16, which permits the board to obtain financial and administrative services from other appropriate sources in the Federal Government and to substitute the "U.S. Metric Board" for the "Secretary of Commerce" in section 4 of S. 1882.

We also have several other important suggestions we feel will clarify and improve this legislation. It is critically important that a sincere effort be made to clear up the present confusion.

H.R. 8674 does not establish a program of planning and coordinating the conversion of the United States to the metric system. Its purpose is to plan and coordinate the increasing use of the metric system. The objective of the planning function is twofold: first, to plan the coordination of voluntary conversion activities so as to encourage effi-

ciency and minimize overall costs to society and second, to develop future national policy regarding metric conversion based on a growing reservoir of knowledge.

Congress, the U.S. Metric Board and the American public must fully understand the policy established by H.R. 8674. Subcommittee Chairman Symington very accurately and explicitly explained in the Congressional Record the intent of the Committee on Science and Technology regarding the national metric policy as established by H.R. 8674.

Unfortunately, several other Congressmen, in the Congressional Record, referred to the Board being responsible for planning and coordinating the Nation's conversion to the metric system. We feel it serves no useful purpose to read into this legislation something that simply isn't there. Such confusion will seriously impede efficient and effective administration of this legislation, and result in numerous appeals for judicial review causing the long and costly delays.

Obviously, any type of metric legislation, regardless of the thoroughness and technical detail will trigger a flood of misguided and irresponsible metric activities.

Metric flim-flam artists and peddlers in pursuit of a fast buck will falsely claim that the United States has adopted the metric system. Teaching aids, textbooks, adaptors and a wide assortment of other gimmicks will flood the country at great expense to the general public.

Confusion regarding the role of the Federal Government in metric conversion is exemplified by a directive presently under consideration by the Department of Defense. This directive specifically calls for promoting the use of metric measurements. Metric advocates realize there will be very little metric conversion without active Federal procurement policy and thus have been desperately promoting a firm DOD commitment on metric conversion.

Such a commitment is inconsistent with the policy of H.R. 8674 which requires the Federal Government to remain neutral regarding metric conversion, and limit its efforts to planning and coordinating its increasing use.

Senator INOUE. May I interrupt at this point, Mr. Hannigan?

Are you really objecting to DOD converting?

Mr. HANNIGAN. No, Mr. Chairman.

Senator INOUE. Or to encourage conversion?

Mr. HANNIGAN. Promoting and encouraging it. Yes, sir. I strongly object to it as a violation of H.R. 8674. If it is in response to industry initiative at no cost to the American taxpayer, OK.

Senator INOUE. Since at this time we have no law, so it is no violation.

What I am trying to point out is that throughout the world, the weaponry and weapon systems of all our allies are based on the metric system. In fact, we had to have a massive conversion to the metric system in the Vietnam war because all the maps made of that area were in kilometers.

Mr. HANNIGAN. In that case it would be practical and reasonable for them to do it and thus we have no objection.

Senator INOUE. The machinery, the tools, the guns, the bullets, were all in metric measurements. Don't you think it is only reasonable that they encourage it?

Mr. HANNIGAN. In the Vietnam war, when our materials were captured, I hope they had trouble converting it.

Senator INOUE. Much of the military equipment now is in metrics.

Mr. HANNIGAN. You mean the tanks and trucks and planes?

Senator INOUE. Most of them.

Mr. HANNIGAN. Not the planes and trucks. Maybe a small part of them; the transmission or something might be. I doubt very much that a jeep is totally metric right now.

Senator INOUE. There has been talk about standardizing the weapon systems in NATO—

Mr. HANNIGAN. I think there may be some advantages, but I don't have a military background. There also probably would be some disadvantages.

Senator INOUE. We can't expect NATO to change from the metric to the English system. Do you think they will do it?

Mr. HANNIGAN. I wouldn't expect them to at all, but maybe NATO shouldn't expect the United States to assume an undue burden in costs to convert to what they want.

If we can coordinate our activities, it might not be unreasonable. If it is reasonable and practical, I have no objection to the conversion. I do object to the use of Government procurement to encourage metric conversion or have a policy of promoting metric conversion.

Senator INOUE. If we are going to be ordering machine guns in metric measurements, the company that is going to be manufacturing that would do it in metric measurements.

Mr. HANNIGAN. Obviously, and I would not object to it if it is in response to an industry initiative and not DOD promoting it. There is a difference.

Senator INOUE. Please proceed, sir.

Mr. HANNIGAN. The strongest supporters of the metric system are obviously transnational corporations who have been especially influential with the DOD. Unfortunately, the military-industrial relationship is not always in the national interest. The DOD's own report on metric conversion contained two significant findings: (1) "Industry must take the lead in any such conversion. DOD must not be placed in a lead role and thereby find itself in the position of forcing the country to convert to metric in the system by writing contracts with metric requirements"—and this is a direct quote from their own study—and (2) the added costs to maintain constant mission capability while converting to the metric system is estimated "to be approximately \$18 billion and are such that they cannot be absorbed without deterioration of the military posture."

It is important to note that this cost estimate is conservative and is in 1970 dollars with no inflation factor applied. Therefore, in 1974 dollars, the cost would be \$22.5 billion.

Obviously, all agencies of the Federal Government must clearly understand congressional intent on metric conversion and consistently apply it.

There is also general confusion regarding the voluntary aspect of metric conversion. For most people, companies and organizations, voluntary conversion is totally unrealistic and dangerously misleading. As the number of transnational government corporations that voluntarily decide to convert to the metric system increase, the voluntary

aspect becomes increasingly compulsive for the remainder of society. The question is thus reduced to determining if what is good for transnational corporations is also good for the U.S. economy and society in general.

Ironically, these multinational giants, the champions of the private enterprise system, will, as pockets of resistance develop, pressure Congress to force metric conversion. This is the tragic situation in the United Kingdom today.

Therefore, we suggest first that the long title be amended to read "To declare a national policy of coordinating the increasing use of the metric system in the United States and to establish a U.S. metric board to coordinate the voluntary conversion to the metric system" and the short be changed to read "This Act may be cited as the Metric Coordinating Act of 1975." Second, that the findings section 3 should be consistent with purpose and intent of the legislation. In both H.R. 8674 and S. 1882, the findings are inconsistent and misleading.

For example, S. 1882 does not establish a national metric policy supporting metric conversion, but section 2, subsection 6 notes that the United States is one of a few countries not establishing a national policy committing to and facilitating metric conversion.

On the other hand, both S. 1882 and H.R. 8674 charge the U.S. Metric Board with the responsibility of recommending future national policy regarding metric conversion.

Therefore, we suggest that the entire section be replaced with the following language:

(1) The metric system of weights and measures has been legal but not mandatory in the United States as a result of action by Congress in 1866. In recent years, use of the metric system has been increasing and there is now a need to plan and coordinate its growth.

(2) Metric conversion will affect all U.S. citizens as workers, as consumers and as taxpayers. Therefore, any legislation must deal fairly with those who may be adversely affected.

(3) There are too many unanswered questions regarding the impact of metric conversion on the U.S. economy, especially inflation, the energy shortage, the replacement of tools and training of U.S. workers, the U.S. international trade position, and the loss of U.S. workers.

(4) A reasonable response to our present situation requires a program which can:

- (a) Plan and coordinate the increasing use of the metric system.
- (b) Respond immediately to problems resulting from this increasing use.
- (c) Conduct research necessary to develop practical plans.
- (d) Develop broad program of public education.
- (e) Recommend necessary actions to Congress and the President.
- (f) Encourage voluntary participation of affected sectors.

However, if for some reason this is unacceptable, then we suggest that section 3(1) only read:

Congress finds that the use of the metric system is authorized by an act passed in 1866; that the customary units in use in the United States have been defined based on the metric units of 1892; and that the metric study conducted by the Secretary of Commerce and submitted to the Congress in 1971 pursuant to Public Law 90-472 has found that increased use of the metric system is inevitable; that a central plan-

ning and coordinating body be established and assigned to plan and coordinate metric conversion activities in cooperation with all sectors of our society; and that immediate attention be given to the education of the public and to the effective U.S. participation in measurement related to international standards activities.

This language is based on the recommendations of the U.S. Metric Study and consistent policy of S. 1882.

Section 11 of S. 1882 establishes a procedure for approval or disapproval of conversion programs approved by the Board. Unfortunately, there is no limit on the frequencies of submittals and thus unnecessarily burdens both the President and Congress or forces them to handle extremely complex and important issues as routine business without due consideration and deliberation.

While it fails to provide details or means of approval, it does, however, direct the Board to implement such programs. This raises the question, "How will the Board implement these programs and what funds and resources are necessary?"

We feel section 10(b) of H.R. 8674, which directs the Board to "provide for procedures whereby industry groups under the auspices of the Board shall formulate and recommend to the Board specific programs for coordinating conversion in each industry and segment thereof . . ." adequately provides for processing future programs, and thus section 11 of S. 1882 unnecessarily complicates the bill.

We recommend that the committee adopt the language of H.R. 8674, section 10(b) and amend reference to section 11(b) in section 10(i) of S. 1882.

My next comments will be directed to the American Bar Association's resolution establishing a mechanism for converting customary units to metric units in statutes, regulations, and other laws at all levels of government.

While I am sure some type of mechanism will be needed to expedite conversion activities in this vital area, I also feel it is premature for this committee to act on this resolution.

It is obvious that this highly respected and responsible organization thoroughly considered this proposal; that it has an excellent grasp of an enormously complex process and that a sincere effort has been made to protect the public interest.

However, this proposed amendment unnecessarily complicates both this piece of legislation and the entire legislative process.

We feel congressional debate on the compulsory aspects of this mechanism and the role of big Government in metric conversion, plus the issue of States rights, seriously and unnecessarily jeopardizes passage of this legislation.

The implications of this amendment are so enormous and it warrants thorough investigation and public review. Clearly, this also is the responsibility of the U.S. Metric Board as provided for in section 10(b) of H.R. 8674.

The next comments are directed toward the section that provides for compensation for the Executive Director. The Executive Director is charged with responsibility for planning and coordinating and implementing all activities of the Federal Government and for assuring that private metric activity is consistent with national policy and interest.

He is also required to cooperate with the Secretary of State, the Secretary of Health, Education, and Welfare, plus the Secretary of Labor and the Attorney General.

Everyone present is well aware of the pecking order of the Federal Government. A grade 18 executive director would have extreme difficulty reaching and influencing the level of authority of power necessary to be effective.

Therefore, I recommend that this committee adopt the language of section 14(b) of H.R. 8674 which provides that the Executive Director shall not exceed level III of the Executive Schedule under section 5314.

Finally, we recommend that section 6(a) of S. 1882 be amended to provide that Presidential appointment of the Chairman be subject to Senate approval. Section 6(a) requires that the Board be broadly representative of American society, and, therefore, it is only logical the U.S. Senate, the highest elected body representative of the American society, give final approval regarding critically important positions.

The U.S. Metric Board will be responsible for recommending national policy regarding metric conversion and for coordinating the greatest industrial change ever undertaken in the history of our country. The Chairman should be an individual with a broad knowledge of the workings of our economy and an understanding of our society. He should be a well-known public figure, fair, objective, and open-minded, and thus deserving of public confidence.

Credibility will be an essential factor in future conversion activities. Obviously, he should not be a person already committed to metric conversion or representing organizations with a vested interest in metric conversion.

His primary responsibility is to the U.S. public and not to encouraging metric conversion.

This concludes my testimony. Thank you for your courtesy and your attention.

Senator INOUE. Thank you very much, Mr. Hannigan.

If you were given a choice of the passage of H.R. 8674 or no bill at all, what would you choose, sir?

Mr. HANNIGAN. I think the country needs legislation like H.R. 8674, with the amendment providing for approval by the Senate of the Chairman and the clarification of the persistent confusion regarding national policy.

I think your committee's report for the good of the country, should eliminate this confusion once and for all. In that sense, H.R. 8674 complies with the AFL-CIO resolution, and there is a need to coordinate metric activity in this country.

Senator INOUE. Then you want a bill.

Mr. HANNIGAN. Yes, sir.

Senator INOUE. Is that the view of other members of the panel?

Mr. PETERSON. Nick Loope, research director for the Carpenters has a few words he wants to say.

Mr. LOOPE. Thank you, Mr. Chairman.

I wish to express on behalf of the United Brotherhood of Carpenters and Joiners of America our gratitude for this opportunity to briefly make some remarks, and we shall be brief.

In the interest of saving valuable time for all here concerned, we shall prefer not to add to the testimony already so capably presented by Messrs. Peterson and Hannigan. This testimony is fully endorsed by the United Brotherhood of Carpenters and Joiners of America.

However, with your very kind permission, I would like to call attention to the voluntary conversion efforts being made at our own cost to our United Brotherhood of Carpenters toward assisting our carpenters, millwrights, millworkers and cabinetmakers and the other numerous subdivisions of our craft to become knowledgeable about the use of the SI metric system of measurements and weights.

This is an effort that was undertaken voluntarily and with the best foresights of which we are capable.

We always try to do what is in our Nation's best interests and in the best interests of all its workers, whether unions or nonunions.

We feel that our nonunion competitors will greatly benefit by these initiatives.

We shall continue to do what we can to the extent of our very limited resources, but we vehemently oppose any provision that mandates that cost "lie where they fall," as the resources of the individual worker are too limited, especially now, and for the foreseeable economic future.

Also, if you please, Mr. Chairman, and other distinguished participants, I should like to briefly note here as I did before Mr. Symington's committee, that in dealing with the time frame we repeat our strongest opposition to a mandated time frame. Not just for ourselves first, but for the vast majority of our employers and related businesses who are small business entities.

I pointed out then in addressing the 10-year constriction or whatever constriction may be endeavored, it shows the fears of the workers we articulate here are merely echoes of the fears of our employers.

Our employers are just good old-fashioned American style free enterprises within our glorious system, which made America great.

They are immediately endangered by a mandated time frame and we echo their concerns already presented in previous testimony toward H.R. 8674.

Our concerns, as their employees, are greatly exacerbated by the knowledge that many of them are in deep debt and many others with heavy financial obligations, in order to "hang in there" and struggle for a profitable return.

Therefore, in their interest and ours, and even that of our unfair competitors, yes, in the interest of the real America as known by the vast majority of its citizens, we plead for your heartfelt consideration as pertains to the great burdens of loans, that if the banking and the financing and attendant economic complexities are not thoroughly considered, these are the American free enterprisers who are going to be wiped out along with their patriotic and law-abiding employees.

We respectfully suggest that our profound trepidations have been and continue to be justified.

We strongly reiterate the need for your best considerations of our small business units and their even smaller employees, and opt in the direction indicated in the statement by Brother Ken Peterson and Tom Hannigan toward a voluntary conversion without any mandating of the period of time.

We thank you most sincerely for this opportunity and great privilege to remark before this Senate committee.

Senator INOUE. Thank you very much, sir.

Our next witness is William E. Zeiter, of Morgan, Lewis & Bockius, representing the American Bar Association.

Mr. Zeiter, we have read your statement and it is a very excellent one.

**STATEMENT OF WILLIAM E. ZEITER, MORGAN, LEWIS & BOCKIUS,
PHILADELPHIA, PA., REPRESENTING THE AMERICAN BAR
ASSOCIATION**

Mr. ZEITER. Thank you. I have a summary which I would like to read.

Senator INOUE. Without objection, the full statement is submitted in the record.

Mr. ZEITER. Mr. Chairman, I am William E. Zeiter of Philadelphia, Pa. I deeply appreciate the opportunity afforded by your invitation to appear here today and testify on the pending metric legislation.

I will not read my qualifications, which are set forth in my prepared statement, but I would like to note for the record that I was a member of the U.S. Metric System Study Advisory Panel established in the Department of Commerce under Public Law 90-472.

In addition to serving on the Executive Committee of the Panel, I accompanied the director of the U.S. Metric Study and the chairman of the Advisory Panel to the United Kingdom in October 1970 to observe firsthand the ongoing British conversion.

In April and May of this year, at the invitation of the Australian Government, I was one of the U.S. Delegates to the North American-Australian Metric Conference, which involved a detailed examination by Canadian and U.S. representatives of the methodology and current status of the Australian conversion effort.

Lawrence E. Walsh, president of the American Bar Association, has very graciously authorized me to present to you the position of the ABA on the metric question.

With that limited exception, however, I am appearing here today as an individual and my views should not necessarily be attributed to anyone other than myself.

The American Bar Association is the world's largest voluntary professional organization, composed of over 200,000 members of the legal profession. Through its House of Delegates, the association speaks for the organized bar on issues of interest and concern to lawyers.

The metric bill which passed the House—H.R. 8674—and S. 1882, which you, Senator Inouye, and Senator Pearson, introduced, are drawn on the assumption that U.S. metric conversion activity will be voluntary, not mandatory.

At its August 1972 annual meeting in San Francisco the ABA House of Delegates endorsed the principal of a voluntary transition, and the association continues to support the concept of a voluntary conversion effort, assuming that the Congress determines that legislation in this area is appropriate.

As a result of information obtained in the intervening 3 years, particularly a comparison of the problems in the United Kingdom with the successes in Australia, the ABA House of Delegates at its August 1975 annual meeting in Montreal called on Congress to face up now, and not later, to the significant legal problems which will be created by legislation encouraging increasing use of metric measurement units.

In this connection the association offers a concrete suggestion for inclusion in the metric bill.

The text of the resolution of the House of Delegates adopted in August at Montreal is set forth in my prepared statement.

The ABA recommendation, it should be noted, does not relate to the metric question generally, nor to its controversial offshoots such as demands for subsidies for workers' tools, special relief for small businessmen, et cetera.

Rather, it focuses on and corrects the widely held misconception that the structural mechanisms for handling the legal aspects of voluntary metric conversion which are appropriate to parliamentary countries with relatively few competing legislative authorities will be adequate to handle the implementation of voluntary conversion programs in the United States.

The special contribution which the association is able to make in this context is to identify the peculiarities of the American situation and to suggest a relatively simple, yet practical and effective, temporary structural mechanism for insuring that government is a part of the solution to the tasks of metric conversion, rather than being a part of the problem.

In my prepared statement I give a summary of the coordinating and sector committee organization which is generally envisioned to coordinate the voluntary metric conversion.

However, significant governmental participation will be inevitable in the implementation of almost every conversion plan.

There is a hypothetical example in my prepared statement relating to the conversion of retail gasoline sales from gallons to liters.

A successful conversion program under that hypothetical example would require at least the following Government action, all of which would have to occur prior to the conversion of any given pump—and, in a number of instances, simultaneously with the conversion:

- (1) State and/or local approval of gasoline sales by the liter.
- (2) Rounding of the Federal gasoline tax to the nearest metric equivalent rate.
- (3) Rounding the State gasoline tax to the nearest metric equivalent rate.
- (4) Rounding the local gasoline tax to the nearest metric equivalent rate.
- (5) Rounding the FEA tankwagon price to the nearest metric equivalent rate.
- (6) Rounding the local regulated price markup to the nearest metric equivalent rate.

Other illustrations could be developed in such obvious areas as building and safety codes, transportation tariffs and other public utility rates, customs tariffs, tax and other reporting to governmental agencies, and so forth.

The point is that Government by its nature cannot be neutral, and in many cases so-called voluntary conversion cannot occur until there has been significant governmental action.

Also, once the requisite Government action has taken place the new metric practices often may be effectively mandated because it would be entirely impractical to continue to operate thereafter with customary units.

In our example above, the weights and measures law might be amended to permit sales in either gallons or liters as an option, but once the taxes are amended to round out in metric quantities, our hypothetical pump will not be able to compute the correct price of "gallon" sales, thereby effectively prohibiting the continued sale of gasoline by the gallon.

The widespread tacit assumption in Congress is that the methods utilized in other countries for effectively resolving these transitional legal problems will be adequate for the task in the United States.

This assumption is at odds with the facts.

The actual situation in the other major English-speaking countries indicates that their experience forms no basis for the assumption that present or contemplated mechanisms for coordinating Federal, State, and local metric actions will be adequate to the task in the United States.

My prepared testimony points out the ways in which Australia, Canada and New Zealand differ structurally from the United States. However, I would like to lay special emphasis on the British experience.

In the United Kingdom decimal currency conversion was effected by the enactment by Parliament of a comprehensive advance program with adequate statutory powers for the conversion of monetary amounts.

When "D Day" came and the general public reacted—as it always does—adversely to the new practices, no further legislation was required of Parliament and the transition was made quickly and with little difficulty.

Unfortunately, in the case of conversion of weights and measures to metric units Parliament procrastinated after the 1965 commencement of the transition—which began, as in the United States, in the industrial sector in response to international considerations—and Parliament did not begin to consider actual legislation until the 1970's.

By that time the cumulative effects of the decimal currency change and entry into the Common Market had combined with the natural adverse reaction toward all change to make the support of any metric enabling legislation a very risky and politically unrewarding position.

In consequence, the United Kingdom transition has lost a great deal of momentum and the British people find themselves in the costly and unsatisfactory position of being partially converted, with all the problems attendant to that status.

As alluded to earlier, the United States exhibits a number of structural characteristics which do not exist in the other countries mentioned above.

First, in the United States, we have at least 55 legislation jurisdictions.

Second, in a number of States the State legislature is incompetent to deal with various subjects which are committed by local law to other legislative bodies.

Chief among these are the home rule powers of municipalities which by state constitutional provisions may not be invaded by action of the State legislature.

In some States, for example, Pennsylvania, a significant part of the law-making power relating to the judiciary has been vested in a body within the judicial system.

Thus, for example, if a State wished to permit the use of a new metric-sized sheet of paper for the filing of documents, et cetera, there is no one governmental body which is competent to take responsible action in the matter.

Third, at almost all levels, the problem is further compounded by the possibility that the executive branch and the legislative authority are not under common control, unlike the Westminster system.

Fourth, another consequence of the Presidential system is the relatively independent status and jurisdiction of legislative committees.

For example, although the metric question generally is within the jurisdiction of the Senate Committee on Commerce, changes in Federal gasoline excise taxes and customs tariffs are within the jurisdiction of the Senate Finance Committee.

The same situation frequently exists at the State level.

These structural features make it quite difficult to enact a single piece of legislation which deals with necessarily related aspects of a metric conversion program.

In addition, the conversion of the entire economy will trigger the introduction and consideration of a very large number of individual bills making the necessary statutory amendments, particularly since the single subject requirement of many State constitutions would prohibit an omnibus bill.

Thus, there is real reason to believe that the legislative process lacks the capacity to handle the number of individual bills required on a piece-by-piece basis.

Further, as noted earlier, the British experience suggests that once the general public has been exposed to the temporary inconvenience necessarily associated with the implementation of metric conversion programs, an antimetric lobby will arise, and it will become difficult to secure affirmative legislative action on subsequent specific adjustments.

Fifth, the U.S. task, with a population of 215 million, will be about 20 times as large as the Australian task.

With a change of this order of magnitude, relatively informal intergovernmental coordinating mechanisms such as those employed in Australia simply will not work.

It is true that we have voluntary intergovernmental coordinating mechanisms such as the National Conference of Weights and Measures, and the National Conference of Commissioners on Uniform State Laws.

However, the optimum implementation time of an approved metric conversion plan will be limited to 1 to 3 years in many cases; although a 10-year program is sometimes generally envisioned for the country

as a whole, actual conversions in particular sectors typically take place over a shorter period.

There is no reason to expect, based on past experience, that after one of these bodies has approved a particular legislative change related to metric conversion, essentially universal enactment of the change could or would follow within any predictable time frame, much less 1 to 3 years.

Given the nature of the foregoing problems, the narrow legal scope of the pending metric bills is remarkable. Even without legislation, the President could doubtless set up an advisory board, authorize it to create a voluntary committee structure, use the moral suasion of the Federal Government to encourage the private sector and State and local governments to convert voluntarily to the metric system, and to recommend necessary implementing legislation for piecemeal enactment.

The House-passed bill, rather than simply expressing a national policy in favor of a coordinated approach to voluntary conversion and establishing housekeeping details for the proposed Metric Board, makes no change in existing law.

It is clear that many sectors of the economy are prepared to convert to the metric system if Congress signals that such a conversion is national policy.

Thus, the mere enactment of one of the current "voluntary" measures will doubtless trigger a broad range of conversion planning, followed by attempts at actual implementation.

In debate on the House bill, Representative Symington stated that enactment of a bill would trigger "a rush of activity." Then the parties may frequently discover that they have been lured into a legislative morass where there is no structural mechanism adequate to the task of securing relatively concurrent enabling legal action by all involved legislative jurisdictions.

In this context, time is money, and it will be essential to predict well in advance the firm date on which commercial transactions in metric units will be permitted, but no such prediction will be possible.

It will also be important to learn when customary units will be prohibited. The Australians discovered that after they had secured a voluntary conversion of the sale of floor covering to a square meter basis, it was necessary to prohibit the advertising of a square-yard price by sharp operators who were deceiving customers by the apparently lower dollar price.

By the fifth clause of article I, section 8, of the Constitution of the United States, Congress is given express power to "fix the standard of weights and measures."

Under this clause, under the commerce clause, and under the necessary and proper clause, Congress unquestionably has adequate constitutional authority to create a "measurement czar" whose metric conversion directives would preempt all inconsistent State laws.

Indeed, when State constitutions prevented the merger of competing lines of railroads, the Congress in the Interstate Commerce Act preempted State corporation laws to permit the implementation of Federal merger policy. And of course, the Uniform Time Act of 1966 represents a full exercise of the Federal weights and measures preemptive power in the measurement of time, the use of daylight saving time, the location of time zone boundaries, et cetera.

In the case of the implementation of voluntary programs of metric conversion, a far less extensive use of the congressional power will be adequate.

The solution is derived from Victoria's Metric Conversion Act, 1973, a temporary act which authorized the administrative presentation to the Victoria Parliament of statutory rules changing the metric system—provided the change, if any, between the actual quantities as stated in the two systems did not exceed 12.5 percent; for example, rounding 2 pounds to 1 kilogram results in an increase of approximately 10 percent in the quantity stated.

If the measure was not vetoed by the Victoria Parliament, it operated to effect the related changes in measurement units scheduled in the measure.

This device was commended by the Australian delegates at the North American-Australia Metric Conference as a highly satisfactory mechanism with a proven history of successful application.

Submitted as appendix A to this statement is an American adaptation of the Victoria plan which is recommended for enactment by the Congress.

The procedure, if the ABA recommendation were adopted, would be as follows:

The sector committee, working under the auspices of the U.S. Metric Board, develops a specific program for coordinating conversion.

For example, the committee working on retail sales of gasoline would bring together representatives of the oil industry, labor, the National Conference of Weights and Measures, the several involved price, regulatory and taxing authorities, the affected congressional committees, and the White House.

A conversion program would be generally agreed upon involving, for example, the extension of metric sale of gasoline progressively from area to area.

Viewed in the abstract, this might pose constitutional problems for various taxing authorities, because State constitutional requirements for uniformity in taxation might be thought to preclude a cents-per-gallon tax in one area of a State and a slightly different cents-per-liter tax in the converted areas of the same State.

Accordingly, the conversion program would contemplate a statutory metric conversion plan which would provide that all cents-per-gallon price regulations and excise taxes would be converted to the nearest rounded tenth of a cent per liter quantity.

In connection with its approval of the proposed conversion program, the U.S. Metric Board would distribute the related metric conversion plan for comment, and the concurrence of the oil industry, labor, the National Conference of Weights and Measures, and the taxing and regulatory authorities, et cetera, would be made a matter of record.

Upon approval of the conversion program by the Board—the steps to this point are also contemplated by, for example, the House bill—the Board would transmit the related metric conversion plan to the Congress and to the President.

If neither a House of Congress nor the President vetoed the plan it would take effect in due course and operate to modify those legal requirements covered by the plan.

The modifications could take effect immediately, or at some later date provided in the plan.

For example, the detailed gasoline plan might provide that the tax adjustments take effect with respect to any computing pump whenever a given pump is converted to read and dispense in metric quantities.

The following are examples of changes in laws and regulations which might be made by a metric conversion plan:

"The speed shall not exceed 55 miles per hour" could become "The speed shall not exceed 90 kilometers per hour."

"The application shall set forth the acreage of the farm" could become "The application shall set forth the area of the farm."

Revisions or corrections to a metric conversion plan could be made by processing a revised plan through the same procedures.

A principal feature of the proposal is that regardless of the other burdens imposed upon Congress at the time, and regardless of the number of jurisdictional lines which are crossed by a metric conversion plan, it will be either approved or rejected within a relatively short period of time and the affected sector will be given a prompt signal as to the feasibility of proceeding with the related conversion program.

As noted earlier, in order to permit the more obvious types of rounding such as the substitution of 1 kilogram for 2 pounds, the proposal would permit—as does the Victoria model—a metric conversion plan to depart by up to 12.5 percent from the exact equivalent of the customary legal requirement.

It has been pointed out that although this limitation provides a significant degree of protection, there are certain legal provisions where a 12.5-percent change might deprive labor, or environmental, or occupational safety and similar groups of hard-won legislative gains.

The preservation of these gains is, of course, a legitimate concern of the Congress and those directly interested, and it is essential that the enabling legislation for metric conversion be carefully drafted so as not to permit its misuse or abuse for the purpose of adversely affecting such existing policy requirements.

One solution might have been to rely on the Metric Board to take such factors into consideration when exercising its discretion to develop a metric conversion plan, or, failing that, to rely on the President or Congress to reject an offending plan.

But such an approach appeared to be inconsistent with the principle, supported by the association in 1972, that metric conversion should be a voluntary activity.

When the principle is one of voluntary action, there is no place for even the possibility that the metric transition might be used as a cover for changing substantive legal requirements over the objection of any significantly affected group.

Thus the text of proposed section 11(b)(3) provides that the Metric Board is powerless to develop a metric conversion plan unless a finding can be made that the related approved program:

represents a consensus of all affected sectors of society, including, as appropriate, small business, science, engineering, labor, education, consumers, the construction industry, government agencies at the federal, state and local level, nationally recognized standards developing and coordinating organizations, metric conversion planning and coordinating groups, or such other individuals or groups as are considered appropriate by the Board to the carrying out of the purposes of this section * * *.

It is anticipated that the Board's action in making such a finding would be subject to judicial review in an appropriate proceeding, and that the limitation would therefore be an enforceable one.

In this context the term "consensus" has a special meaning which is taken from the usage in voluntary standards-making activities. I might say parenthetically the language I am about to read is derived from the charter of the American National Standards Institute, Inc. which, of course, is the old American Standards Association, and the very light bulbs we have in this room and the cord on the microphone here, are all products of the long-existing voluntary standardization operation in this country, and which carries with it a well-established gloss as to what we mean by consensus in this context.

Generally speaking, a voluntary standard is accepted when it represents a consensus of those substantially concerned with the scope and provisions of the standard.

A consensus is reached for the purpose of voluntary standards-making when substantial agreement is reached by concerned interests.

Consensus in this context implies much more than the acceptance of a simple majority, but not necessarily unanimity.

What is intended here can perhaps best be understood from a few examples.

Assume that a law requires an additional brakeman on railroad trains which exceed "3,000 feet"—0.9144 kilometer—in length.

A proposal is made by the rail industry in connection with railroad metrication that the requirement be rounded to cover trains exceeding "1.0 kilometer"—3,281 feet—in length.

If the metric conversion plan is not acceptable to the operating railway labor representatives, a consensus will not exist within the meaning of the language quoted earlier, because the brakemen are obviously affected by the change and the longer trains may pose a safety hazard.

A change to "1.0 kilometer," if desired by the industry, would have to be accomplished in the usual legislative manner independent of the Metric Act.

However, if the conversion were from "3,000 feet" to "914 meters" such a change, if generally accepted, could be made in the face of a limited amount of dissent, since the change is merely a language translation rounded to the nearest meter, and obviously would not adversely affect the safety of train operations in any material way.

In order that there can be no question on this score the committee is urged to include in its report one or more examples such as those just given so that it will be manifest that the procedures of the Metric Act for clearing the way for the implementation of voluntary plans have been so drawn that they are not susceptible of abuse.

The existing versions of the proposed metric legislation throw the users of measurement units into the metric ocean without any legal life preservers.

The American Bar Association has closely followed the development of metric conversion activity during recent years and is convinced that such a course is neither necessary nor permissible.

The structural improvements in the program for the implementation of metric conversion which are submitted today have worked well elsewhere and represent the minimum response which the Congress should take if it decides to legislate national policy on metric conversion.

Mr. Chairman, the foregoing exhausts my function as a representative of the American Bar Association.

As I indicated earlier, the balance of my testimony represents my individual views.

My first point relates to the policy provisions of the bills.

There seems to be a developing consensus that it is neither necessary nor desirable to legislate a 10-year period as a goal for U.S. conversion to the metric system as suggested in S. 100.

Taking the absence of any fixed time period as having been decided, I suggest that there results a serious gap which must be filled if Congress is to establish a meaningful policy in this area.

Thus the House bill provides in section 5 that the Metric Board is to "implement the policy set out in this Act."

Section 10 of the bill provides that the Board shall "carry out a broad program of planning * * * with the aim of implementing the policy set forth in this act * * *"

Yet in section 3(1) of the act the principal policy is declared to be "to plan and coordinate" increasing metric usage.

As H.R. 8674 has emerged from the House, the policy direction apparently given by the Congress is circular: to plan planning.

But what is the objective of this planning? When you plan you ordinarily have an objective?

The Australia Metric Act contained a definite goal of metric conversion during a 10-year period. As noted a few moments ago, S. 100 contains a similar 10-year conversion goal.

There is no quarrel with those who have concluded that a 10-year period is too inflexible. It is too long in some case and possibly too short in others.

However, the House report on on H.R. 8674 recognizes that the enactment of a metric bill is needed to "give impetus" to metrication—H. Report 94-369, page 18—and the House debates confirm this view.

The effect of the deletion of the 10-year goal without the substitution of any other standard necessarily delegates the whole problem to the Metric Board.

As a former member of the Executive Committee of the Metric System Study Advisory Panel, and as a present member of the executive committee of the American National Metric Council, I can predict that the result of the policy vacuum in the metric bill will be to set the stage for time-consuming and potentially divisive disputes as the U.S. Metric Board is organized.

Consider the practical problems which will face the U.S. Metric Board. In Australia one of the earliest sectors which converted was sports, which was almost entirely a soft or language conversion.

The Australian Post Office is converting its internal telecommunications operations which have very little direct contact with the public in measurement-sensitive areas.

The railroads, while of course not hard converting—for example, physically changing such items as the track gauge—also took part in the conversion effort.

An effort is being made to encourage real estate brokers to advertise residential and commercial real estate in metric terms.

The question of who should be encouraged to be a pacesetter was a primary issue in Australia.

Since none of these areas are directly related to international trade, we inquired what policy considerations could logically lead the Australian government to encourage metric conversion in these areas.

It turns out that the answer is quite simple. Government, like all sectors of society, looks to the long-term saving in metrication to offset the costs and trouble of the transition.

Education is one of the principal expenses of government, and the goal of Government metrication policy must be to bring about an environment where the general public no longer needs to be familiar with customary units.

When that point is reached, the teaching of customary units may be discontinued in primary and secondary education generally, with the resulting release of that time for other educational purposes.

Here in the United States there are indications that the states, which, of course, are free to make their own policy decisions in the field of education, are in a sense stealing the march on the Congress by deemphasizing and, it is reported, in some instances eliminating, the teaching of customary units.

Therefore the goal of metric board planning should be to "coordinate," in the sense that this term is used in the Metric Act, education with the rest of society.

This coordination will necessarily be accomplished by planning for a pervasive change in the language of measurement—but not necessarily the physical sizes of things, as in the gauge of a railroad—used throughout all of society so that children who complete school and enter the outside world will find themselves in a metric language environment.

The reason why the Australian Post Office is converting its internal operations is to avoid becoming a customary island in a metric ocean with all the permanent training and recruiting problems which would be incident to that status.

Sports were selected as pacesetters because it was recognized that their early conversion would be a most effective way to generate public familiarity with metric usage on a widespread basis.

So that the U.S. Metric Board may have a pole star to guide it, rather than to be left to fend for itself without adequate congressional direction, I urge the committee to consider inserting in the metric bill a finding as set forth in my prepared statement, and a statement of policy, as follows:

The Congress finds that experience in other jurisdictions which are converting or have converted to the use of the metric system indicates that an appropriate goal of national weights and measures policy is the encouragement of the progressive expansion of the use of metric measurement language in the several sectors of the economy on a voluntary basis until the teaching of customary units of weights and measures may be discontinued in primary and secondary education generally.

It is therefore declared that the policy of the United States shall be to encourage the progressive expansion of the use of metric measurement language in the several sectors of the economy on a voluntary basis until the teaching of customary units of weights and measures may be discontinued in primary and secondary education generally without material adverse effect on the general public.

I suggest that the foregoing language embodies the essence of the debate on H.R. 8674 in the House of Representatives and pins it down into legal terms.

While we are clearly not going to metricate the gage of our railroads, in the sense of hard or size conversions, most of us in this room will live to see the day, and it may come sooner than we think, when yards and feet will have become part of a special language used only by such as real estate abstractors who will employ the terms interchangeably with chains, rods, perches, poles, and meters.

My second point is a technical one relating to the application to the Metric Board of the Federal Advisory Committee Act, 5 U.S.C. App. I (1972 Supp.). I would have thought the FACA would have applied to the Metric Board and the subordinate groups authorized by the metric act, and I would have thought the reference in section 11(a) of H.R. 8674 to reimbursement of advisory committees and panels "as may be authorized by law" was a direct reference to FACA section 7(d)(1)(A).

However, H.R. 94-369 at page 19 "suggests" that a representative of the Board attend advisory committee meetings, yet FACA section 10(e) prohibits the holding of any advisory committee meeting in the absence of a properly designated officer or employee of the Federal Government. It is therefore difficult to reconcile the applicability of the FACA with the language of the House report.

I therefore urge the committee to have the staff consider the question of the applicability of the FACA to the Metric Board and clarify the matter in either the legislation or the Senate committee report.

Finally, my third point relates to the language which appears at the bottom of page 19 of the House report under the heading "Designation of Accepted Units/Symbols." I agree that it will be essential for the Metric Board during its lifetime to be the source of accepted practice in using and abbreviating symbols for physical quantities which shall be employed during and following conversion to the metric system.

However, in the absence of equivalent language in the text of the legislation, it is difficult to reconcile this statement in the House report with section 4(a) of H.R. 8674, which expressly states that the metric system for the purposes of the act is the international metric system as interpreted by the Secretary of Commerce. Hopefully either the final legislation or the Senate committee report could clarify this matter.

Senator INOUE. Thank you very much, sir. I gather from your statement that in your mind, H.R. 8674 is just an articulation of the status quo.

Mr. ZEITER. That is correct. In fact, if we had to choose the House bill, without our amendment, and no House bill at all, we would not want any bill at all because we think, from a lawyer's point of view, the bill in its present form is an exercise in general oratory policymaking. It doesn't really accomplish anything specific and may cause some very significant problems.

Senator INOUE. Are you convinced that the Executive at the present time has sufficient authority to appoint an advisory council?

Mr. ZEITER. This is happening already in the DOD. We see this in the GSA. The metric system has been legal in this country for over 100 years. The executive branch has authority to procure in the metric system if it wants to.

Senator INOUE. I agree with you. The problem you mention must be resolved whether or not we pass a bill because, obviously, the United States is moving along into the metric system, whether or not the Government takes an official position. In so doing, as you pointed out, we may be facing up to some horrendous problems. Would you suggest a separate measure addressed to that problem you described?

Mr. ZEITER. No. We are mindful of the failure of the original metric study to obtain an appropriation. As I understand it, the Department of Commerce never got an appropriation for the original 3-year metric study under Public Law 90-472. They had to reprogram funds for that study. Having observed the progress of metric legislation thus far and the difficulty there has been in getting even this attenuated type of metric legislation through the House of Representatives it is our judgment that it is now or never.

If we don't get adequate structural provisions in a metric bill now, in order to open the way to take care of this thing, it is going to be very difficult to handle metric legislation later. For example, a piece of legislation which provides that a 55-mile per hour energy speed limit becomes 90 kilometers per hour. In that context you will have the energy people on one side of the question. You have the Teamsters' Union on the other side and all sorts of things. It is our judgment that a general procedure has to be developed now before the expected anti-metric public reaction develops.

The ABA procedure is really voluntary. You cannot send something up this pipeline if a concerned party is objecting. There is one big difference between the ABA proposal and the Victoria statute. Under the Victoria statute, if the plan goes up to parliament and it is not vetoed, the plan is a law whether or not somebody objected. We have tried to draft something that is consistent with the realities of the present political situation. We have tried to draft a procedure that says a metric conversion plan doesn't go up the pipeline to the Hill unless everyone has pretty much signed off.

Senator INOUE. Who will be responsible for this determination? The board?

Mr. ZEITER. The board would have to determine on the record that there is a consensus. If it determines there is a consensus then it is free to transmit the plan to Congress and to the President. Of course, the minuscule minority that may still be objecting could bring their complaints to the attention of the Congress and the President. But as we have drafted the proposed procedure, based on the consensus principle, if anyone is really affected by a particular metric conversion plan, the Board should not send it to Congress and the President unless the Board had worked out those problems. So, we see this procedure as a way in which once genuine agreement has been reached by the people affected. The governmental problems will be cleared out of the way, more or less automatically.

Where, however, there is a policy question, as in my example on length of trains—this particular matter has been a problem in the United States over the last 20 or 30 years—it has to be handled in separate legislation because the treatment of such issues is completely outside of our proposal.

Senator INOUE. How do you respond to the statement that your proposal might violate the principle of States rights?

Mr. ZEITER. Where the State preemption is involved, there must first be a finding by the Board that the preponderance of the States or the appropriate conference of the States have agreed to it. Translated into practical terms, the ABA proposal states that if the Board is going to send up a metric conversion plan relating to highway signs, the sponsors of the plan will have to get the agreement of the U.S. Association of Highway Administrators.

If the Board is going to send up a metric conversion plan relating to local weights and measures, the sponsors of the plan will have to get the approval of the National Conference of Weights and Measures. But you see, what is important to note is that the highway administrators may give approval by a vote of, for example, 35 to 8. The provisions of our proposal are such that if a conversion plan is approved by 35 to 8, and the plan goes up through our procedure, and is not vetoed by the President and Congress, under the paramount constitutional power of the Federal Government in weights and measures, we then get uniform kilometer per hour signs all around the United States, even in the 8 States that were in the minority.

If such a procedure is regarded as an imposition on States rights, then we say that such is the absolute minimum Congress must do. Congress has done much more to tread on States rights, if you will, in other areas, particularly the area of time. I believe you were in Congress during the years when there were the debates on daylight saving time and the various related issues. What happens when Indiana is divided in half by a time zone boundary, and so forth?

Senator INOUE. How would you define consensus as used by you?

Mr. ZEITER. I have defined "consensus," in my prepared testimony. The concept is taken from the charter of the American National Standards Institute. The term means substantial agreement but not necessarily unanimity. But it must be substantial agreement as to those affected.

If you have a substantial group, such as the union representing the operating railway workers mentioned in the example in my testimony, they would have to agree to the plan or in my judgment there would not be a consensus within the special meaning that the word "consensus" has developed in the voluntary standards area. On the other hand, if you had some other labor union not directly affected by train operations, that objected, I would consider such an objection not to demonstrate a failure of consensus, because they would only be peripherally affected. But if the operating unions who were directly affected by the length of trains objected, we would not have a consensus.

Senator INOUE. How do you reach the figure of 12½ percent?

Mr. ZEITER. That is the figure in the Victoria Act. It is just enough to cover the problems of rounding, the principal of which is the pound-kilogram conversion. You have to add about 10 percent to the 2 pounds in order to get 2.2 pounds which is the 1 kilogram equivalent. This gives you enough flexibility to effect necessary rounding.

There is the same problem, of course, in highway speeds. The practice is to specify speed limits in whole multiples of 10 miles per hour or 5 miles an hour. After conversion the limits will be in units of 10 kilometers or 5 kilometers per hour, so you are going to have to have some play in the joints. But the ABA proposal provides that when you don't convert exactly you must set forth in the metric conversion plan

for the benefit of Congress exactly why you didn't make a precise conversion and your reasons therefore. Of course, the Board will say, well, we just didn't want to have 89.46 kilometers per hour unit on all our highway signs. We wanted to make it a round 90 kilometers per hour.

Senator INOUE. Are you aware of any State that is now anticipating conversion and appropriately changing its laws?

Mr. ZEITER. Of course, we know, for example, the State of Ohio has been trying out a metric highway sign program. I understand the Conference of Commissioners on Uniform State Laws is going to draft a model implementation law for the States. The conference has not yet appointed the committee but they will try to implement metric conversion at the State level.

The ABA proposal would presumably only be applicable in matters of broad gage national concern. Each State will have similar problems and presumably at some point they will want to address this in some way or another.

Senator INOUE. Then your view is that H.R. 8674 without your proposal would be less desirable than no bill?

Mr. ZEITER. That is right. For example, I understand the American Society of Civil Engineers has adopted a resolution that provides that 6 months after the enactment by Congress of a metric bill, they will change the language in their civil engineering publications from feet to meters. In their resolution they don't say what kind of bill passes. They just say a metric law. The enactment even of a so-called voluntary metric law, in the nature of the House bill, will trigger this result.

Even more, enactment of any metric bill will have, obviously, a social impact on people. And from our point of view, as those who have to deal with the legal nuts and bolts when the hard times come, when our clients are between a rock and a hard place and they want to sell gasoline by the liter but they find out it won't work because only five of these seven organizations have given the legal clearance, we just don't want that.

Senator INOUE. Then, I gather you disagree with the response of Dr. Ambler.

Mr. ZEITER. Yes. We feel we have done our homework. I leave it to the committee to conclude whether Commerce has done its homework. We think we have all the facts that the U.S. Metric Board would have 2 years from now. We think we have presented these facts to Congress and that it is going to be easier to make the decision now than 2 or 3 years from now.

Senator INOUE. Thank you. You have been most helpful.
[The statement follows:]

STATEMENT OF WILLIAM E. ZEITER ON BEHALF OF THE AMERICAN BAR ASSOCIATION

Senator Inouye and Members of the Committee: I am William E. Zeiter of Philadelphia, Pennsylvania. I deeply appreciate the opportunity afforded by your invitation to appear here today and testify on the pending metric legislation.

Although my undergraduate training was in electrical engineering, and I was employed briefly by The Bell Telephone Laboratories, Inc., my entire professional career has been devoted to the practices of law. I am a partner in the firm of Morgan, Lewis & Bockius, which is my principal professional connection.

In addition I fulfill several responsibilities in state government. I am retained as Legal Consultant to the Court Administrator of Pennsylvania and am employed as Executive Director of The Advisory Committee on Appellate Court Rules. In these connections I am a draftsman of various court rules. For a num-

ber of years, I have been Secretary and a Public Member of the Joint Committee on Documents, which is an agency of the Commonwealth of Pennsylvania responsible for the codification, printing and distribution of official rules and regulations of state agencies. In that connection, my responsibility has included the review and regulation of state agency use of units of measurement in regulations having the force and effect of law. An outgrowth of the work relating to regulations has been a project to codify for the first time the statutory law of Pennsylvania, and it has been my privilege to draft the original organic act for the project and to prepare drafts of a number of titles of the new Pennsylvania Consolidated Statutes.

I am a member of the Ad Hoc Energy Panel in the Office of Technology Assessment of the United States Congress.

I was appointed in July, 1969, as a member of the U.S. Metric System Study Advisory Panel established in the Department of Commerce under Public Law 90-472. In addition to serving on the Executive Committee of the Panel, I accompanied Dr. Daniel V. DeSimone, then Director of the U.S. Metric Study, and Mr. Louis F. Polk, Chairman of the Metric System Study Advisory Panel, to the United Kingdom in October, 1970, to observe first-hand the ongoing British conversion. On that occasion, we were privileged to meet and interrogate members of government responsible for metric policy, as well as officials of the Metrication Board, Decimal Currency Board, Confederation of British Industry and British Standards Institution.

In April and May of this year, at the invitation of the Australian Government, I was one of the U.S. delegates to the North American-Australian Metric Conference, which involved a detailed examination by Canadian and U.S. representatives of the methodology and current status of the Australian conversion effort. The conference was held in Sydney, Canberra and Melbourne and was supplemented by a trip to Auckland, New Zealand for a briefing by the New Zealand Metric Advisory Board. A National Science Foundation report on the conference was prepared by the participants and I authored the sections of the report on "Legislation and the Role of Government" and "Legal Considerations".

As the Committee may know, pending the creation of the U.S. Metric Board a nonprofit body known as the American National Metric Council has been functioning as the principal metric conversion coordinating body in the United States. I am a Vice Chairman of ANMC, serving as a member of the Executive Committee of its Board of Directors and as Chairman of its Procedures Committee.

From time to time I have given talks on the legal aspects of metrication, including an appearance in October 1973, before a forum sponsored by the World Trade Institute in New York City, and a similar appearance earlier in Chicago.

In August 1968, the Section of Corporation, Banking and Business Law of the American Bar Association established a Committee on Metric System in Commercial Transactions, which has operated under my chairmanship since its establishment. In March 1973 I testified on behalf of the ABA on the metric question before a subcommittee of the House Committee on Science and Astronautics. I am also currently Vice Chairman of the ABA Section of Science and Technology.

Lawrence E. Walsh, President of the American Bar Association, has very graciously authorized me to present to you the position of the ABA on the metric question. With that limited exception, however, I am appearing here today as an individual and my views should not necessarily be attributed to anyone other than myself.

The American Bar Association is the world's largest voluntary professional organization, composed of approximately 170,000 members of the legal profession. Through its House of Delegates, the Association speaks for the organized bar on the issues of interest and concern to lawyers.

A. Background. The metric bill which passed the House (H.R. 8674) and the Administration bill (S. 1882) are drawn on the assumption that U.S. metric conversion activity will be voluntary, not mandatory. At its August 1972 Annual Meeting in San Francisco, the ABA House of Delegates endorsed the principal of a voluntary transition, and the Association continues to support the concept of a voluntary conversion effort, assuming that the Congress determines that legislation in this area is appropriate.

As a result of information obtained in the intervening three years, particularly a comparison of the problems in the United Kingdom with the successes in Australia, the ABA House of Delegates at its August 1975 Annual Meeting in

Montreal, called on Congress to face up now, and not later, to the significant legal problems which will be created by legislation encouraging increasing use of metric measurement units. In this connection the Association offers a concrete suggestion for inclusion in the metric bill.

The text of the resolution of the House of Delegates adopted in August at Montreal is as follows:

"Resolved, that if the Congress of the United States decides that it is in the interest of our country to change to the metric system on a coordinated basis, the American Bar Association urges the enactment by the Congress of temporary legislation in substantially the form set forth in the accompanying report, exercising the Federal power over weights and measures so as to provide an effective structural mechanism for converting customary units to metric units in statutes, regulations and other laws at all levels of government on a coordinated and timely basis in response to voluntary conversion programs adopted and implemented by various sectors of society under the auspices and with the approval of the proposed United States Metric Board or similar agency."

The ABA recommendation, it should be noted, does not relate to the metric question generally, nor to its controversial offshoots such as demands for subsidies for worker's tools, special relief for small businessmen, etc. Rather it focuses on and corrects the widely held misconception that the structural mechanisms for handling the legal aspects of voluntary metric conversion which are appropriate to parliamentary countries with relatively few competing legislative authorities will be adequate to handle the implementation of voluntary conversion programs in the United States. The special contribution which the Association is able to make in this context is to identify the peculiarities of the American situation and to suggest a relatively simple, yet practical and effective, temporary structural mechanism for insuring that government is a part of the solution to the tasks of metric conversion, rather than being a part of the problem.

B. Analysis of the Problem. The voluntary approach to metrication on a coordinated basis contemplates that the Metric Board will set up a limited number of coordinating committees covering broad areas of the economy. Under each coordinating committee would be a number of sector committees, each concerned with the development of a metrication program for a particular sector of the economy. Smaller task forces or working groups could be arranged as required. Except for a limited amount of staff support, all of the committees, task forces, working groups, etc. would be composed of unpaid volunteers who are knowledgeable in and leaders of the various areas of the economy involved. Such a structure has already been established by the American National Metric Council, a nonprofit body set up by the American National Standards Institute.

A sector committee would develop a timetable for metric conversion in its assigned area, and obtain a consensus of affected suppliers, consumers, labor and related regulatory authorities of the product or service involved. The resulting conversion program would be reported to successively higher levels in the hierarchy for checking with the timetable of related industries (e.g., if the paint-makers are going to convert from gallons and pounds to liters and kilograms, will the change in labeling affect the transportation industry where its tariff charges may be expressed in and depend upon shipping documents expressed in gallons or pounds), and ultimately would be approved by the Metric Board. After Metric Board approval the individual companies in the affected sector (and the related regulatory authorities) would voluntarily implement the conversion program along the contemplated timetable.

However, significant governmental participation will be inevitable in the implementation of almost every conversion plan.

Consider, as a hypothetical example, the conversion of retail gasoline sales from gallons to liters (to avoid the risk of a diversion into the problems of a specific industry the following example has been developed without any attempt to conform to the facts of the actual case, but the illustration nevertheless gives a fair insight into the general nature of the problem of governmental coordination).

Assume that state and local weights and measures laws require retail sales in gallons or fractions thereof; that the tankwagon price of gasoline is controlled in part by the Federal Energy Administration; that the retail markup by the dealer is controlled in part by a local agency (local rent control still exists in New York City and other areas and (in addition to widespread public utility regulation) forms of local price control are not unknown throughout the United

States on selected commodities) ; that Federal, state and local taxes are imposed upon the gasoline at the point of sale ; that the computing pumps can be set to register total price (including tax) in only cents per 0.1 unit (gallon or liter) ; and that the industry is prepared to convert the measuring mechanism in the pumps from gallons to liters, but wishes to avoid the considerable additional expense of rebuilding the price computing portions of all our gasoline pumps.

As the foregoing hypothetical example indicates, a successful conversion program would require at least the following governmental action, all of which would have to occur prior to the conversion of any given pump (and in a number of instances, simultaneously with the conversion) :

- (1) State and/or local approval of gasoline sales by the liter.
- (2) Rounding of the Federal gasoline tax to the nearest metric equivalent rate.
- (3) Rounding the State gasoline tax to the nearest metric equivalent rate.
- (4) Rounding the local gasoline tax to the nearest metric equivalent rate.
- (5) Rounding the FEA tankwagon price to the nearest metric equivalent rate.
- (6) Rounding the local regulated price markup to the nearest metric equivalent rate.

Other illustrations could be developed in such obvious areas as building and safety codes, transportation tariffs and other public utility rates, customs tariffs, tax and other reporting to governmental agencies, etc. The point is that government by its nature cannot be neutral, and in many instances so-called "voluntary" conversion cannot occur until there has been significant governmental action. Also, once the requisite government action has taken place the new metric practices often may be effectively mandated because it would be entirely impractical to continue to operate thereafter with customary units. (In our example above, the weights and measures law might be amended to permit sales in either gallons or liters as an option, but once the taxes are amended to round out in metric quantities, our hypothetical pump will not be able to compute the correct price of "gallon" sales, thereby effectively prohibiting the continued sale of gasoline by the gallon.)

The widespread tacit assumption in Congress is that the methods utilized in other countries for effectively resolving these transitional legal problems will be adequate in the United States. This assumption is at odds with the facts.

C. Limited Relevance of Experience Elsewhere. The actual situation in the other major English-speaking countries indicates that their experience forms no basis for the assumption that present or contemplated mechanism for coordinating Federal, state and local metric actions will be adequate to the task in the United States.

Australia. Australia, with a population of approximately 13,000,000 is divided into six states and a territory subject to Federal authority. In addition, all seven sovereignties are organized on the Westminster or parliamentary system, which implies that the executive and the lower house of parliament are almost always under a common control. The 1975 North America-Australia Metric Conference revealed that there were significant problems of coordination in Australia, particularly in building construction, transportation and education, but that ultimately it was possible to resolve these problems by bringing representatives of the seven governments to a common conference table, after which they returned home to secure the necessary implementing legislation, which their control of the several parliaments made possible. In a number of instances the supersession of inconsistent local by-laws and ordinances was necessary and was accomplished by state government action.

New Zealand. New Zealand, with a population of approximately 3,000,000, is a single legislative jurisdiction, organized on the Westminster system with a single House of Representatives. The government of the day simply let it be known that conversion to the metric system was part of its program, and periodically enacted necessary enabling legislation when and as recommended by the New Zealand Metric Advisory Board.

United Kingdom. The United Kingdom, with a population of approximately 54,000,000 is (except for Northern Ireland under certain conditions) a single legislative jurisdiction, and, of course, is organized on the Westminster system. Decimal currency conversion was effected by the enactment by Parliament of a comprehensive advance program with adequate statutory powers for the conversion of monetary amounts. When "D Day" came and the general public reacted (as it always does) adversely to the new practices, no further legislation was required of Parliament and the transition was made quickly and with little difficulty.

Unfortunately, in the case of conversion of weights and measures to metric units Parliament procrastinated after the 1965 commencement of the transition (which began, as in the United States, in the industrial sector in response to international considerations) and did not begin to consider actual legislation until the 1970's. By that time the cumulative effects of the decimal currency change and entry into the Common Market had combined with the natural adverse reaction toward all change to make the support of any metric enabling legislation a very risky and politically unrewarding position. In consequence the United Kingdom transition has lost a great deal of momentum and the British people find themselves in the costly and unsatisfactory position of being partially converted, with all the problems attendant to that status.

Canada. Canada, with a population of about 22,000,000 is divided into 13 legislative jurisdictions, all of which are organized on the Westminster system. As Canada has just moved into the actual implementation phase of metric conversion (with the conversion of weather reporting of temperatures from Fahrenheit to Celsius on April 1, 1975) it is too early to draw definitive conclusions from the Canadian experience. However, in Canada weights and measures matters are within the constitutional scope of the Federal Government, and it is understood that the Federal Department of Consumer and Corporate Affairs, in which is lodged the weights and measures function, anticipates that a preemptive exercise of this Federal power will be required in order to implement effectively many aspects of the Canadian program.

D. Structural Problems Faced in the United States. As alluded to earlier, the United States exhibits a number of structural characteristics which do not exist in the other countries mentioned above. Principal among these are the following:

(1) *Number of legislative jurisdictions.* In the United States we have at least 55 legislation jurisdictions, i.e. Federal, 50 states, District of Columbia, Puerto Rico, the Virgin Islands and Guam.

(2) *Diffusion of State Legislative Authority.* In a number of states the state legislature is incompetent to deal with various subjects which are committed by local law to other legislative bodies. Chief among these are the home rule powers of municipalities which by state constitutional provisions may not be invaded by action of the state legislature. In some states (e.g. Pennsylvania) a significant part of the law making power relating to the judiciary has been vested in a body within the judicial system. Thus, for example, if a state wished to permit the use of a new metric-sized sheet of paper for the filing of documents, etc., there is no one governmental body which is competent to take responsible action in the matter.

(3) *Existence of Presidential system.* At almost all levels the problem is further compounded by the possibility that the executive branch and the legislative authority are not under common control. Indeed, even where both branches are nominally under the control of the same party, the relatively weak status of the party connection frequently results in serious lack of coordination between actions in the two branches.

(4) *Legislative committee jurisdictions.* Another consequence of the Presidential system is the relatively independent status and jurisdiction of legislative committees. For example, although the metric question generally is within the jurisdiction of the Senate Committee on Commerce, changes in Federal gasoline excise taxes and customs tariffs are within the jurisdiction of the Senate Finance Committee. The same situation frequently exists at the state level. These structural features make it quite difficult to enact a single piece of legislation which deals with necessarily related aspects of a metric conversion program. In addition, the conversion of the entire economy will trigger the introduction and consideration of a very large number of individual bills making the necessary statutory amendments, (particularly since the single subject requirement of many state constitutions would prohibit an omnibus bill). Thus there is real reason to believe that the legislative process lacks the capacity to handle the number of individual bills required on a piece-by-piece basis. Further, as noted earlier, the British experience suggests that once the general public has been exposed to the temporary inconvenience necessarily associated with the implementation of metric conversion programs an antimetric lobby will arise, and it will become difficult to secure affirmative legislative action on subsequent specific adjustments.

(5) *Relative huge size of the country.* The successful conversions in Australia and New Zealand are comparable to converting a single medium-sized U.S. state or a large city. To this task both countries applied a relatively large volun-

teer structure with full governmental backing. The United States task, with a population of about 215,000,000, will be about 20 times as large as the Australian task. With a change of this order of magnitude, relatively informal inter-governmental coordinating mechanisms such as those employed in Australia simply will not work. It is true that we have voluntary intergovernmental coordinating mechanisms such as the National Conference of Weights and Measures and the National Conference of Commissioners on Uniform State Laws. However, the optimum implementation time of an approved metric conversion plan will be limited to one to three years in many cases (although a ten-year program is sometimes generally envisioned for the country as a whole, actual conversions in particular sectors typically take place over a shorter period). There is no reason to expect, based on past experience, that after one of these bodies has approved a particular legislative change related to metric conversion, essentially universal enactment of the change could or would follow within any predictable time frame, much less one to three years.

E. Inadequate Response of Pending Legislation. Given the nature of the foregoing problems the narrow legal scope of the pending metric bills is remarkable. Even without legislation the President could doubtless set up an advisory board, authorize it to create a voluntary committee structure, use the moral suasion of the Federal government to encourage the private sector and state and local governments to convert voluntarily to the metric system, and to recommend necessary implementing legislation for piecemeal enactment. The House-passed bill (H.R. 8674), other than simply expressing a national policy in favor of a coordinated approach to voluntary conversion (which would launch the Federal judiciary upon the preemption seas with only the slightest hint as to the proper course) and establishing housekeeping details for the proposed Metric Board, makes *no change* in existing law.

It is clear that many sectors of the economy are prepared to convert to the metric system if Congress signals that such a conversion is national policy. Thus the mere enactment of one of the current "voluntary" measures will doubtless trigger a broad range of conversion planning, followed by attempts at actual implementation. (For example, we understand that the American Society of Civil Engineers has provided for the automatic elimination of any use of customary units in its publication "six months after the . . . enactment of [a] federal metrication law.") In debate on H.R. 8674 Representative Symington stated that enactment of a bill would trigger "a rush of activity" (Cong. Rec. Daily ed. p. H8385). Then the parties may frequently discover that they have been lured into a legislative morass, where there is no structural mechanism adequate to the task of securing relatively concurrent enabling legal action by all involved legislative jurisdictions. In this context time is money, and it will be essential to predict well in advance the firm date on which commercial transactions in metric units will be permitted,¹ but no such prediction will be possible. (It will also be important to learn when customary units will be prohibited. The Australians discovered that after they had secured a voluntary conversion of the sale of floor covering to a square meter basis, it was necessary to prohibit the advertising of a square yard price by sharp operators, who were deceiving customers by the apparently lower dollar prices.)

F. Recommendation by the Association. By the fifth clause of Article I, § 8 of the Constitution of the United States Congress is given express power to "fix the standard of weights and measures." Under this clause, under the commerce clause and under the necessary and proper clause, Congress unquestionably has adequate constitutional authority to create a "measurement czar" whose metric conversion directives would preempt all inconsistent state laws. Indeed, when state constitutions prevented the merger of competing lines of railroads the Congress in the Interstate Commerce Act² preempted state corporation laws to permit the implementation of Federal merger policy. And, of course, the Uniform Time Act of 1966³ represents a full exercise of the Federal weights and measures preemptive power in the measurement of time, the use of daylight saving time, the location of time zone boundaries, etc.

In the case of the implementation of voluntary programs of metric conversion a far less extensive use of the Congressional power will be adequate. The solution

¹ The Act of July 28, 1866, Ch. 301, 14 Stat. 339, now R.S. Sections 3569, 3570, 15 U.S.C. §§ 204, 205, has been interpreted to permit a state to require that trade be conducted in customary units. E.g. butter by the pound, milk by the quart, etc.

² Interstate Commerce Act, § 5(11), 49 U.S.C. § 5(11).

³ 80 Stat. 107, 15 U.S.C. § 260 et seq.

is derived from Victoria's Metric Conversion Act, 1973,⁴ a temporary act which authorized the administrative presentation to the Victoria Parliament of statutory rules changing customary measures in any law of a quantity expressed in the metric system (provided the change, if any, between the actual quantities as stated in the two systems did not exceed 12.5% ; for example, rounding 2 pounds to 1 kilogram results in an increase of approximately 10% in the quantity stated). If the measure was not vetoed by the Victoria Parliament it operated to effect the related changes in measurements units scheduled in the measure. This device was commended by the Australian delegates at the North American-Australia Metric Conference as a highly satisfactory mechanism with a proven history of successful application.

Submitted as Appendix A to this statement is an American adaptation of the Victoria plan which is recommended by the Association for enactment by the Congress. The procedure, if the ABA recommendation were adopted, would be as follows:

The sector committee, working under the auspices of the U.S. Metric Board, develops a specific program for coordinating conversion. For example, the committee working on retail sales of gasoline would bring together representatives of the oil industry, labor, the National Conference of Weights and Measures, the several involved price, regulatory and taxing authorities, the affected Congressional Committees, and the White House.

A conversion program would be generally agreed upon, involving, for example, the extension of metric sale of gasoline progressively from area to area. Viewed in the abstract, this might pose constitutional problems for various taxing authorities, because state constitutional requirements for uniformity in taxation might be thought to preclude a cents per gallon tax in one area of a state and a slightly different cents per liter tax in the converted areas of the same state. Accordingly the conversion program would contemplate a statutory "metric conversion plan" which would provide that all cents per gallon price regulations and excise taxes would be converted to the nearest rounded tenth of a cent per liter quantity.

In connection with its approval of the proposed conversion program, the U.S. Metric Board would distribute the related metric conversion plan for comment, and the concurrence of the oil industry, labor, the National Conference of Weights and Measures, and the taxing and regulatory authorities, etc. would be made a matter of record.

Upon approval of the conversion program by the Board (the steps to this point are also contemplated by, for example, H.R. 8674) the Board would transmit the related metric conversion plan to the Congress and to the President.

If neither a house of Congress nor the President vetoed the plan, it would take effect in due course and operate to modify those legal requirements covered by the plan.⁵ The modifications could take effect immediately, or at some later date provided in the plan. For example, the retail gasoline plan might provide that the tax adjustments take effect with respect to any computing pump whenever a given pump is converted to read and dispense in metric quantities.

The following are examples of changes in laws and regulations which might be made by a metric conversion plan:

"The price shall not exceed 60.1 cents per gallon" could become "The price shall not exceed 15.9 cents per liter".

"The speed shall not exceed 55 miles per hours" could become "The speed shall not exceed 90 km/h".

"The application shall set forth the acreage of the farm" could become "The application shall set forth the area of the farm".

"No pipe shall have a diameter of less than 4 inches" could become "No pipe shall have a diameter of less than 10 centimeters".

"The specimen shall be subjected to a temperature of 400° F" could become "The specimen shall be subjected to a temperature of 200° Celsius".

Revisions or corrections to a metric conversion plan could be made by processing a revised plan through the same procedures.

A built-in safety feature of the proposed structural mechanism is that it is only available after all affected private and governmental interests have arrived at a consensus. Another principal feature is that regardless of the other burdens

⁴ 22 Eliz. 2, Ch. 8423 (1973) (See Appendix B to this statement).

⁵ See, e.g., 5 U.S.C. §§ 901 et seq., 80 Stat. 394 (executive reorganization plans); 31 U.S.C. §§ 1401 et seq., 88 Stat. 333 (budget impoundment messages); 45 U.S.C. § 718, 87 Stat. 999 (railroad system plans). A comprehensive list of such provisions is collected at pp. 753-819 of *Jefferson's Manual* (H. Doc. No. 416, 93rd Cong. 2d Sess. 1975).

imposed upon Congress at the time, and regardless of the number of jurisdictional lines which are crossed by a metric conversion plan, it will be either approved or rejected within a relatively short period of time and the affected sector will be given a prompt signal as to the feasibility of proceeding with the related conversion program.

It is anticipated that each plan ordinarily would contain "boiler plate" containing authority permitting a state legislative body to make subsequent changes in the revised metric quantities, as long as such revisions were expressed in metric terms.

Unless otherwise provided by Congress, the legal effect of all metric conversion plans would expire when the U.S. Metric Board ceases to exist (except that those changes which had become a part of the codified law would, of course, continue in effect), because by then the various measurement quantities would be so effectively built into the fabric of the economy that there would be no need for reference to a plan which is essentially transitional in nature.

G. Significance of the consensus requirements. As noted earlier, in order to permit the more obvious types of rounding, such as the substitution of 1.0 kilogram for 2 pounds, the proposal would permit (as does the Victoria model) a metric conversion plan to depart by up to 12.5% from the exact equivalent of the customary legal requirement.

It has been pointed out that although this limitation provides a significant degree of protection, there are certain legal provisions where a 12.5% change might deprive labor, or environmental, or occupational safety and similar groups of hard-won legislative gains. The preservation of these gains is, of course, a legitimate concern of the Congress and those directly interested, and it is essential that the enabling legislation for metric conversion be carefully drafted so as not to permit its misuse or abuse for the purpose of adversely affecting such existing policy requirements.

One solution might have been to rely on the Metric Board to take such factors into consideration when exercising its discretion to develop a metric conversion plan, or failing that, to rely on the President or Congress to reject an offending plan. But such an approach appeared to be inconsistent with the principle, supported by the Association in 1972, that metric conversion should be a voluntary activity. When the principle is one of voluntary action, there is no place for even the possibility that the metric transition might be used as a cover for changing substantive legal requirements over the objection of any significantly affected group.

Thus the text of proposed Section 11.1(b) (3) provides that the Metric Board is powerless to develop a metric conversion plan unless a finding can be made the related approved program: represents a consensus of all affected sectors of society, including, as appropriate, small business, science, engineering, labor, education, consumers, the construction industry, government agencies at the Federal, State and local level, nationally recognized standards developing and coordinating organizations, metric conversion planning and coordinating groups, or such other individuals or groups as are considered appropriate by the Board to the carrying out of the purposes of this section. . . ."

It is anticipated that the Board's action in making such a finding would be subject to judicial review in an appropriate proceeding, and that the limitation would therefore be an enforceable one.

In this context the term "consensus" has a special meaning, which is taken from the usage in voluntary standards-making activities. Generally speaking a voluntary standard is accepted when it represents a consensus of those substantially concerned with the scope and provisions of the standard. A consensus is reached for the purposes of voluntary standards-making when substantial agreement is reached by concerned interests. Consensus in this context implies much more than the acceptance of a simple majority, but not necessarily unanimity. What is intended here can perhaps best be understood from a few examples.

Assume that a law requires an additional brakeman or railroad trains which exceed "3000 feet" (0.9144 km) in length. A proposal is made by the rail industry in connection with railroad metrication that the requirement be rounded to cover trains exceeding "1.0 km" (3,281 feet) in length. If the metric conversion plan is not acceptable to the operating railway labor representatives, a consensus will not exist within the meaning of the language quoted earlier, because the brakemen are obviously affected by the change and the longer trains may pose a safety hazard. A change to "1.0 km", if desired by the industry, would have to be accomplished in the usual legislative manner independent of the metric act.

However, if the conversion were from "3000 feet" to "914 meters" such a change, if generally accepted, could be made in the face of a limited amount of dissent, since the change is merely a language translation rounded to the nearest meter, and obviously would not adversely affect the safety of train operations in any material way.

In order that there can be no question on this score, the Committee is urged to include in its report one or more examples such as those just given, so that it will be manifest that the procedures of the metric act for clearing the way for the implementation of voluntary plans have been so drawn that they are not susceptible of abuse.

H. *Conclusion.* The existing versions of the proposed metric legislation throw the users of measurement units into the metric ocean without any legal life preservers. The American Bar Association has closely followed the development of metric conversion activity during recent years and is convinced that such a course is neither necessary nor permissible. The structural improvements in the program for the implementation of metric conversion which are submitted today have worked well elsewhere and represent the minimum response which the Congress should take if it decides to legislate a national policy on metric conversion.

APPENDIX A

TEXT OF PROPOSED LEGISLATION

Section 11. (a) The Board is hereby authorized to monitor the effect of Federal and State activities and requirements upon the implementation of specific programs for coordinating conversion developed under the auspices of and approved by the Board.

(b) Whenever the Board finds, after notice in the Federal Register and consultation with affected sectors of society, that—

(1) the specification by any law of the United States, or of any State or possession, of a quantity in customary units is inconsistent with an approved program or that a reference in any law of the United States, or of any State or possession, to a customary unit without any numerical statement associated with that unit, is inconsistent with an approved program; and

(2) such specification or reference materially interferes with the due implementation on a voluntary basis of such approved program; and

(3) such approved program represents a consensus of all affected sectors of society, including, as appropriate, small business, science, engineering, labor, education, consumers, the construction industry, government agencies at the Federal, State and local level, nationally recognized standards developing and coordinating organizations, metric conversion planning and coordinating groups, or such other individuals or groups as are considered appropriate by the Board to the carrying out of the purposes of this section; and

(4) in the case of a specification or reference by any State, the failure of such jurisdiction to take specific conversion action is inconsistent with the applicable program agreed upon, implemented or to be implemented, by affected States generally;

the Board may develop a metric conversion plan which incorporates all or any part of the approved program, which shall identify the law or laws affected and shall set forth a quantity or quantities expressed in units of the metric system of measurement which shall be substituted for the customary quantity or quantities as contemplated by the related approved program or a reference consistent with the metric system of measurement which shall be substituted for the reference to a customary unit. No metric quantity set forth in a metric conversion plan under this section shall differ from the corresponding customary quantity by more than 12.5%. If a metric quantity is not the exact equivalent of a customary quantity because of rounding or otherwise the plan shall set forth the amount of the adjustment and the reasons therefor.

(c) Upon the development by the Board of a metric conversion plan, the Board shall transmit the plan to the President and the Congress. The plan shall be delivered to both Houses of Congress on the same day and shall be approved at the end of the first period of sixty calendar days that the Congress is in session after the date on which the plan is transmitted to it and to the President unless between the date of transmittal and the end of the sixty-day period, either House passes a resolution stating in substance that it does not favor the plan or the President disapproves the plan and gives his reasons therefor.

(d) Upon the approval of a metric conversion plan, or on any later date specified therein, or by the Board pursuant thereto, the plan shall become effective and the metric quantities or the references consistent with the metric system of measurement, or both, specified therein shall insofar as provided in the plan be deemed to be substituted for the related customary quantities and references. All such approved plans shall expire when the Board shall cease to exist unless the Congress, by law, shall determine otherwise; provided that such expiration shall not affect any law of the United States directly amended pursuant to subsection (f).

(e) An approved metric conversion plan may be amended by the same procedure as is provided in this section for the development and approval of an original plan.

(f) Where a law of the United States, other than a provision of the United States Code which has been enacted as positive law, is modified by an approved metric conversion plan, the law so modified shall be regarded as directly amended for purposes of publication of the United States Code or any other official legal codification published by or on behalf of the United States.

APPENDIX B

1973

VICTORIA.



ANNO VICESIMO SECUNDO

ELIZABETHÆ SECUNDÆ REGINÆ

No. 8423.

An Act to facilitate the Conversion to the Metric System
of Measurement of certain References to Physical
Quantities.

[17th April, 1973.]

BE it enacted by the Queen's Most Excellent Majesty by and
with the advice and consent of the Legislative Council and the
Legislative Assembly of Victoria in this present Parliament
assembled and by the authority of the same as follows (that is
to say) :—

1. This Act may be cited as the *Metric Conversion Act 1973*. Short title.

2. In this Act unless inconsistent with the context or interpretation.
subject-matter—

“Metric system of measurement” means measurement in
terms of units for the time being authorized pursuant
to the *Weights and Measures (National Standards) Act*
1960 of the Commonwealth (as from time to time
amended) and—

- (a) comprised in the International System of Units
for the time being approved by the General
Conference on Weights and Measures ;
- (b) decimally related to those units and for the time
being so approved ; and

(c) such

3792/73.—PRICE 10 cents.

- (c) such other units as are declared, from time to time as prescribed in the *Metric Conversion Act 1970* of the Commonwealth (as from time to time amended) to be within the metric system.

"Physical quantity."

"Physical quantity" includes—

(a) a quantity stated in terms of—

- (i) two or more physical quantities referred to in association with each other ; or
- (ii) one or more physical quantities referred to in association with a stated amount of money ; and

(b) a quantity expressed in terms of gauge, mesh or size in a context which implies a statement of a physical quantity.

Substitution of reference to reference in the metric system of measurement.

3. (1) Where in any Act there is a reference to a physical quantity expressed in a system other than the metric system of measurement, the Governor in Council, notwithstanding anything to the contrary in any other Act or law, but subject to this Act, may by regulation amend the Act by substituting for any such reference a reference to a physical quantity expressed in the metric system of measurement.

(2) The difference in measurement between the physical quantity expressed in the metric system pursuant to sub-section (1) and the physical quantity not expressed in the metric system, which it replaces, shall not exceed—

- (a) in a case where the physical quantity measured is temperature—one degree Celsius ; and
- (b) in a case other than a case referred to in paragraph (a)—12.5 parts per centum of the physical quantity which is not expressed in the metric system.

(3) Where in any Act referred to in sub-section (1) there is a reference to a unit of a physical quantity expressed in a system of measurement other than the metric system of measurement but without any numerical statement associated with that unit, the Governor in Council, notwithstanding anything to the contrary in any Act or law, but subject to this Act, may by regulation amend the Act by substituting for that unit a reference to an appropriate unit of a physical quantity expressed in the metric system of measurement.

Regulation to be a statutory rule.

(4) A regulation made pursuant to this Act shall be a statutory rule for the purposes of the *Subordinate Legislation Act 1962*.

Disallowance by Parliament.

(5) Parliament may disallow such statutory rule or any amendment to any such statutory rule, whether or not it has been adversely reported on by the Subordinate Legislation Committee.

(6) The

(6) The several provisions of any such statutory rule which are not brought into operation on a day or the respective days stated in the statutory rule may be brought into operation on a day or the respective days to be fixed by proclamation of the Governor in Council published in the *Government Gazette*, and different amendments appearing in a statutory rule may be brought into operation on different days whether or not the amendments are amendments to the same Act.

Amendments may come into operation on different days.

(7) Where an amendment to an Act made pursuant to the foregoing provisions of this section is not disallowed by Parliament, the Act so amended shall be regarded as directly amended, and the provisions of the *Amendments Incorporation Act 1958* shall apply to that Act accordingly.

Application of Act No. 6422.

4. Where in a regulation made pursuant to this Act a reference is substituted as permitted by sub-section (1) of section 3, the reference which substitutes that reference may differ in form or style from the reference it replaces so long as the difference in measurement is within the limits laid down by sub-section (2) of section 3.

Substituted references may differ in form &c.

5. Where by or under any Act a maximum, minimum or standard measurement is prescribed by means of a reference to a physical quantity expressed in a system of measurement other than the metric system of measurement, then, anything lawfully done or omitted to be done, in compliance with that maximum, minimum or standard measurement shall not cease to be lawful by reason only of the substitution for that physical quantity of a physical quantity expressed in the metric system of measurement within the limits laid down in sub-section (2) of section 3.

Lawful acts not to be unlawful because of conversion to metric system.

6. (1) This Act shall remain in force until the 1st day of July, 1974.

Expiry of Act.

(2) The expiry of this Act shall not affect the previous operation thereof or the validity of any action taken thereunder.

MELBOURNE :

By Authority : C. H. RIXON, Government Printer.

Senator INOUE. Our next witness is Mr. William McLean, vice chairman of the metric commission, Engineers Joint Council of New York City. Welcome to the committee, sir.

STATEMENT OF WILLIAM McLEAN, VICE CHAIRMAN, METRIC COMMISSION, ENGINEERS JOINT COUNCIL, NEW YORK, N.Y.

Mr. McLEAN. I am speaking on behalf of Mr. Oldshue. He could not be here.

I am speaking on behalf of Engineers Joint Council, a federation of 38 engineering societies representing the viewpoints of approximately one-half million engineers in the United States.

We believe that conversion to the metric system will be in the best interest of the United States now and in the years to come. The metric system is simple and facilitates communications between all countries of the world. It is also easier for students of all ages and abilities to learn.

We believe that the best system of metric units is the international system of units, which is more commonly known as SI. We further believe that SI should be formally adopted by the United States. To this end, the board of directors of Engineers Joint Council, in an action taken on November 14, 1974, approved the following resolution.

That the Board of Directors of Engineers Joint Council endorse the adoption of a single system of measurement in the United States, and that System shall be the International System of units commonly known as SI, as described by the resolutions of the General Conference of Weights and Measures.

In general, we believe that the cost of conversion to the metric system can be minimized by a planned program. As the volume of machinery and products made to U.S. standards falls, and the volume of machinery and equipment made to metric standards rises, the total cost of products and machinery purchased in the United States should be planned to rise only to the minimum possible level during the conversion period, and thereafter should fall to the lowest possible level when full conversion to metric units has taken place.

It is our belief that engineers are in a unique position to evaluate methods so as to assure minimum cost during the transition period to switch from rational conventional sizes of products to rational metric sizes.

We think that a metric conversion board, generally as spelled out in the several bills, would be a sensible method of planning.

We would like to offer our services to nominate outstanding engineers who we feel could best serve on this activity. Membership in Engineers Joint Council is restricted to societies which are primarily composed of individual engineers. When the Metric Conversion Board is selected, we feel that some of the members should be chosen to represent the engineering community from individual member-oriented groups, represented, in the main, by the Engineers Joint Council.

We believe that engineers will use SI in engineering design and communication. It is not important, in our opinion, that the general public use every one of these units in their everyday life.

On the other hand, we would urge that both Federal and other municipal governing bodies use SI units in their requisition and pur-

chasing functions which, in our opinion, will insure the utmost accuracy in technical and financial specifications and installations.

That is all, Mr. Chairman.

Senator INOUE. Thank you very much. Have you studied the measure that passed the House, H. 8674?

Mr. McLEAN. I have; yes.

Senator INOUE. Are you in favor of the bill as passed by the House?

Mr. McLEAN. We feel this covers what we said.

Senator INOUE. You heard the statement by the American Bar Association. Do you have any thoughts on that, sir?

Mr. McLEAN. I don't want to tangle with the legal profession, but I think that what we do now in a voluntary way is taking care of a great many of the problems, and I really don't anticipate quite the trouble that the ABA does.

Senator INOUE. Well, I appreciate your participation this morning, sir. And we will do our best to carry it out. Thank you.

Our next witness is Mr. Adrian Weaver, director of standards practices, IBM Corp., New York, who will be testifying on behalf of the American National Metric Council.

Welcome, Mr. Weaver.

TESTIMONY OF ADRIAN WEAVER, DIRECTOR OF STANDARDS PRACTICES, IBM CORP., NEW YORK, ON BEHALF OF AMERICAN NATIONAL METRIC COUNCIL; ACCOMPANIED BY SAM DANIELS, PROGRAMS DIRECTOR; AND LOUIS PERICA, DIRECTOR OF INFORMATION SERVICES

Mr. WEAVER. Thank you, Mr. Chairman, for the privilege to appear before you today.

My name is Adrian Weaver. I am director of standards practices for the IBM Corp., and also chairman of the board of the National Metric Council.

Accompanying me today is Mr. Sam Daniels on the right and Mr. Louis Perica, director of services for the National Metric Council.

The American National Metric Council is a nonprofit organization established in May of 1973 through the initiative of the private sector to assist all segments of the American economy in planning, coordinating, and implementing the voluntary change to the metric system of weights and measures.

I might add we currently have over 1,200 subscribers that consist of the major corporations of this country and major technical and trade associations and members of the governmental departments.

The purposes and policies of the Metric Council are defined in its articles of organization and bylaws, a copy of which is provided the committee as part of this statement (exhibit B).

ANMC adheres to a policy of nonadvocacy as required by its articles of organization—by the way, we have 6 attachments to be added, and I will only refer to the attachments.

Senator INOUE. Without objection, the attachments will be made part of the record.¹

¹ Attachments B-F are in the committee files.

Mr. WEAVER. It is not the purpose of ANMC to convince anyone that metric conversion is necessary or that it should be resisted. ANMC does, however, advocate a well-planned, well-managed, and nationally coordinated approach to metric on the part of those desiring to make the change. It is the purpose of ANMC to provide the mechanism through which the proper planning and coordinating activities can be accomplished. And I would like to add here, all the subscribers to the council join me in recognizing the conversion to metric in the United States is occurring, and it is more meaningful to manage that changeover than it is to just let it happen.

ANMC's charter also prevents it from testifying on particular aspects of legislation. However, we are permitted to provide a statement on the status of metric activities. I am pleased to do both here today.

Over the past 24 months, ANMC has established a comprehensive committee structure covering over 30 sectors of the economy. The committees and their activities are listed in the ANMC Progress Report of June 1975, a copy of which is exhibit C. Please refer to pages 2 and 3 which is a list of those committees. Our structure allows for additional coordinating and sector committees as needed and we expect to include service industries and the farming community in the near future.

Pages 6 to 13 of the progress report list company and organizational subscribers and pages 14 and 15 list ANMC's board of directors. Note that our activity is supported by personal involvement of representatives of all facets of our society including organized labor and small business.

The Metric Council has also become the principal clearinghouse for metric information in the United States. ANMC publishes a news publication called the Metric Reporter, which provides information on metric developments as they unfold at home and abroad. It is widely circulated and is the major news source in the country on metric activities. I should add; it is read and quoted in the United Kingdom, in Australia, and Canada, as being most representative of the metric activity and progress in the United States.

At the council's offices here in Washington, we maintain a comprehensive metric library. As part of its information program, ANMC's metric practice committee presented a "Seminar for Writers of SI Metric Documents" in Chicago in October 1974 and in New York in May 1975. The seminar will be conducted on November 6, 1975, in Houston and on November 7, 1975, in Los Angeles.

The commission of the American Metric Council Practice Committee is to promote the consistent application of metric units in this country. We issue special publications dealing in depth with select metric topics.

In February of this year, the council published a report to the Nation, which I have added as an appendix, entitled, "Management of Metric Implementation," the most comprehensive report on metric status since the Department of Commerce study in 1971.

If you will look at page 2 of the "Management of Metric Implementation," you will note the Secretary of Commerce's statement, and I will quote:

I applaud groups such as the American National Metric Council which have taken the initiative in the private sector and are helping to smooth the way for

adopting the metric system. The United States Department of Commerce will continue to work with the Council and similar groups towards an orderly metric conversion.

On March 17-19 of this year, ANMC held its First Annual Conference and Exposition in Washington, D.C. Over 600 representatives from industry, government, education, and labor attended the conference. The exceptionally high attendance in a period of severe economic recession is the clearest indication of the growing interest in metric conversion in the United States. Exhibit E is the message which President Ford sent to our conference.

During April of this year—and you heard this previously referred to—the Council organized and cosponsored with the Canadian and Australian metric commissions a North American-Australian Metric Conference. Purpose of the jointly sponsored conference was to allow a select group of U.S. and Canadian delegates to discuss in depth the Australian metric conversion program and to observe firsthand the way in which metric conversion has been implemented in Australia. The trip was very successful.

ANMC on June 27, 1975, submitted to the National Science Foundation a report to the conference. And I should note, the conference was funded in part by the national conference and in part by NSF.

And after the conference, the U.S. delegates reported—these were not members of the Council per se, but the total delegates reported that the national policy in the United States should be established by the U.S. Congress and the policy should be clear, firm and wholehearted commitment to metric conversion.

Despite the lack of national metric legislation, dozens of the Nation's largest corporations are planning voluntarily for transition to metric, and in some cases implementation is already under way.

Examples include General Motors, Honeywell, IBM, International Harvester, Rockwell International, Ford Motor Co., and the J. C. Penney Co. The auto industry, the tractor industry, the computer industry and the steel industry are in the vanguard of change. But serious planning has begun in such diverse companies as Pfizer Inc., GTE, Hewlett-Packard, Sears Roebuck & Co., and McDonnell-Douglas Corp., Procter and Gamble, Seven-Up Co. and Western Electric. The actions of large U.S. corporations are having a precipitous impact on their thousands of suppliers and a catalytic effect on other corporations.

I would like to shift now and say a few words about conversion cost and timing. That has been a subject of discussion before this committee. Metric conversion involves a lot more than learning a new language of measurement. That is certainly part of it. It is a major business proposition affecting all aspects of a company's operations.

An immediate concern is the cost of metric conversion. There are costs, but experience has shown that realistic cost estimates are difficult to determine. At General Motors Corp., they are finding that their actual costs are far below original estimates.

I might add, sir, that has been generally the reporting of companies that well along in the metric conversion program. Current cost realizations are lower than their original expectations.

Senator INOUE. Have you made any estimate as to what the cost would be to the Federal Government if workers were reimbursed for conversion costs?

Have you made any studies as to what this cost would be?

Mr. WEAVER. No, sir. We have made no studies on that particular question. The question, I should add, was well explained this morning by some of the other representatives. It is a diverse question. There are cases in which the companies themselves will handle the reimbursement of that cost.

I think there will be cases in which individuals will be definitely affected, but it is not a uniform situation across the board.

Senator INOUE. Well, organized labor maintains that, whether the company covers the cost or if the individual does so, it is the same because, they argue, if the companies do pay for the conversion cost, it will be taken out of the workers pockets in the negotiating process.

Mr. WEAVER. I heard that comment, sir, and I have no comment.

Senator INOUE. Do you have any figures to give us?

Mr. WEAVER. No, sir. The timing and strategy have a major impact on conversion costs. For manufacturing companies the strategy that makes best economic and business sense is to gear metric implementation to the introduction of new components and products. This is the philosophy being applied by the major corporations.

And I should add, that is the philosophy in my corporation; as a new product or new technology is introduced, it is designed and introduced in metric. But we are not going back and redesigning the produce that has already been put in the public domain. We are keeping it in its customary units as developed.

An important consideration for industry is the need to dovetail conversion plans to availability of metric materials from suppliers and to demand from customers. It is for this reason that a nationally coordinated program of conversion is desirable. If metric supplies are not available at competitive prices, it would be foolhardy for a manufacturer to pay the premium price required for a special order unless he has a way of recovering his cost. Nor would a company wish to jeopardize its standing with its customers by imposing on them a metric product for which they are not yet ready. The timing of a company's change is thus of critical importance in minimizing the cost of conversion and in maximizing the benefits.

The primary function of ANMC is to coordinate metric activities in and between various segments of the economy. This is being managed through a series of 5 coordinating and 30 sector committees, and I referred to that earlier.

The initial work of the committees is of an investigatory nature. The primary source of information is the trade, technical, labor and education associations, and in some instances, individual corporations. Already over 300 corporations, companies, and unions are active in ANMC committee work. This support includes small business and organized labor as well as big business.

I would like to add parenthetically, both Mr. Hannigan and Mr. Loope, testifying here earlier for organized labor are active and constructive contributors to the Council's organization and activities.

Details of this comprehensive support are described in Exhibit F. Developments to date within each sector and future plans are also presented. Progress includes organization of the committees and

determination of the status of metric activity within sectors. To varying degrees, committees have addressed the following areas:

Metric standards recommendations, definition of metric units to be used, and identification of laws, codes, and regulations requiring amendment for industry to go metric.

And I am sure you will agree, sir, all of those things are part of the planning work that needs to be done.

The active participants in the coordinating and sector committees are people from the industries, trade associations, labor organizations, and government agencies that are affected by the change to metric. The list I was looking for just a moment ago is a summary of the meetings that have been held under the auspices of the council in 1974 and so far in 1975.

Out of our five coordinated committees, a total of 62 committee coordinating sector committee meetings were held in 1974, with participation in total of over 670 people. In 1975, to date, those same committees have held 38 meetings, with over 460 people participating.

All of the volunteers serving on ANMC's coordinating and sector committees are supported by their organizations. This support includes travel expenses as well as the salaries of the participants. This is the business-like way to manage metric conversion. It is the approach which produces the least cost to the American taxpayer. And that is why the American National Metric Council is supported as widely as it is, through the private sector.

The coordinating and sector committees have held to the concept of nonadvocacy. While those involved have recognized benefits as well as disruption, the central theme has been of preparedness on the basis that metric conversion will continue to be a progressive national undertaking, ultimately influenced by legislative action.

As I said earlier, the American National Metric Council was established under the auspices of the American National Standards Institute. When representatives of ANSI last appeared before a congressional hearing on this subject on March 22, 1973, they said:

It is the firm intent of ANSI in organizing, sponsoring, and funding the Metric Council that its activities and programs should supplement and support the National Metric Conversion Board when it is appointed.

Both Congress and the administration appreciate that the National Board will need to consult with and work in close cooperation with all affected elements of society to develop and implement a rational metric conversion plan. It has been the experience of every nation now converting that planning and coordination for a metric changeover required both a statutory board and a strong well organized and experienced private planning and coordinating effort.

Those comments still apply today. Even more so in light of the over 2 years of experience by the ANMC in managing the voluntary change to metric. The American National Metric Council is a well-established organization intimately involved in the voluntary change to metric. We look forward to a close working relationship with the U.S. Metric Board when it is formed.

Although there exists within some industries, as you have heard throughout the day, almost a refusal to consider the question, there exists within industry a wide range of interests and commitments to metric. It is fair to say that the metrication process is moving ahead. Each month more and more companies and organizations declare their intention to change to metric. These private groups have established

and are supporting their own coordinating mechanism—the American National Metric Council.

As the manager of metric conversion, the metric council is helping the private sector undertake the changeover wherever it becomes desirable in cooperation with Government and in a well-planned, well-prepared manner to provide the most benefits at the least cost.

I thank you for the opportunity to appear and present the status of conversion and the council activities. And I would be pleased to answer any questions.

Senator INOUE. Thank you very much.

I recognize your charter prohibits you from commenting upon legislation, but what do you think of the assessment made by Mr. Zeiter that passage of H.R. 8674, as is, would simply be an articulation of the status quo and therefore undesirable?

Mr. WEAVER. I realize the intent of your question, but I believe, by the policy of my group, I must decline to answer that.

Senator INOUE. You are not authorized to make any comments on any of the bills pending before us.

Mr. WEAVER. No, sir.

Senator INOUE. Would you be able to comment on the proposal made by Mr. Zeiter in representing the ABA on the coordination issue?

Mr. WEAVER. Let me be more specific with that, sir, the need for—

Senator INOUE. The Acting Director of the NBS suggested it would be wrong for the Congress to adopt the proposal made by the American Bar Association, because there may be other alternatives. The American Bar Association suggested that we should immediately begin considering the adoption of the proposals made by them, on coordination.

Mr. WEAVER. Sir, that again is detail of legislation as I interpret it, but I can say that this all reflects the need for a national policy in national legislation so those matters can be brought to a head in focusing on it.

Senator INOUE. Thank you very much, sir.

[The statement follows:]

STATEMENT OF ADRIAN G. WEAVER, CHAIRMAN OF THE BOARD OF DIRECTORS OF THE AMERICAN NATIONAL METRIC COUNCIL (ANMC)

Mr. Chairman and members of the Committee, it is a privilege to appear before you today.

My name is Adrian G. Weaver, Director of Standards Practices, the IBM Corporation. I am also Chairman of the Board of Directors of the American National Metric Council.

Accompanying me today are Mr. Sam Daniels, Programs Director, and Mr. Louis Perica, Director of Information Services. Both are on the staff of the American National Metric Council. (Biographies are Exhibit A)

The American National Metric Council is a nonprofit organization established in May 1973 through the initiative of the private sector to assist all segments of the American economy in planning, coordinating and implementing the voluntary change to the metric system of weights and measures. The purposes and policies of the Metric Council are defined in its Articles of Organization and Bylaws, a copy of which is provided to the Committee as part of this statement. (Exhibit B) ANMC adheres to a policy of nonadvocacy as required by its Articles of Organization. It is not the purpose of ANMC to convince anyone that metric conversion is necessary or that it should be resisted. ANMC does however advocate a well-planned, a well-managed, and nationally coordinated approach to metric on the part of those desiring to make the change. It is the purpose of ANMC to

provide the mechanism through which the proper planning and coordinating activities can be accomplished.

ANMC's charter also prevents it from testifying on particular aspects of legislation. However we are permitted to provide a statement on the status of metric activities in the U. S. and to give an account of our activities. I am pleased to do both here today.

Over the past twenty four months, ANMC has established a comprehensive committee structure covering over 30 sectors of the economy. The committees and their activities are listed in the ANMC *Progress Report* of June, 1975, a copy of which is Exhibit C. Please refer to pages 2 and 3. Our structure allows for additional coordinating and sector committees as needed and we expect to include Service Industries and the Farming Community in the near future.

Pages 6-13 of the *Progress Report* list company and organizational subscribers and Pages 14 and 15 list ANMC's Board of Directors. Note that our activity is supported by personal involvement of representatives of all facets of our society including organized labor and small business.

The Metric Council has also become the principal clearinghouse for metric information in the United States. ANMC publishes a biweekly news publication called the *Metric Reporter* which provides information on metric developments as they unfold at home and abroad. It is widely circulated and is the major news source in the country on metric activities. At its offices here in Washington, ANMC maintains a comprehensive metric library. As part of its information program, ANMC's Metric Practice Committee presented a "Seminar for Writers of SI Metric Documents" in Chicago in October, 1974 and in New York in May, 1975. The seminar will be conducted on November 6, 1975 in Houston and on November 7, 1975 in Los Angeles. On October 6 and 7, 1975, ANMC conducted a "Metric Management Workshop" in Chicago. The workshop will be repeated in New York City on February 2 and 3, 1976.

ANMC issues special publications dealing in depth with select metric topics. In February, ANMC published A Report to the Nation on the *Management of Metric Implementation*, the most comprehensive report on metric status since the Department of Commerce study in 1971. (Exhibit D) If you will look at page 2 of *Management of Metric Implementation* you will note the Secretary of Commerce's statement, "I applaud groups such as the American National Metric Council which have taken the initiative in the private sector and are helping to smooth the way for adopting the metric system. The United States Department of Commerce will continue to work with the Council and similar groups towards an orderly metric conversion."

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During the last two weeks of April this year, ANMC organized and cosponsored with the Canadian and Australian metric commissions a North American-Australian Metric Conference. Purpose of the jointly sponsored conference was to allow a select group of U. S. and Canadian delegates to discuss in depth the Australian metric conversion program and to observe first hand the way in which metric conversion has been implemented in Australia. The trip was very successful. ANMC on June 27, 1975, submitted to the National Science Foundation (NSF) a report on the conference. (The Conference was funded in part by NSF). After the conference, the U. S. delegates reported that a national policy of "clear, firm, and wholehearted commitment" to metric conversion should be established by the U. S. Congress.

Despite the lack of national metric legislation, dozens of the nation's largest corporations are planning voluntarily for transition to metric, and in some cases implementation is already underway.

Examples include General Motors, Honeywell, IBM, International Harvester, Rockwell International, Ford Motor Company, and the J. C. Penney Company. The auto industry, the tractor industry, the computer industry, and the steel industry are in the vanguard of the change. But serious planning has begun in such diverse companies as Pfizer Inc., GTE, Hewlett-Packard, Sears Roebuck and Company, and McDonnell-Douglas Corporation, Procter and Gamble, Seven-Up Company, U. S. Steel, and Western Electric. The actions of large U. S. corporations are having a precipitous impact on their thousands of suppliers and a catalytic effect on other corporations.

CONVERSION COST AND TIMING

Metric conversion involves a lot more than learning a new language of measurement. It is a major business proposition affecting all aspects of a company's operations.

An immediate concern is the cost of metric conversion. There are costs, but experience has shown that realistic cost estimates are difficult to determine. At General Motors Corporation they are finding that their actual costs are far below original cost estimates.

Timing and strategy have a major impact on conversion costs. For manufacturing companies the strategy that makes best economic and business sense is to gear metric implementation to the introduction of new components and products. This is the philosophy being applied by the major corporations.

An important consideration for industry is the need to dovetail conversion plans to availability of metric materials from suppliers and to demand from customers. It is for this reason that a nationally coordinated program of conversion is desirable. If metric supplies are not available at competitive prices it would be fool-hardy for a manufacturer to pay the premium price required for a special order unless he has a way of recovering his cost. Nor would a company wish to jeopardize its standing with its customers by imposing on them a metric product for which they are not yet ready. The timing of a company's change is thus of critical importance in minimizing the cost of conversion and in maximizing the benefits.

ANMC FUNCTIONS

The primary function of ANMC is to coordinate metric activities in and between various segments of the economy. This is being managed through a series of 5 coordinating and 30 sector committees.

The initial work of the committees is of an investigatory nature. The primary source of information is the trade, technical, labor, and education associations, and in some instances, individual corporations. Already over 300 corporations, companies, and unions are active in ANMC committee work. This support includes small business and organized labor as well as big business. Details of this comprehensive support are described in Exhibit F. Developments to date within each sector and future plans are also presented. Progress includes organization of the committees and determination of the status of metric activity within sectors. To varying degrees, committees have addressed the following areas: metric standards recommendations, definition of metric units to be used, and identification of laws, codes, and regulations requiring amendment for industry to go metric.

The active participants in the coordinating and sector committees are people from the industries, trade associations, labor organizations and government agencies that are affected by the change to metric. All of the volunteers serving on ANMC's coordinating and sector committees are supported by their organizations. This is the business-like way to manage metric conversion. It is the participants. This is the business-like way to manage metric conversion. It is the approach which produces the least cost to the American taxpayer.

The coordinating and sector committees have held to the concept of non-advocacy. While those involved have recognized benefits as well as disruption, the central theme has been of preparedness on the basis that metric conversion will continue to be a progressive national undertaking, ultimately influenced by legislative action.

The American National Metric Council was established under the auspices of the American National Standards Institute. When representatives of ANSI last appeared before a Congressional hearing on this subject on March 22, 1973, they said, "It is the firm intent of ANSI in organizing, sponsoring, and funding the Metric Council that its activities and programs should supplement and support the National Metric Conversion Board when it is appointed."

"Both Congress and the administration appreciate that the National Board will need to consult with and work in close cooperation with all affected elements of society to develop and implement a rational metric conversion plan. It has been the experience of every nation now converting that planning and coordination for a metric changeover required both a statutory board and a strong well organized and experienced private planning and coordinating effort."

Those comments still apply today. Even more so in light of the over two

years of experience by the ANMC in managing the voluntary change to metric. The American National Metric Council is a well-established organization intimately involved in the voluntary change to metric. We look forward to a close working relationship with the United States Metric Board when it is formed.

MOVING AHEAD

Although there exists within industry a wide range of interests and commitments to metric it is fair to say that the metric it is fair to say that the metrication process is moving ahead. Each month more and more companies and organizations declare their intention to change to metric. These private groups have established and are supporting their own coordinating mechanism—the American National Metric Council. As the manager of metric conversion, the Metric Council is helping the private sector undertake the changeover wherever it becomes desirable in cooperation with government and in a well-planned, well-prepared manner to provide the most benefits at the least cost.

Thank you for the opportunity to appear and present the status of metric conversion and ANMC activities. We will be pleased to answer any questions you may have.

List of Exhibits

- A—Biography of Adrian G. Weaver, S. D. Daniels, and Lou Perica.
- B—ANMC Articles of Organization and Bylaws.
- C—ANMC *Progress Report* dated June 1975.
- D—*A Report to the Nation on the Management of Metric Implementation.*
- E—President Ford's Metric Message to the ANMC First Annual Conference.
- F—ANMC Coordinating & Sector Committees Status Report.

Exhibit A

A. G. WEAVER, DIRECTOR OF STANDARDS PRACTICES, INTERNATIONAL BUSINESS MACHINES CORPORATION

A. G. Weaver, director of standards practices, is responsible for corporate overview of all IBM internal standards and standardization programs primarily as related to IBM products.

Mr. Weaver joined IBM in 1951 as a design engineer in Endicott and subsequently held various management positions in development and product engineering. He held during 1957 a Sloan Fellowship from MIT. In 1966 he advanced to manager of engineering standards as a member of the Corporate standards staff. He then became director of standards applications in 1967 and assumed his present position in 1969.

Mr. Weaver holds a BA degree in physics from Colgate University and an MS in Industrial Management from Massachusetts Institute of Technology.

Mr. and Mrs. Weaver live in Stamford, Connecticut.

BIOGRAPHY OF S. D. DANIELS

S. D. Daniels is Programs Director for the American National Metric Council located in Washington, D.C. He is a graduate of Purdue University (BSME) and Harvard (MBA). Mr. Daniels was Director of Trade Relations for Standard Pressed Steel. While manager of technical services there, he participated as a member of the U.S.A. delegation in ISO meetings related to fasteners. He was Director of Technical Services at Aerospace Industries Association, a program planning officer at FAA, and his military service was with the headquarters staff of the Air Force standardizing material, equipment and servicing connections for military and naval aircraft.

BIOGRAPHY OF LOUIS PERICA

Louis Perica is Director of Information Services for the American National Metric Council located in Washington, D.C. He received his B.A. degree from Hiram College (Ohio) in 1952 and did postgraduate work at the University of Denver.

From 1959 to 1967, Mr. Perica was with North American Aviation, Inc. (now part of Rockwell International) in California and Texas as Proposal Coordinator with the Rocketdyne Division, closed circuit television news writer for the Space Division, and Publications Supervisor for the Solid Rocket Division.

He joined the MITRE Corporation, Bedford, Mass., in 1967 as General Supervisor of Publications, and assumed the position of Director of Information with the Washington Administrative Operations of MITRE in McLean, Virginia, in 1970.

Mr. Perica has chaired various seminars and workshops for the American Management Association and has addressed the National Conferences of the Society for Technical Communication, in addition to speaking for the American National Metric Council.

Senator INOUE. Our final witness today is Mr. Richard Cortright of the Office of Government Relations, National Education Association.

Mr. Cortright, welcome, sir.

STATEMENT OF RICHARD CORTRIGHT, OFFICE OF GOVERNMENT RELATIONS, NATIONAL EDUCATION ASSOCIATION; ACCOMPANIED BY AL CARR, LEGISLATIVE SPECIALIST

Mr. CORTRIGHT. Thank you.

Senator INOUE. Do you care to introduce your colleague?

Mr. CORTRIGHT. I am Richard Cortright, a professional associate in the Division of Instruction and Professional Development of the National Education Association.

I am accompanied by Mr. Alfred Carr, legislative specialist at the National Education Association.

The NEA is the largest public employee organization in the country, representing about 1.7 million teachers and other educators. We have 50 State affiliates and over 9,000 local units in our country.

Mr. Chairman, we are grateful to Senator Magnuson and to you and to members of the committee for this opportunity to present some of our views on metric conversion.

For more than a century, the NEA has supported a national program of metric conversion. This concern has been expressed in resolution form every year since 1968 by the 10,000-member delegate body of the NEA.

The current 1975 NEA resolution endorses a conversion to the metric system and encourages teachers to take immediate steps to prepare to teach the metric system as the primary system of measurement:

The National Education Association believes that a carefully planned effort to convert to the International System of Units (SI metric system) is essential to the future of American industrial and technological development and to the evolution of effective world communication. It supports Federal legislation that would facilitate such a conversion.

The Association urges that the SI metric system of weights and measures be taught at all educational levels to assure the orderly transition to the use of the SI metric as a primary system.

The NEA supports legislation for a planned conversion period to allow time for teachers to become fully familiar with the metric system, to experiment with ways of teaching it, to develop learning programs and resources, and to identify various other resources needed for effectively teaching the metric system.

A planned conversion period should provide opportunities for teachers for all subjects and grades to become sufficiently familiar with the metric system to allow them to integrate this system of measurement into their instruction.

Although it is likely that a high proportion of mathematics and science teachers are already prepared to deal with the metric system as

the primary system of measurements, we are concerned that nonscience teachers also have the opportunity to become prepared to teach metrics, particularly on the elementary level.

Learning the metric system will be increased if students learn in a variety of subjects, such as home economics, English, industrial arts, agriculture, music, business education, distributive education, and vocational-technical classes.

The NEA has already taken steps to implement its resolution on conversion to the metric system by deploying staff to assure that teachers become aware of the need for metrication. Appended is a copy of steps taken by NEA to implement the resolution on conversion to the metric system and an annotated bibliography, if we can add those.

The education community through the day-to-day classroom practitioner will play a vital role if the country converts to the metric system. We therefore recommend that the classroom practitioner be included as a member of the U.S. Metric Board.

We also concur with one of the best studies we feel has been prepared, one done by the NIE, Metric Inservice Teacher Training: Learning From the English and Australian Experience. We understand there are good parts and bad parts we can learn from other countries, but we do feel these studies from the NIE study are very useful.

For example, one, the teachers should be trained for metric education only as part of a national plan for conversion to the metric system of measurement. That is, not as a piecemeal, ad hoc kind of quick training program.

Two, universal adherence to standards is essential. In the two countries studied, variations in spellings, definitions, and symbols were often impediments in the early phase of metrication; in other words, standards set by the board.

Three, avoid one-time crash courses. Brief training sessions followed by classroom practice periods received almost unanimous support from British and Australian educators. Indeed, we feel there is too much teacher education in this area and sometimes it is wrong.

Four, the development of teacher-training materials should be coordinated with materials for training other segments of the population. "It is sheer waste to develop teacher training materials oblivious to materials being developed for other adult groups."

Therefore, we strongly endorse the recommendation that in-service training should function as an integral part of a carefully designed, well-planned, and coordinated metrication effort with strong national leadership and direct representation of all parties concerned.

The National Educational Association endorses and offers its wholehearted support for the passage and implementation of legislation leading to the general use of the metric system in the United States. We join with our other educational colleagues and organizations like the National Council for the Teachers of Mathematics and our State affiliates, such as the Higher Education Association which has already taken leadership in providing the kind of teacher training, in-service education which we feel is realistic and helpful for the teachers of this country.

Thank you, Mr. Chairman.

Senator INOUE. Thank you very much, Mr. Cortright.

Do you have any comments to make on the House-passed measure, H.R. 8674?

Mr. CORTRIGHT. Yes. We like that bill and we support it, and give our endorsement to it.

Senator INOUE. What about the other measures that are under consideration, S. 100 and S. 1882?

Mr. CORTRIGHT. S. 100 we also support.

Senator INOUE. I believe you were here when the representative of the American Bar Association testified. Do you have any thoughts on his presentation to share with us?

Mr. CORTRIGHT. Unfortunately, I did arrive late and I only heard the end of his remarks, so I am not prepared to respond. However, we would be pleased to respond at a later time, if you wish, Senator.¹

Senator INOUE. We would appreciate that. Thank you very much. It has all been very helpful.

[The appendix follows:]

NATIONAL EDUCATION ASSOCIATION BRIEFING MEMO, INSTRUCTION AND PROFESSIONAL DEVELOPMENT, SEPTEMBER 1974, No. 7

METRIC CONVERSION AND THE TEACHER

"They've worked all right so far, so why throw out inches and pounds?" That question may reflect the major argument against a national changeover from the traditional standards of weights and measures to the metric system. But whether the individual, be he teacher or not, wants metric or not, the United States seems by popular acceptance committed to the changeover. Agencies of the federal government have recommended "that the United States change to the International Metric System; that this be done through a coordinated national program; that the Congress establish a target date ten years ahead; and that there be a firm government commitment to this goal."

NEA RESPONSES TO METRIC CONVERSION

NEA Resolution C-17, "Conversion to the Metric System," supports conversion:

"The National Education Association believes that a carefully planned effort to convert to the metric system is essential to the future of American industrial and technological development and to the evolution of effective world communications. It supports federal legislation that would facilitate such a conversion.

"The Association declares that teachers of all grades should teach the metric system as the preferred system of weights and measures of the United States, and beginning in 1973-74, should teach the metric system with greater emphasis to assure, as a national goal, the orderly transition to the use of the metric system as a primary system by 1980."

Teacher association action toward conversion has taken place to implement the resolution. For example, the California Teachers Association was a co-sponsor of the "Going Metric—Meeting the Conversion Challenge" Conference of 1,200 persons in September 1973 in Los Angeles. Teachers themselves have developed useful conversion materials for use in classrooms.

Fifty-four years ago the *Scientific Monthly* reported: "While any intelligent child can learn and carry in his mind the whole metric system in three lessons, and any adult can master the same in one hour or less of serious study, no man ever has, and probably no man ever will, master the United States system of weights and measures."

SOME ADVANTAGES OF THE METRIC SYSTEM

1. The metric system (the International System of Units, or SI) is the language for measurement throughout most of the world.
2. The metric system is easier to use than the English system of measurement.

¹ See p. 221.

3. The metric system is a simple, logically planned system of weights and measures. Like the currently used numeration and monetary systems, it is a decimal system. Coordinating measures of length, area, volume, and mass with decimalization facilitates computations.

4. A single set of prefixes is uniformly used with the metric units. Once these prefixes have been learned, changing to multiples or submultiple units is a simple operation.

5. The time spent in classrooms on teaching computation with common fractions can be reduced. Competence in the manipulation of common fractions will not be as essential for students to learn. Moreover, the time saved can be productively restructured to other student learning. More time will be saved by teaching just the one system—metric.

Federal legislation for metric conversion supports the following positions:

1. Changes to the metric system should be made only where it is useful to do so.

2. No subsidy for change should be provided by the federal government.

3. The changeover should be voluntary.

4. The initiative for changeover should not come from the federal government.

The National Bureau of Standards is the key federal agency responsible for metric affairs. A three-year study by the Bureau considering the feasibility of metric changeover concluded that if the United States "goes metric," the chief educational needs will be new instructional materials and "some retraining of teachers." The report recommended a ten-year conversion period which would provide ample lead time for publishers to prepare new publications and for school districts to provide appropriate retraining for staff. A key point for members of the united teaching profession is to be sure that appropriate and sufficient resources are made available for teacher preparation. Teachers should determine in-service programs on metrication.

Going metric in the schools will require substantive changes in the curriculum. Revision of textbooks and purchase of metric measuring materials will accompany and, in some cases, initiate these changes. But the changes will not mean a tremendous outlay of money since replacement costs are an expected and normal part of school budgets. Gradual conversion to the metric system will occur within most districts. As traditional materials and programs grow old they will be replaced with new metric materials.

The NEA Position Paper on the Impact on School Programs of a Planned Program of Conversion of Metric Measurement suggests six principles to follow in making the conversion:

1. Instruction in metric measurement will need to begin when the child is first introduced to the concept of measuring an object: use of metric should continue, with growing levels of understanding and application, in every succeeding grade.

2. Linear units of measure, the easiest to comprehend and apply, will be taught first.

3. Instruction will need to be restricted to a single system, using metric units only, without the old units "tagging along."

4. Teachers will first emphasize the most used prefixes, such as milli- and centi-, introducing the less used ones, such as deci- and deka-, after the basic ones are learned.

5. There will be greater stress on the use of decimals and less on fractions.

6. Much practice will be needed in using metric standards and estimating in terms of metric units.

Conversion should not be taught. Stress should be placed on learning to "think metric."

There once was a student named Peter
Who asked, "Why use meter and liter?"
But when he found out
He let out a shout,
"Cause meter and liter are neater!"

"Teaching Children To Think Metric"
Today's Education, April 1973

Ten years from now is 1984. Nineteen eight-four might be symbolic, not of the insidious Orwellian year, but of enlightened progress in better communication nationally—and internationally—through the metric system.

APPENDIX

IMPLEMENTATION

In order to implement this resolution of the governance body of the association, the NEA has taken several steps.

1. Delegation to professional staff responsibility for the implementation of metric education.
2. Presentation of testimony in favor of metric conversion for both general education and adult continuing education at hearings called by the National Bureau of Standards.
3. Publication of an issue of the NEA Journal, *Today's Education*, featuring metric education; publication of a subsequent article on metric education in *Today's Education*.
4. Membership on the Education Committee convened by the National Bureau of Standards for Washington-based organizations.
5. Membership on the Advisory Committee of the National Association for Metric Education.
6. Monitoring of the Interstate Commission on Metric Education.
7. Participation in the first International Conference on Metric Education.
8. Hosting of meetings on metric education at the NEA Headquarters, Washington, D.C.
9. Preparation and delivery of testimony and telegrams in support of federal metric legislation to Members of the Congress.
10. Preparation of the Instruction and Professional Development *Briefing Memo and Annotated Bibliography*.

FUTURE PLANS

1. Exploration of a proposal for federal funding of a teacher education and public-supported project in metric education.
2. Exploration of an industry-supported proposal to gain support for metric education in the schools.
3. Development of a proposal for a teacher education program for metric education for teachers.

Senator INOUYE. I am sorry the session had to be this long, but I wanted to complete this morning's session. I thank all of you who participated this morning.

Our next hearing is set for Friday morning at 10 o'clock. Until then, this committee will stand in recess.

[Whereupon, at 1:03 p.m., the hearing was adjourned, to reconvene at 10 p.m., Friday, October 10, 1975.]

METRIC CONVERSION ACT OF 1975

FRIDAY, OCTOBER 10, 1975

U.S. SENATE,
COMMITTEE ON COMMERCE,
Washington, D.C.

The committee met at 10 a.m. in room 5110, Dirksen Senate Office Building, Hon. Wendell Ford presiding.

OPENING STATEMENT BY SENATOR FORD

Senator FORD. Good morning.

Today, the Committee on Commerce will conclude its hearings on metric conversion legislation. It is our desire during these hearings to receive testimony from a wide spectrum of witnesses representing varied sectors of our economy which would be affected by metrication. As Senator Inouye indicated on Wednesday, the committee would be pleased to receive written statements by parties whose appearances we were unable to accommodate because of time constraints. I want to announce that the National Retail Merchants Association has submitted a statement for the record.

The use of the metric system was authorized by Congress in 1866. In 1875, the United States was one of the original signatories to the Convention of the Meter. Since 1893, the customary units of weights and measures used in the United States have been based on metric measurement standards.

The United States is the only industrial nation using a nonmetric system. Four other nations—Brunei, Yemen, Liberia, and Burma—retain a customary measurement system. In an increasingly metric world, we are a notable exception.

Today, many industries and firms have adopted or are in the process of converting to metric measurements. Some of our Nation's leading businesses now market metric products. Most States have extensive metric education programs, and today more students are learning the metric system than ever before in our history.

All of these metric activities are proceeding without a declaration of Federal Government policy or Government guidance. In this area, private industry, States, and cities have forged ahead of the National Government in recognizing the needs of a modern, technological society.

This morning, the committee will receive the testimony of a representative of consumers, State governments, small business, and standards-development organizations.

Our first witness this morning is Mrs. Esther Peterson, consumer adviser to the president of Giant Food.

Mrs. Peterson, we are delighted to have you this morning, and you have some remarks we would be delighted to hear.

**STATEMENT OF ESTHER PETERSON, GIANT FOOD, LANDOVER, MD.;
ACCOMPANIED BY ODONNA MATHEWS**

Mrs. PETERSON. Thank you, Senator. I have with me my assistant, Odonna Mathews. I would like her to be here to answer questions.

I am Esther Peterson, vice president of consumer programs of Giant Food, and I am honored to appear before you today to testify in favor of legislation which, if passed, would declare a national policy of converting to the metric system and would establish a Metric Conversion Board to coordinate voluntary conversion to the metric system. I am pleased to note that last month the House of Representatives passed a measure that would commit the Federal Government to assisting metric implementation in the United States as well as establishing a Metric Conversion Board. It was my privilege to testify before the House committee on metric conversion and I welcome the opportunity to reiterate my beliefs before this committee today.

As a consumer representative and also as a citizen, I welcome the leadership of the Congress to help bring the United States out of measurement isolation. We who pride ourselves on so many significant and positive innovations are the last holdouts for an archaic and complicated system of weights and measures. One computerized, sophisticated society demands a coherent, logical method of determining and conveying measurement that is in accord with the rest of the world. The United States cannot afford to be out of step with the rest of the international community. I support measures before you which are designed to assist the changeover from customary to metric units.

Today, I wish to address some of the consumer aspects of metric conversion. The metric bills now being considered by the U.S. Congress, if passed, can have a positive impact on American consumers, provided they are involved from the very beginning. The changeover may not be easy, but it can and must be made. Let us be frank. Metric conversion is inevitable. International trade is now based on the metric system. The scientific community has, of course, used this method of measurement for a number of years.

It is vital to evaluate goods, products, and changes in terms of how they will affect the end user, the consumer, in everyday life. We must insist on a positive, human approach to the changeover. We must show consumers that the practical advantages of metric units far outweigh the difficulties. A carefully coordinated national program is essential, not only to reduce the costs of the changeover, but also to make the changeover understood and orderly.

My experiences in various consumer positions have reinforced my strong belief in the necessity for including the consumer in any decisionmaking process. The transition period to the metric system could be a difficult time if the consumer is not properly prepared and informed. The consumer needs to know the facts—what the metric system will mean in terms of everyday life experiences. The consumer must be involved from the beginning of any national changeover. I believe that if the proposed legislation is enacted, the consumers' interests and

needs will be considered, for the bills before you require consumer representation.

As with anything new, people are naturally suspicious of unfamiliar terms and concepts. In addition, there is a good deal of misinformation about the metric system. We therefore must act with dispatch in seeing that positive information is available to all segments of our society. As I have said, it won't be easy because a lot of people are afraid of change.

High on the agenda of any metric conversion board must be public education. The media can and should play a pivotal role in any consumer education program. Representatives from the communications sector should be included from the outset. Conveying a positive approach to metric conversion will be a key to its success.

This is well illustrated by a study conducted by the Department of Commerce and released as part of the U.S. metric study in 1971. According to survey results from that study, those persons classified as possessing a great deal of knowledge of the metric situation were largely—74 percent—in favor of going metric. In contrast, those who had little or no such knowledge were generally—75 percent—against it. You know, I must say I find this true in my present experiences as consumer adviser to Giant where we are moving into a new computer assisted checkout system. We found great fears of people who didn't understand the system, who didn't know about it, who were afraid of the unknown. But once they know, once they learn about the system, it's terribly interesting how the positions change. It's a human thing, I suppose, with change. The results in this study and in our own experience dramatically demonstrate the need for education programs of a wide variety during the changeover in order to have the support of the public.

I believe that the potential advantages to consumers who will be using the metric system are often understated. I speak about the metric system from my own experience. I lived abroad in Sweden and Belgium and found the metric system to be a simple and practical system which is fairly easy to learn. I could compare prices and values on the basis of decimal units using the metric system of weights and measures. Once I learned this basic principle, comparison became easy. At first, of course, it was a bit different, but since my children were also taught to think metric in the schools, it became a good family learning experience. This is already happening in our own schools and homes.

At Giant Food I have been intimately involved with unit pricing and showing consumers how this tool can give them information needed in comparing the price-per measure. Unit pricing works just as well if the units are in grams as it does in its present use of price per pound, per quart, per 100 square feet, or per 100 count. Consumers are becoming accustomed to purchasing by unit and this tool will be helpful in the metric conversion process.

Just for illustration, I had our creative people convert our shelf price label to a metric measurement. Of course, this is greatly blown up. We have shelf price labels under almost every article in the supermarket. Here, for example, is Giant cider vinegar, in a 4-liter container. It cost \$1.64, or 41¢ per liter. I think that the tools we are now using could be easily converted to metric measurements.

I am sure many consumers will ask, "Won't the metric system cause an increase in prices?" Again, a good consumer education program is vital. For example, while a liter of milk could cost a little more than a quart, the consumer is actually receiving more product. Consumers will soon realize that they are still paying the same price per amount as always, but they are merely getting more or less depending upon the relation of customary sizes to their closest metric equivalents.

However, I must emphasize the importance of approaching the entire metric conversion with complete honesty. If prices do increase due to higher costs, we must tell the consumer, explain the reasons. The public is far more willing to accept explanations of honest cost increases than any shoddy attempts to bilk the public by offering reduced contents in standard packages. As to who will pay the basic costs of converting tools, cans, packages, I say that we must also consider the costs of not converting to metric units. These costs of converting will be reduced if we move toward an orderly metric conversion now. As the Canadian Metric Commission so aptly noted:

If we are prepared to assume the costs of metric conversion once, the benefits of the conversion will continue to accrue to us year after year as long as there are things to measure and people to measure them. Thus, metric conversion should be viewed as a one-shot, nondepreciating investment which will earn . . . a continuing annual dividend.¹

The metric system also offers the opportunity to introduce improved standards for clothing sizes and to simplify packaging and can sizes. For example, our ready-to-wear clothing is currently labeled with a variety of arbitrary size designations which often vary with each manufacturer. A size 12 dress may vary from one brand to another. However, as metric labels are adopted, we have the opportunity to develop a logical, uniform system of sizing based on actual body measurements.

I would urge all companies, both manufacturers and retailers, who are planning to convert to metric packaging or units, to form advisory committees to guide them. Of course, these committees should include consumer representatives. We are beginning to discuss consumer information and education about the metric system with our advisory committees at Giant. I would note here that in Canada the change to metric has afforded the opportunity to rationalize packaging sizes. For example, where formerly there were 30 sizes of toothpaste tubes, there are now 6 metric sizes. This permits easy price comparisons. In addition, "the resulting reduction in number of sizes means lower packaging costs and reduced inventory for the producer, reduced shelf space and inventory for the retailer, and more sensible shopping decisions for the consumer."²

And here again, I think the metric system is inevitable just as the computer checkout is. And the more we can integrate the techniques science has provided for us, the better we are going to be in terms of cost and in understanding.

Many people have become familiar with the metric system. Large numbers travel and live abroad. They are finding that the metric units are not quite as strange as we once thought while we become more in-

¹ Georges Mailhot, "Why SI? A Consideration of the Benefits and Costs of Canada's Conversion to the Metric System of Measurement," p. 3. Metric Commission, Ottawa, Canada: Unpublished paper. Nov. 13, 1974.

² Georges Mailhot, "Why SI? A Consideration of the Benefits and Costs of Canada's Conversion to the Metric System of Measurement," p. 1. Metric Commission, Ottawa, Canada: Unpublished paper. Nov. 13, 1974.

ternational in all ways. It is important that we learn to speak the same measurement language. So whether the consumer is designing an engine, measuring a slip cover, driving to work, or flying overseas, he will be using the same units each time and not converting back and forth.

The Australians have given us a fine example of a smooth transition to metric which involved the public all the way. The primary aim of the Australian Metric Conversion Board was to overcome public apprehension. Dual labeling and conversion exercises were avoided for a "think metric" approach. The consumer was saturated with metric information. Special target dates were set for each sector—speed and road signs, temperature, clothing, et cetera—so the consumer knew what to expect and when. The board published booklets, distributed posters, showed films, gave speeches, and utilized the media. There were very few cases of unfair practice in the marketplace, because no one dared to cheat the consumer with a metric-sensitive press watching every move.

The success of the Australian metric program was also enhanced by a strong initial and sustained support by the Australian Government. We need that same kind of support from all branches of our own Government. Many agencies have already begun to prepare for metric. All need to move ahead.

The most important point here is that the Australian legislation utilized a metric conversion board which kept their public informed right from the beginning. Today, a little over 5 years after legislation was passed in Australia, the conversion process is almost completed.

The experiences in the United Kingdom illustrate both what we should and should not do. Their Metrication Board believed that their government departments should have taken the position of leadership in the conversion process. Let us not repeat their error. Their Metrication Board also questioned whether dual labeling helps or hinders the metric conversion. Public resistance to metric may have been encouraged by too long a transition period. They suggest a quicker, more complete imposition of metric labeling. The need for public education becomes all the more obvious.

We will continue to move toward metric conversion units with or without national legislation. Consumers are already being directly affected by the metric system in many ways. Look at the grocery shelves. We often find dual declarations on labels, especially on imported items, but this is increasingly in our own domestic labels as well. Here are some typical product labels that are on our shelves today. It has the weight in ounces and the weight in grams. The nutrition label has grams on it. People are beginning to think in terms of metric.

As another example, a large soft drink manufacturer recently announced that it will offer one-half liter and liter containers at the same price to the consumer as a pint or quart. I commend this manufacturer—I think it's 7-Up who's doing this—for taking a positive step in making the hard conversion to metric units while leaving the price the same. Wine will soon be bottled in metric-sized containers. This will have the effect of reducing the number of bottle sizes from 16 to 7—I wonder if we really need such a proliferation of sizes anyway? Some clothing manufacturers are offering dual-size tickets in inches and centimeters. Some retailers are packing coffee in kilos and explaining the difference to consumers. The upcoming Olympic games

will feature meter races. Distances on some road signs are now being expressed in kilometers and miles per hour. These are only a few examples.

But all of these activities are proceeding without any ground rules or overall plan. There is some confusion in the practice of metric. Labelers in one company are using different symbols and units than labelers in another company. Educators in New York want to know how it is being done in Ohio. Changes are being made before preparing the consumer for them. This can increase the consumer's anxiety and confusion about the transition to the metric system. And also, speaking from the inside of retailing, it can cause some confusion if packaging and labeling standards are not set and then companies invest in their own experimental programs which then must be changed to suit Government standards. It's easier for us if we can look ahead and anticipate, so we can make the needed changes in all these areas where we are already involved. This will enable us to avoid an added expense burden to our retailers.

Guidance in the form of Federal legislation is needed. We need a uniform approach in order to implement a smooth and total conversion in all areas * * * where standards are set and followed, target dates are met, and uniformity in practice exists. The American Bar Association recently adopted a resolution urging Congress to enact legislation to ease the transition to metric units in statutes and regulations at all levels of government. We need dynamic leadership from the top. Coupled with creative initiative from all sectors of our society, our transition to metric should be as orderly and easy as possible.

The American National Metric Council is a voluntary organization that has been coordinating information on the changeover to metric for those who seek it. As one of the directors of the Council, I have seen how educators, consumers, business, labor, and industry representatives are being involved. The Council is prepared to continue to assist in metric conversion if legislation is passed. Giant Food is also prepared to assist in this campaign as well, and I'm confident that the National Consumers League, of which I am president, would cooperate. I think there's a body of good will around the country wanting to assist constructively.

We have a big responsibility to help consumers begin to think metric now. This can only be accomplished if legislation is enacted which calls for a nationally coordinated program. Consumers have a right to be informed about metric. Much resistance to metric conversion stems from the public's lack of knowledge about metric. If legislation involving the principles incorporated in the bills before you is passed, I believe that these fears can be dispelled and we can get on with the important task of metric conversion.

Senator Ford. Thank you, Mrs. Peterson, for a very fine statement.

I'd like to ask you a few questions if I may before you leave the table. It's quite probable that in the initial phases of the metric conversion there will be a lot of confusion, I suspect, among consumers about the metric equivalents. There might be opportunities to mislead consumers.

How do you suggest this problem might be minimized?

Mrs. PETERSON. I think it can only be minimized by a lot of public education. I think that if we can set up advisory committees with the retail industry and the others, again with consumers, the danger points can be seen in advance. We must have the media looking into potential abuses. We have to have a lot of scrutiny. We are talking with our consumers now at Giant about what we can do to help. We are hearing their fears, their fears of different measurements, and of change. These are normal fears that consumers have. But once you take them through the process and explain the system, these fears disappear. It's education. But, it's not easy. This is again why I support the legislation to start now. I think it's hard to defraud the public if you have an informed group.

Senator FORD. You mentioned the retail industry, and, of course, it will bear much of the brunt of the conversion because retail stores deal with virtually all consumers. Do you think it might be advisable if a representative of the retailers be included on the board?

Mrs. PETERSON. Oh, yes. I think they should be, very definitely. You see, I view the retailer as the purchasing agent for the consumer and I'm so aware of this in my work at Giant as a consumer representative. When I meet with the buyers, I recognize the problems that they have in determining what to do with the products on our shelves. Their involvement is important. I think it's essential that they be represented.

Senator FORD. You mentioned that you have lived in other countries and raised your family there. You said something about maybe it would be a little easier to buy clothes or things for our grandchildren. I'm glad you said that because I'm about to enter that field because it will affect me.

Mrs. PETERSON. It's amusing because I have grandchildren. I have to have my daughters-in-law send me the measurements in inches, because a size 6 for one boy won't fit my grandson. There's a lot of confusion.

Senator FORD. Well, all the other English-speaking countries have converted or are in the process of converting. Are there special consumer issues or problems that might be relevant to what we are about to do, and are there lessons we can learn? You mentioned England earlier, where the government was criticized for not taking a more active leadership role.

Mrs. PETERSON. Again, I'm not really an authority on other countries. I'm looking at it from the standpoint of a consumer and trying to make it the easiest way.

Senator FORD. There are more of those than anything else.

Mrs. PETERSON. Well, I would like to look more thoroughly as to whether or not dual conversion is good. I would really like some people—maybe I can get Giant to—I don't know—to be rather bold. Suppose we took one product, milk, for example, and put it in a liter container. We could then demonstrate how much more this is compared to a quart and give the information to consumers. I think it helps if we can get people to think metric with a familiar product. I'm a little afraid of the dual conversion. I think there are possibilities for confusion. A lot of us aren't very good in math, but everyone can count to 10. I think we have got to begin some hard conversions so people can begin to think metric. I'd like to see a great big public campaign

by the Advertising Council of America and the media on "Think Metric."

Senator FORD. I think you mentioned in your statement that the consumer apprehension over the metric conversion results primarily from the fear of the unknown.

Mrs. PETERSON. Exactly.

Senator FORD. And then this substantiates your statement that an educational program will be necessary.

I have one final question. We have several bills before us to consider. Is there any one of the metric bills you prefer?

Mrs. PETERSON. Well, in looking at them, and I haven't had an opportunity to read all the testimony that's been presented before you, my personal feeling is that I would lean toward the Pell bill. It seems a little more direct and strong. We must look at what the costs are and where the shoe will pinch, let me say. I'm afraid if we don't have an understanding of some of those features, we may deter our moving ahead with metric. My philosophy is let's look at it, and let's look at it squarely. I think the Conversion Board would have to direct itself to a lot of these questions.

That doesn't mean that I don't like the other bills. It's just that I'd like to move ahead as much as we can, and establish thorough guidelines. I don't want us to wait too long.

Senator FORD. Fine. Mrs. Peterson, I have no further questions. My colleagues are absent this morning, but you have made a very fine witness. I do thank you for coming, and I also thank the young lady who is with you. We shall push right on, as you recommend.

Mrs. PETERSON. Thank you.

Senator FORD. The next witness will be the Honorable M. J. McCauley, State representative, House of Representatives, Winona County, Minn.; accompanied by Professor Herbert Johnson, chief, Department of Mathematical Sciences, Winona State University, Winona, Minn.

I understand people call you "Mac."

STATEMENT OF HON. M. J. McCAULEY, STATE REPRESENTATIVE FROM WINONA COUNTY, MINN.; ACCOMPANIED BY PROF. HERBERT JOHNSON, CHIEF, DEPARTMENT OF MATHEMATICAL SCIENCES, WINONA STATE UNIVERSITY

Mr. McCAULEY. That's right. I am M. J. "Mac" McCauley. I'm a representative in the House of Representatives for Winona County in Southeastern Minnesota. I am also associate professor of physics at Winona State University and a member of the Science and Technology Committee of the National Council of State Legislators. In the latter capacity I serve as chairman of their metrication subcommittee.

Being a member of the NCSL, National Council of State Legislators, I did meet you once, Mr. Chairman, in Kentucky at the energy meeting we had down there.

Senator FORD. You looked familiar.

Mr. McCAULEY. And you indicated approval—you weren't here then; you were running. You indicated approval of our chief executive's first name at that time.

Senator FORD. That's right. I liked that very well. There are very few pretty names around. The Governor of Minnesota's first name is Wendell, and that happens to be my first name, so I approve of his first name.

Mr. McCAULEY. My comments today will be limited to metric action that has been taken by the State of Minnesota and the implications of the Federal plan of metrication on existing State statutes.

I have distributed to the committee a copy of the Minnesota metric bill which I authored. The legislation was passed in the 1974 State legislature and is now law. The intent of the legislation was that the State of Minnesota begin a gradual but deliberate implementation of the metric system of weights and measures and to this end the Commissioner of Administration was appointed to be in charge of implementing this plan.

Specifically, the rules and regulations promulgated by the Commissioner of Administration pursuant to the legislation provides for full conversion of the commerce of the State to the metric system when this system has been fully adopted as national standards by the Congress of the United States. Please note the contingency in the mandate—when this system has been fully adopted. Our plan is contingent upon the Federal plan.

The Department of Administration in direct response to this legislation formed the Minnesota Metric Council. It consists at the present time of an ad hoc group of four persons representing government, education, labor and business. Their chief function is to advise the Commissioner of Administration on implementing the Minnesota metric law and to date they have discussed with the Commissioner the need for such a public awareness of that.

In my opinion, it makes sense to have a Federal plan to coordinate and direct progress for the entire Nation, not let each State go off individually. I believe it will not be difficult to convince industry to convert, especially multinational concerns. We have seen in the last 2 years two American cars who were primarily metric—the Mustang II and the new Chevette. Industry realizes the necessity of making their products broader. As the multinational companies go metric, so goes the Nation.

As an example of this, Lake Center Industries, a small manufacturing concern in Minnesota, began using the metric system in related parts to the automotive industry. They have diversified their operations and continued to supply Detroit with parts. Lake Center Industries is concerned with metrics, and more and more specifications are coming in, in metrics.

I do wish to discuss some of the problems raised in legislation if Congress adopts a metric conversion plan that are significant in the implementation of almost every conversion plan.

There are 50 State legislatures, and the impact of this legislation being voted into law is quite far reaching. However, the precise effect on State and Federal laws cannot be determined at this time without substantial detailed research, and it does appear that the legislation before you, if adopted, would require revision of existing statutes.

Our Metric Council did check and see that about 85 statutes in Minnesota have to be changed. Many States are now working on this, and they have been identified, and I think action to revise them

will be undertaken when legislative impetus is provided at the national level.

The American Bar Association at their meeting in August of 1975 did devote considerable time and energy to the question of metrication and the law. The bar association adopted a report to its house of delegates and did discuss hypothetical examples of conversion of retail gasoline sales from gallons to liters. This example indicates that a successful conversion program would require at least the following governmental action, all of which have to occur prior to the conversion of any given pump.

First, State and/or local approval of gasoline sales by the liter; (2) rounding of the Federal gasoline tax to the nearest metric equivalent; (3) rounding the State gasoline tax to the nearest metric equivalent; and (4) rounding the local gasoline tax to the nearest metric equivalent rate.

Now, you also have to round out the FEA tank wagon price to the nearest metric equivalent and round out the markup to the nearest metric equivalent. And there are other regulations that appear obvious, such as building safety codes and so forth.

State and Federal Governments cannot be neutral when this legislation becomes law. In many instances, the so-called voluntary conversion cannot occur until there's been at least some significant Government action. Also, once Government has taken action—just for an example, when we talked about the weights and measure laws which must be amended to permit sales in either gallons or liters as an option, but once taxes are amended and rounded out to the metric quantities, the pump is thereby effectively prohibited from continuing the sales in gallons.

It is clear that many factors of our economy are preparing to convert to this metric system if this Congress signals that such a conversion is a national policy. But the State of Minnesota and other States, as well as the American Society of Civil Engineers, as an example, have provided for automatic conversion once Congress has acted. Many businessmen are working at metric conversion, but this is most important and I hope you can convey this to your committee members. I think it's the everyday individual, the guy in the street, who might present the greatest concern or opposition to the metric system. We are moving forward as far as education is concerned at the elementary and secondary level, but there must be time given to those who are out of school to adjust to the conversion.

Considerable efforts have to be made at both the National and State level to help these persons who are not familiar with the metric system. Even with the considerable progress being made toward integration of the metric system into American life, support from Congress is still essential. Continued and perhaps increased financial assistance to educational programs is needed to insure public involvement in the knowledge and conversion activities. State governments need a certain amount of guidance from the Federal Government in establishing policies, regulations, and schedules. The U.S. Metric Board is needed to adopt research on efforts of conversion on various sectors and groups of the economy to be represented on this Board, both the economy and State and so forth, to recommend remedial and supportive legislation and amendments to existing laws. This Board

must also facilitate cooperation among all factions involved in conversion activities, mediate disputes, and insure that all, including the consumer and taxpayers, have a voice in determining the course of metric transition in the United States.

Mr. Chairman, that concludes my formal remarks, and I want to thank you for letting me appear here before you.

Senator Ford. We are delighted to have you.

Professor Johnson, do you care to make a statement?

Mr. JOHNSON. Yes. Thank you, Mr. Ford.

My name is Herb Johnson. I'm chairman of the Department of Mathematical Science at Winona State University, Winona, Minn.

I suspect if I were to place a theme or a title on my brief presentation, it would probably be, Can we afford to proceed in a haphazard fashion with our metrication program?

The Department of Mathematical Science of Winona State University has been involved with a metric training program since June 1973. Initially, a short course, a one-fourth hour credit course, was designed to meet a request from local teachers for a practical introduction to the metric system. Since that time, the course has been taken into virtually every town in southeastern Minnesota through our continuing education division and has been offered on campus several times each quarter. Currently, I'd say that approximately 1,200 persons have received their initial training in metrication through us. Personally, I have been involved. I have taught a great number of these metric courses, both on campus and off campus, and as a result I have had the opportunity to talk "metric" with a vast audience—farmers, teachers, students, businessmen, manufacturers, professional people, housewives, young and old. I have attempted to stay current in metrication through professional journals and meetings. My remarks today are based on personal experience as a teacher of a metric short course, a coauthor of a metric textbook, and a student of SI.

In my opinion, it's apparent that the pace of metrication has increased in the past year, especially in educational circles. Several multistate consortiums have been formed to plan how the Nation's educational institutions can best prepare Americans to understand and use metrics. Many colleges and universities are now offering short courses similar to the offering at Winona State University. NAME—National Association for Metric Education—was recently organized. Professional journals such as the *Arithmetic Teacher* and the *Mathematics Teacher* contain articles devoted to the teaching of metric measurement at various levels of our elementary and secondary schools. Professional teacher organizations are devoting time in their National and State meetings for discussions on metric education. It is obvious that the educational community is concerned and is definitely on a metric path.

Almost daily, some form of metric material crosses my desk—a sample metric textbook, a listing of available metric materials courtesy of some professional organization, an advertisement for some type metric training aid, and so forth. Based on my examination of these materials and programs, I believe that it is obvious that we have been proceeding in a haphazard fashion. Let me cite examples: Base units versus basic units; SI defines seven base units, some publications adhere to these seven base units, others refer to the basic units—the

meter, the liter, and the gram. Spellings vary—metre versus meter, liter versus litre, deka versus deca. Confusion reigns.

Recently, I taught a section of our metric course in West St. Paul, Minn., to a group of elementary and secondary teachers. One of the participants, Marjorie Hiltunen, a teacher of mathematics at the junior high school level, summarized her feelings in the following statement:

It has been my experience that the inconsistencies found in different math textbooks make the teaching of this subject (metric education) very difficult. I use three different textbooks in my eighth and ninth grade general mathematics courses, and my ninth grade algebra course, only to have the following differences: dekameter vs. decameter (dam or dkm?), metre vs. meter, litre vs. liter.

Naturally, she is concerned. She wants to teach the system properly. If she followed the NBS Letter Circular 1052, February 1974, "All You Will Need To Know About Metric," she would probably spell the base unit of length in the form "meter," and the common name for the cubic decimetre in the form "liter." If she followed the NBS Guideline For Use of the Metric System, Letter Circular 1056, November 1974, she would use the "metre" and "litre" spellings, and also find that the appropriate prefix for a factor of 10 is "deka" with the abbreviation "da." A further examination of the document would also convince her that she shouldn't be teaching her youngsters to separate digits into groups of three by the use of a comma. Not to pick on the National Bureau of Standards, because I think there is a small department within the Bureau working on metrics and it has done a phenomenal job. I cite them only as examples of our haphazard approach.

The same teacher could also read a number of articles in professional journals, different metric texts now on the market, attend professional meetings for teachers, or metric meetings around the country and still come home confused. In my opinion, confusion on such simple matters as spelling will reign until the Federal Government takes action. The definition of the "metric system of measurement" in S. 1882 is, "the international system of units as established by the General Conference on Weights and Measures in 1960 and interpreted or modified for the United States by the Secretary of Commerce." We need that formal interpretation and modification at this time. I believe we need Federal legislation.

A further danger is involved in a lack of congressional action and a subsequent national plan for metrication. Many students at different levels are being taught something about metric measurement. These students who could well be "metric missionaries" are finding little application in their everyday lives beyond that of a few temperatures being reported in degrees Celsius, a few informational road signs, and an occasional reference to sale of grain in metric tonnage. Their enthusiasm for the simplicity of the metric system is soon dampened since they have no place to apply their new-found knowledge. There are many citizens who will not be convinced of the necessity to learn the metric system until Federal action occurs. There are industries in this country that recognize the need to switch to metric but are deferring action until a Federal plan is announced. I believe we need that Federal plan.

Philosophically, I believe that when a change is made it must be made for value and progress—not a change for the mere sake of a change. Throughout the proposed legislation that I have read, I see

such statements as "rationalization," "simplification," "improvements in design," "economical benefits." I do believe that we can rationalize and simplify many of our products. In education, I believe that we can rationalize and simplify. As a mathematics educator, I have seen many students at various levels that have a great aversion to mathematics. I have no studies to document my belief; however, I believe that a good many students are "turned off" to mathematics about the time they are in the upper elementary grades—about the time they are being taught fundamental manipulations with fractions. I have found entering freshmen at the university, and possibly graduates, who cannot manipulate fractions. Why were they taught fractional manipulation? Primarily because our antiquated form of measurement depends upon a knowledge of fractions. The modern metric system does not. Can we not, therefore, rationalize and simplify our curriculum? Can we save time and effort by seriously reducing the time spent on fractional manipulations in the upper elementary school, and better spend that time on the fundamentals of arithmetic? I cannot answer this question. I can only speculate on an answer. It does provide an example of rationalization and simplification in the industry that I represent.

I urge you as members of this committee and as Members of the U.S. Senate to enact some form of legislation to give direction and purpose to the change now in progress.

This concludes my statement.

Senator FORD. Thank you very much, Professor. Both of you gentlemen have stated some very positive facts.

On the basis of your experiences and your observations—or both—has the pace of the metric conversion accelerated in the last few months or the last few years here in the United States?

Mr. JOHNSON. I could respond to that initially. I believe it has. Representative McCauley brought in the example of the one small manufacturing concern in our small town. I have had many calls from them recently. They are becoming more concerned. They are finding more pressure to do more converting. A very small machine shop, a two-man machine shop recently contacted me and wanted to get something metric. They were very concerned. And it was a two-man shop. More and more of their specifications are coming through with metric measurements and they simply had to convert.

Senator FORD. You said a few minutes ago, Representative McCauley, that seven States have now adopted some program for increasing use of the metric system.

Mr. McCAULEY. Yes, that is true.

Senator FORD. Are they smaller or larger States?

Mr. McCAULEY. I have those seven States here: Colorado, Hawaii, Louisiana, Minnesota, New Mexico, Utah and Virginia. They have actually adopted laws and in Alaska—of course, that's a pretty large State, but as far as population is concerned is small. Resolutions of the school boards have been done in 29 States, including Illinois, Ohio, Oregon—

Senator FORD. Are these State boards of education?

Mr. McCAULEY. That's right.

Senator FORD. The boards have adopted resolutions?

Mr. McCauley. That's right. But just a few years ago, Mr. Chairman, there was no metric legislation on any State statute.

Senator Ford. So you can see the States progressing while we are waiting to catch up. That would be a good statement I think.

You suggested, I believe, in your comments that we need to provide legislation or a procedure whereby we can convert existing rules and regulations and laws. Do you see a major problem with converting existing legislation—I think you said there were 80-some statutes in Minnesota.

Mr. McCauley. About 85 statutes have been identified.

Senator Ford. I guess Minnesota has all their statutes on computer, and it wouldn't take long to program them, so 85 would probably be about right.

Have you encountered any problems in the conversion of your State statutes?

Mr. McCauley. No, Mr. Chairman. We are waiting for Federal action to take place and then we will go ahead.

Senator Ford. On the basis again of what you have seen and your experiences, what specific things should we avoid doing or what foreign programs should we duplicate? What are some of the pitfalls and what are some of the positive approaches that we could be doing here and perhaps incorporate in your program or statement of policy?

Mr. Johnson. Yes, we do need the consistency and I think Mrs. Peterson earlier mentioned the need for public education at all levels. I can see a need for massive education through all forms of the media. I think education is really going to be the key to a swift and easy conversion, a good system of education.

Senator Ford. One of the proposals in the previous metric conversion legislation was the establishment of a 10-year timetable. Is such a timetable desirable? Is it too long or too short? What is your suggestion?

Mr. McCauley. I personally believe a 10-year time period is about right. I wouldn't like to see any legislation passed that doesn't have some sort of timetable in it someplace; otherwise, we could just continue on for the next century.

Senator Ford. Do you think 10 years is too long?

Mr. McCauley. I don't believe it's too long.

Senator Ford. I think Australia moved very far toward completion in 5 years.

Mr. Johnson. I personally feel that we can make an effort toward converting in 5 years in this country since industry has already taken the lead. Education is ready to go. I really don't know whether we need 10 years.

Senator Ford. In other words, you'd say 10 years should be the maximum and maybe 5 years minimum time?

Mr. McCauley. I would think so, yes.

Senator Ford. I don't believe I have any further questions. We are very pleased that you two gentlemen could be with us this morning, and we thank you for your informative and very complete statements. Thank you.

The next witness will be Mr. Donald Peyton, American National Standards Institute of New York.

STATEMENT OF DONALD PEYTON, AMERICAN NATIONAL STANDARDS INSTITUTE OF NEW YORK; ACCOMPANIED BY JOHN GREEN

Mr. PEYTON. Thank you very much, Mr. Chairman.

I have with me Mr. John Green who represents the American National Standards Institute here in Washington. John has been involved with the process of metric standards for an awful long time, having headed up the Office of Technical Services at the Department of Commerce, so you may have some questions that he can help with.

Senator, let me say first that we in ANSI particularly are grateful to one of your colleagues, Senator Pell. We feel like he does. We have been working on metric legislation for about 15 years, the same as the Senator has. As a matter of fact, in 1968, Senator Pell addressed the 50th Anniversary of ANSI and he suggested that we get going on metric and we formed a Metric Advisory Committee and have been particularly active ever since. So I think we can all say that as much as we appreciate appearing before your committee, we hope this is the last round and we can get metric legislation underway.

You have a number of bills before you and we might address that point right off. I think that these bills are not all that dissimilar, but they have sort of evolved as more hearings have been held and more information has been presented. Given the choice, we would favor the enactment of H.R. 8674 because it provides for what we believe to be a more flexible and more practical system.

There are a few sections we want to address. We have some suggestions for modification, mostly in the interest of emphasis or clarity.

Our organization is a private, nonprofit voluntary standards coordinating group. We encompass 180 technical, professional labor, consumer and trade organizations of about 1,000 companies. We have been working on the development of standards for 57 years, since 1918. In fact, we have been working on metric and customary units all during that time.

In addition, internationally, ANSI is the U.S. member of the International Organization for Standardization, ISO, and, through the U.S. National Committee, influential in the affairs of the International Electrochemical Commission, IEC. ISO and IEC are the world's leading international nongovernmental standards developing organizations. By virtue of its active participation in these organizations ANSI has access to the hundreds of international standards they have promulgated, as well as to the standards and metric plans of some 80 countries including those who have been or are in the process of metric conversion.

ANSI will continue to work with all segments of U.S. industry and government as it has over the past 57 years to coordinate the development of standards to meet the actual needs identified by either change to or increased use of SI units. ANSI has a firm policy that all standards proposed for international adoption must be expressed in SI units along with any other units used.

We feel that ANSI's primary contribution to metric conversion is and will be in strengthened and expanded work with standards-developing groups—many of which have adopted metric use policies—as well as with standards users to bring about a well-coordinated comprehensive effort to meet the needs of America for standards whether

expressed in metric or in customary units of measure. This is one of the primary purposes of ANSI.

In delineating the duties of the U.S. Metric Board, H.R. 8674 uses language which should insure that the Board takes full advantage of the experience and competence of the American National Standards Institute and its federated system. The process of determining where and when metric standards will be needed and the development of such standards is already well underway in this system. Enactment of H.R. 8674 will provide an additional motivation for the system to move ahead in a well-planned and coordinated manner in order that the shelf of metric standards will be available as metric planning proceeds.

Metric planning and management of metric implementation are integral parts of ANSI's overall program and operations. As the committee has heard from other witnesses, ANSI founded the American National Metric Council in 1973 to provide the Nation with a practical means of coordinating metric planning and conversion within and among the various segments of society. The Metric Council, which is directly affiliated with ANSI, is available to assist the Metric Board as needed and to carry out a substantial portion of the program envisaged in H.R. 8674.

In establishing and initially funding the Metric Council, ANSI intended that the Council's programs and activities would supplement and support the U.S. Metric Board when it is appointed. The ANMC-ANSI role in the United States will be similar to that played by the national standards organizations of the United Kingdom, Canada, Australia, New Zealand, and South Africa in the efforts of those countries to achieve metric conversion.

As stated previously, there are sections of H.R. 8674 on which we have suggestions to offer for the consideration of the committee.

Section 6 of your bill on the composition of the board, I think, was rather carefully drafted. It contains rather broad categories which we generally favor, and this has to be. If you try to get everybody in the United States, you'll have to hire Soldier's Field to have a meeting. We would recommend strongly in the category of science and engineering that every effort be made to have at least one person who is thoroughly familiar and currently active in the development of standards on both the national and international basis, the reason being that in your bill, section 10(a) calls for consultation of nationally recognized standards developing and coordinating organizations, and 10(d) encourages activities of standardization organizations, and section 10(f) which involves cooperation and consultation with private international organizations such as ISO through their respective member bodies. In the case of ISO, ANSI is the member body.

So we'd like to have at least one person on that Board that's familiar with the whole gamut of standard making, because I think the Board is going to need that type of advice.

Section 9 states that the Board shall cease to exist when the Congress, by law, determines that its mission has been accomplished. We definitely support the provision that Congress should have the final determination on the Board's continuing existence. To strengthen this provision and possibly avoid unnecessary continuation until the "last conversion is completed," the committee may want to consider adding a more specified period for review and justification. It would not be

unreasonable to specify review and evaluation of the Board's mission at the end of 5 years and yearly thereafter. Some of these open-end contracts get far stretched out, I'm afraid.

There is one section, 10(a), on which we want to call your attention. The original bill that was introduced, I believe on behalf of the administration, which is H.R. 1882 which Senator Inouye introduced on this side, contains language on consultation which was dropped in the House bill, and frankly, we think that serious consideration should be given to putting that language back in. It's on page 7, line 13, and it states in H.R. 1882:

The Board will take advantage of activities underway in the private sector so as not to establish, within its own organization and staff, provision for activities that would unnecessarily duplicate those being undertaken in the private sector.

The House bill—H.R. 8674—makes a small allusion to this, but no longer contains language we think should be included as a discipline so as not to duplicate efforts, and so the Board can take full advantage of what's available right now at no cost to the taxpayers and get a better job done. So I think this is one section that needs a little more thought.

Section 14(b) is another housekeeping thing. H.R. 8674 states that the salary level of the Executive Director shall not exceed level III of the executive schedule. In S. 1882, the level is established at grade 18 of the general schedule. ANSI is not involved in either case, but we think the Senate might want to consider what the Executive Director has to do and with whom he has to interface. If this man or woman is going to work with Secretaries and Cabinet people or sub-Cabinet people, if you're going to recruit the type of person you really need for this very important job, of limited duration, we would think that the higher the scale, the better qualified he may well be.

On the business of costs, we have no particular thoughts on cost of conversion because I think these things vary depending on need, and they change rapidly, but there was one thing the House report said that sort of surprised us. The Committee on the Budget estimated that the cost of administering the act would be \$2 million the first year and \$3 million annually thereafter.

Yesterday, or I believe it was Wednesday, Dr. Ambler stated it would be \$3.5 million, and we're not trying to suggest less expense in this case. What we are saying is let's have a good, realistic look at potential costs. We think \$2 million to do the job that's envisioned in this bill is very optimistic. I don't think it can be done with that level of funding. You might want to have your GAO take a look at the past history of independent agencies which are similar to the proposed Metric Board, just so the Congress doesn't get disillusioned and come up with low figures and then receive large appropriation requests later on which cause consternation. Frankly, by spending the necessary amounts and doing some contract studies, and getting the right people involved, in the long haul you're probably going to save money, because the better the planning, the better the conversion; the less it's going to cost overall. So this isn't the place for saving.

Having said those things, we thought you might be interested in just a short review of the status of metric standards in the United States and in this context we are not using the definition used by the

Metric Council which includes anything that has a metric unit in it. ANSI has been looking at this for years and just recently published what we call a Metric Bibliography which has about 1,100 listings. When you compare that with the 1975 catalog of standards, there's an awful long way to go if all of these are going to become metric. We have 6,000 recognized American national standards. There are some 25,000 more in specific use in the United States. There are about 3,000 international standards. We could only find about 1,100 of these which we call "hard conversion" standards. There are of course thousands of standards in which SI units have been included.

We found there are about 15 American national standards that are "hard converted." There are some special specifications, for example, on limits and fits which we converted, but there are over 1,000 ISO standards that are converted and about 33 from the Electrical Technical Commission.

This is not to say we are not in shape. This is just a status report. In fact, it's quite encouraging because we are converting to the metric system in the United States and the standards organizations are expanding their efforts to develop metric standards. So it's good to have to have a base to start with.

ANSI has been involved in the development of the ISO standards because we work closely with the international organizations. In addition, through the experience particularly of what I suppose you'd call the old metric countries—Germany, France, now England, Japan—there are literally thousands of metric standards available.

The base from which we will start the conversion in this country is actually quite good and we think it's particularly good because you have in place your governmental agencies such as the NBS standards. You have the American National Standards Institute with its federated members. You have the American National Metric Council. We're not starting from scratch, even though we may be the last industrialized country in the ballgame. We think the future is promising and I'm here to add that the ANSI and the American National Metric Council welcome the opportunity to play an effective role in the change to the metric system. Early enactment of H.R. 8674 or similar legislation is encouraged and supported because the more time we spend now debating something that's going to happen, the more time it's going to take to get on with the complicated task of developing standards, getting them accepted, and getting them into use. So we think it's time to move and we are here to help. We would be glad to answer any questions.

Senator FORD. Thank you, Mr. Peyton.

I asked Representative McCauley and Professor Johnson what kind of timetable would be desirable—the minimum and maximum. Do you have a recommendation as to what target dates and number of years we should plan for completion?

Mr. PEYTON. Well, frankly, Senator, having worked in the field where you have to get a reasonable consensus to be effective, we have concluded that mandated time spans, long or short, really are counter-productive. I'll tell you why. In the United States, you have an entirely unique situation. People have been talking about Australia, comparing a nation of 13 million people to one of our size, and the concentration of industries is like comparing a high school football team with the

Green Bay Packers. With all the things you have to coordinate and all the different facets, we really believe that the flexible approach of H.R. 8674 without mandated times is preferable, the major reason being if you give some people 10 years, they are going to take 10 years, but there are other segments that are going to be ready to go and they shouldn't be held up.

We prefer the language in the bill which says let's get the Board operating and have the Board review the plans. It may be if this thing lags—we don't think it will because metric conversion is too far along—if it starts to lag, something could be added, but we are not in favor of a mandated time schedule.

Senator FORD. Of course, I agree with you about the dissolution of the Board at some given time to stop bureaucratic growth. I also have found in my limited experience here that if you don't set a timetable you have a greater chance for the bureaucratic growth of the Federal Government to accelerate. I'm of the opinion that if we do not set a reasonable timetable and just leave it open-ended, there will still be some loose ends a long, long time from now, where as a deadline may put pressure on the Board.

Mr. PEYTON. That's possible, I suppose. As a matter of fact, it's a matter of opinion. If you're going to put in a time, though, for heaven's sakes don't say a 10-year time. Give some guidelines and let people work with a flexible system. I have no quarrel with review. Congress is going to review the progress every year anyway. But mandated time schedules are really not that effective. I'm talking about the situation of a very diversified society with all kinds of businesses and the amount of integration we have to make in metric of this country is far greater than in most other countries.

Senator FORD. You made the statement about funds to adequately finance this program. Do you have an educated guess as to the amount of money it should start out with?

Mr. PEYTON. Not really.

Senator FORD. You said \$2 million would be somewhat inadequate. The \$3.5 million may be more realistic. Do you think maybe we should go to \$4 or \$5 or \$3.5 million.

Mr. PEYTON. We're not in a position to talk about the amount of money necessary, but I think Dr. Ambler probably has more information today than the original report of the budget.

Senator FORD. The longer we go, the more it's going to cost.

Mr. PEYTON. I think the real cost is going to be on startup time and getting an adequate board, but I don't think this is the place to be particularly penurious, but I don't have any magic figures; \$2 million isn't very much money for an organization like this.

Senator FORD. Let me ask another question. You say it's your judgment it wouldn't be good to set a timetable.

Mr. PEYTON. Not for the individual sectors. The sectors have to work out their own—the industrial sectors have to work out their own time periods. I think this was contemplated in most of the legislation, Senator.

Senator FORD. But say the time frame in which to set up a program is limited or has a target date. Do you agree with that?

Mr. PEYTON. I probably do, but as I say, we are not in favor of rigid time requirements but flexible time, yes.

Senator FORD. The program is what I'm concerned about here.

Mr. PEYTON. Absolutely.

Senator FORD. Setting a time limit on the development of a program may be the best way to move it along at an accelerated pace.

Mr. PEYTON. I hope I understand you correctly. I don't think any board with the composition considered here is going to have the ability or the expertise or the intimate knowledge to be able to set individual conversion programs for different sections of industry.

Senator FORD. No. I think we're going to have to have a broad program and timetable by which to convert the total country.

Mr. PEYTON. Right.

Senator FORD. Then we can let the various sectors find their own good way. I'm trying to find out your thinking on this. You would agree that the program could have a timetable in its development, and then the sectors within that could have an open end to be flexible in their actual conversion.

Mr. PEYTON. I would have to agree with that. There would have to be flexibility in the individual sectors.

Senator FORD. What are some of the pitfalls that we might try to avert and what are some of the pitfalls we should look for?

Mr. PEYTON. Well, I believe, Senator, that the pitfalls were quite well covered in the legislation itself which evolved from the national metric study and from an awful lot of experience. The things—I don't think that they are particularly pitfalls, but they require attention—they are in the bill. We have to emphasize cooperation worldwide on the development of standards. For example, we've got to be sure that the United States is represented in standardization activities. There are going to be many times when some of our practices are different than those overseas and we have to do all we can to get them included in the international documents.

As I say, I think most of the pitfalls were actually contemplated. I do think the American Bar Association proposal merits consideration because it has not been specifically delineated in the bill and I think this does require a good bit of attention and particularly since the ABA has decided—and I think rightfully so—that the way to get at the problem is to have a national consensus on change, get the affected interests in and get them working together. This is the basis on which we work and the ABA proposal makes a lot of sense, but I don't think the pitfalls are really that great.

Naturally, as the gentleman stated before, education is important. We have to get public information and education going. Industrial change won't be that much of a problem. I don't think there's anything that I can figure that's not covered adequately in this bill if the board carries out the duties they are supposed to carry out because the bill delineates almost everything.

Senator FORD. Let me ask you one final question, Mr. Peyton. If this Congress should fail to enact a metric conversion bill, what, in economic terms, would this mean? Would we hurt our economy? Would we increase the cost to industry? Would we save money by moving on with the metrication process? What impact would it have if we failed to pass the metric legislation?

Mr. PEYTON. I certainly can't give you a quantitative answer, but failure to move and have a national policy I think will continue to be a problem if the United States is dealing in the field of international standards, the reason being that when you take your products overseas and work in an international context you naturally have to know and be aware of what's going on in your own country, what type of production and what type of manufacturing and the rest. We will continue to have customary based standards probably for a long, long time, but the real thing is it takes a great deal of effort, an awful lot of expense and an awful lot of manpower and consideration to come to international agreements.

International standards don't just evolve because you go to a meeting. They take a long time. Every time we go overseas nowadays the first thing the international organizations ask us is what's going on in metric, because the world is looking at the United States to see what we're going to do. We produce a lot of the world's goods and consume a lot of the world's goods and, frankly, I think the major impact of this thing will be the added cost which manufacturers will have to carry in dual inventory of parts, to have dual designs to meet domestic and international markets. When you're working in competition with a given country that's metric you're going to make the product but it's probably going to cost you more money which could cut us out of competition of the international marketplace. I can't quantify it, but I really believe time is awaiting. We have had an awful long debate on this thing.

Senator FORD. I wanted to get that into the record. Thank you very much. We appreciate both you gentlemen being with us this morning. [The statement follows:]

STATEMENT OF DONALD L. PEYTON, MANAGING DIRECTOR, AMERICAN
NATIONAL STANDARD INSTITUTE

The American National Standards Institute has testified or presented statements to committees of the U.S. Senate and House of Representatives since the mid-nineteen sixties supporting Congressional establishment of a national policy relating to metric usage in the United States. The Institute is pleased to appear today before the Senate Committee on Commerce in support of such action.

A number of bills on metric usage have been introduced and one, H.R. 8674, passed the House of Representatives on September 5. Of these, ANSI generally favors H.R. 8674 since it provides what we feel is a flexible yet practical approach. H.R. 8674 retains in essence most of the recommendations ANSI has offered for Congressional consideration in previous statements. The position of ANSI on metric conversion has evolved and has been modified over a period of almost a decade, beginning with establishment of an ANSI Metric Advisory Committee prior to the study conducted by the National Bureau of Standards in 1968 (Public Law 90-472).

There are sections of H.R. 8674 on which we offer suggestions for the sake of emphasis or clarity. These are not believed to be substantive and perhaps could be accommodated in the Committee's report. The sections involved are Sec. 6 on the composition of the board; Sec. 9 on the life of the board; Sec 10(a) on consultation and cooperation with existing organizations; and Sec 14(b) on the salary level of the board's Executive Director. We have some general remarks to make about Sec. 17 on funding of the board's activities.

As the Nation's voluntary standards coordinating body, ANSI and its more than 180 organization members and 1000 company members will be playing a continuing important role in ensuring that standards required for metric conversion are developed on a timely basis.

Internationally, ANSI is the U.S. member of the International Organization for Standardization (ISO) and, through the U.S. National Committee, influential in the affairs of the International Electrotechnical Commission (IEC). ISO and IEC are the world's leading international nongovernmental standards developing organizations. By virtue of its active participation in these organizations ANSI has access to the hundreds of international standards they have promulgated, as well as to the standards and metric plans of some 80 countries, including those who have been or are in the process of metric conversion.

ANSI will continue to work with all segments of U.S. industry and government as it has over the past 57 years to coordinate the development of standards to meet the actual needs identified by either change to or increased use of S.I. units. ANSI has a firm policy that all standards proposed for international adoption must be expressed in S.I. units along with any other units used.

We feel that ANSI's primary contribution to metric conversion is and will be in strengthened and expanded work with standards-developing groups—many of which have adopted metric use policies—as well as with standards users to bring about a well-coordinated comprehensive effort to meet the needs of America for standards whether expressed in metric or in customary units of measure. This is one of the primary purposes of ANSI.

In delineating the duties of the U.S. Metric Board, H.R. 8674 uses language which should ensure that the Board takes full advantage of the experience and competence of the American National Standards Institute and its federated system. The process of determining where and when metric standards will be needed and the development of such standards is already well under way in this system. Enactment of H.R. 8674 will provide an additional motivation for the system to move ahead in a well planned and coordinated manner in order that the shelf of metric standards will be available as metric planning proceeds.

Metric planning and management of metric implementation are integral parts of ANSI's overall program and operations. As the Committee has heard from other witnesses, ANSI founded the American National Metric Council in 1973 to provide the Nation with a practical means of coordinating metric planning and conversion within and among the various segments of society. The Metric Council, which is directly affiliated with ANSI, is available to assist the Metric Board as needed and to carry out a substantial portion of the program envisaged in H.R. 8674.

In establishing and initially funding the Metric Council, ANSI intended that the Council's programs and activities would supplement and support the U.S. Metric Board when it is appointed. The ANMC-ANSI role in the United States will be similar to that played by the national standards organizations of the United Kingdom, Canada, Australia, New Zealand, and South Africa in the efforts of those countries to achieve metric conversion.

SUGGESTED MODIFICATIONS

As stated previously, there are sections of H.R. 8674 on which we have suggestions to offer for the consideration of the Committee.

Sec. 6 on the composition of the board contains rather broad categories which we generally favor, since to include each and every segment of society affected by metric change would be impractical. We would recommend, however, that in the category of science and engineering consideration be given to insuring that at least one member of the board be experienced and currently active in both national and international standards development. Thorough familiarity with the procedures and operation of ANSI and ISO are essential to successful implementation of Sec. 10(a) which call for consultation with nationally recognized standards developing and coordination organizations; Sec. 10(d) which encourages activities of standardization organizations; and Sec. 10(f) which involves cooperation and consultation with private international organizations such as ISO through their respective member bodies. In the case of ISO, ANSI is the member body.

Sec. 9 states that the board shall cease to exist when the Congress, by law, determines that its mission has been accomplished. We definitely support the provision that Congress should have the final determination on the board's continuing existence. To strengthen this provision and possibly avoid unneces-

sary continuation until the "last conversion is completed," the Committee may want to consider adding a more specific period for review and justification. It would not be unreasonable to specify review and evaluation of the board's mission at the end of five years and yearly thereafter.

Sec. 10(a) on consultation and cooperation with existing organizations and activities, as written in H.R. 8674, represents a substantive change from the legislation originally introduced. In the interest of efficiency and economy and to insure that the board makes optimum utilization of existing capability in standardization and metric planning, ANSI recommends that serious consideration be given to restoration of the language contained in S. 1882, Sec. 0(a) as follows:

(Page 7 line 9-13): "The Board *will take advantage of activities under way in the private sector so as not to establish, within its own organization and staff, provision for activities that would unnecessarily duplicate those being undertaken in the private sector.*" [Italics added]

Sec. 14(b) states that the salary level of the Executive Director shall not exceed level III of the Executive Schedule. In S. 1882 the level is established at grade 18 of the General Schedule. Commensurate with the responsibilities of the Executive Director and the interface and cooperation he must establish with executives of various departments and agencies of government, we would suggest that Executive Level III is appropriate. If the board is to recruit an individual with the qualifications and experience required for a position with a limited duration, the higher of the two scales will probably be necessary.

Sec. 17 contains general appropriation authorization language. The problem here is not with the language of the various Bills, but rather with information contained in the section on cost and budget data on page 26 of the House Report (No. 94-369) which accompanied H.R. 8674. In this section the Committee on the Budget estimated that the cost of administering the Act to be "\$2.0 million the first year and \$3.0 million annually thereafter." While ANSI supports a conservative approach to government expenditures and feels that the board will find itself able to obtain a lot more in the way of planning and coordination assistance from existing organizations than is generally believed, we would be remiss if we did not suggest that the estimates appear to be terribly optimistic. It might be worthwhile for this Committee to request that the General Accounting Office or perhaps the Committee on the Budget look into the estimates, giving consideration to the cost of operating similar independent agencies.

STATUS OF METRIC STANDARDS

Increased usage of the metric system in the United States will require availability of what might be termed a complete shelf of metric standards. No one can accurately estimate the number that will be needed. As a practical matter, the generally accepted philosophy of the United States is that "use should dictate standards, standards should not dictate use." In this way our Nation has encouraged invention, innovation, and improvement in both product and services.

ANSI thought the Committee would be interested in having a current status report on the availability of metric standards, at least those which have been identified for possible use from the Catalog of American National Standards and catalogs of both ISO and IEC.

The 1975 Catalog of Standards of ANSI contains some 6,000 listing of approved American National Standards. In addition, some 3,000 international standards are listed. How many may be considered to be "metric?" The breakdown is as follows:

American national standards.....	15
Special ANSI metric publications.....	¹ 10
ISO standards and recommendations.....	1, 057
IEC recommendations	33
CEE recommendations	2
Total	1, 117

¹ Metric package; ANSI adaptation of ISO System of Limits and Fits; Transactions of Conference on Metric Mechanical Fasteners (OMFS).

The breakdown by subject category is as follows:

Category	American national standards	International standards
Agricultural tractors and machinery.....		5
Aircraft and space vehicles.....		63
Basic quantities and units.....		15
Bearings.....	1	48
Chains and lifting hooks.....		11
Cinematography.....		43
Computers and information processing.....		25
Conduit.....		2
Construction.....		18
Containers and packages.....	5	12
Drafting, design and tolerance data.....		11
Electrical machines and apparatus.....		33
Home cooking and baking utensils.....	1	1
Industrial trucks.....		7
Laboratory glassware.....	2	27
Limits and fits.....		10
Machine elements.....	1	40
Machine tool data.....		29
Materials.....		65
Medical devices.....		7
Metrology and properties of surfaces.....		2
Nuclear energy.....		7
Office machines.....		7
Pallets and pallet trucks.....	1	3
Photography.....		44
Plastics.....		108
Refrigeration.....	1	9
Road vehicles.....		27
Rubber and rubber products.....		104
Safety signs.....		2
Screw threads.....	2	10
Taps and clearance drills.....		3
Textiles and machinery for.....		106
Threaded fasteners.....	1	25
Tools and tooling.....		80
Tubes, pipe and fittings.....		49
Washers.....		1
Welding.....		33
Total.....	15	1, 092

This is the "base" from which our cooperating standards developing organizations must begin their document search. In addition, committees and organizations will consider literally thousands of metric standards developed and in use in other nations, particularly those of Germany, United Kingdom and other countries which are on the metric system.

The fact that all of these documents are available from ANSI and that ANSI is a participant in most if not all the international technical committees of ISO and IEC from which international metric standards will eventually flow should be encouraging to Congress and the U.S. Metric Board. While we realize that a tremendous amount of work will be required and that planning and coordination of metric conversion is essential, this Nation is not "starting from scratch."

The mechanisms are in place. The experienced and qualified standards organizations are ready and willing to assist as required. ANSI and the American National Metric Council welcome the opportunity to play an effective role in the change to the metric system. Early enactment of H.R. 8674 or similar legislation is encouraged and supported.

Senator Ford. The next witness will be Mr. Richard Thompson, chief, weights and measures, Department of Agriculture, University of Maryland.

STATEMENT OF RICHARD L. THOMPSON, CHIEF OF WEIGHTS AND MEASURES FOR THE STATE OF MARYLAND; ACCOMPANIED BY SYDNEY D. ANDREWS, DIRECTOR OF THE DIVISION OF STANDARDS FOR THE STATE OF FLORIDA

Mr. THOMPSON. Thank you, Mr. Chairman.

I am Richard L. Thompson, chief of weights and measures for the State of Maryland. Today, I appear before you as the chairman of

the National Conference on Weights and Measures and to represent the views of that body. Invited to testify with me is my colleague, Mr. Sydney D. Andrews, director of the Division of Standards for the State of Florida. Mr. Andrews is the immediate past chairman of NCWM. He was recently appointed to chair a new conference committee which has been established to provide coordination of metric activities through interaction with the U.S. Metric Board, the American National Metric Council, and other groups in the public and private sectors. Mr. Andrews has had a distinguished career in the field of standards and measurement and he presently serves as a member of the board of directors of the American Society for Testing and Materials.

The National Conference on Weights and Measures—and incidentally, if I may interject a point here, the bills refer to it as the National Conference “of” Weights and Measures; it would be more correct to replace “of” with “on”. The National Conference on Weights and Measures was established in 1905 for the purpose of securing and maintaining uniformity among State weights and measures laws and regulations. The Bureau, which is an agency of the U.S. Department of Commerce, has continued its sponsorship of the Conference over these many years.

The Conference is an organization of State, county, and city weights and measures officials from throughout the United States. Meetings of the Conference bring together officials from all levels of government and representatives from business, industry, trade associations, and consumer organizations to hear, discuss, and take action on matters that relate to weights and measures technology and administration. The actions of the Conference provide the legal and technical basis for our system of weights and measures in the United States; and the Conference has been cited on numerous occasions as a most effective example of Federal/State cooperative effort.

Mr. Chairman, we are very pleased to be here today representing our fellow State and local officials for the purpose of offering our support for the passage of H.R. 8674 without amendments. Under section 10(g)(3), you have recognized the need for consulting with the National Conference on Weights and Measures so as to assure that its membership is appropriately involved in metric conversion activities and are thus assisted in their efforts to bring about timely amendments to weights and measures laws. We can only add that our role is a major one and that our metrication activities are already underway. State weights and measures laws fully recognize the metric system; but we need congressional action to pave the way for a smooth transition in converting our regulations and procedures, which are the basis for equity in the marketplace. As experienced implementers, we wish to stress that (1) a declared national policy for metrication and (2) a metric board are necessary and, at the present time, sufficient to meet the needs for orderly planning and to mobilize cooperative mechanisms. With these tools, you will have provided the basis to end the drifting toward metrication and to launch our ship on a sure and steady course.

In order for your committee to possess a clear understanding of the impact weights and measures officials have upon our society, it may be desirable for me to offer you a definition of our activity. The term

"weights and measures" is generally recognized as meaning: all weights and measures of every kind; instruments and devices for weighing and measuring, and any appliance and accessory associated with any or all such instruments and devices. Weights and measures officials have historically been engaged in the inspection and testing of those devices used to buy or sell or that are used for hire or award.

The responsibility of these officials, however, goes much further than this. Working through the National Conference on Weights and Measures, they are frequently engaged in the development of technical requirements relative to the design, performance, and use of weighing and measuring devices. They also strive to develop practical and effective laws and regulations which encompass the labeling of packaged commodities, the use of specific units of measurement, and the method of sale of commodities.

There is virtually no one in this country today who is not daily affected by the activities of the weights and measures official. Protection is provided for you when purchasing meat which is weighed at the supermarket, gasoline which is measured at the service station, mileage which is metered by a taxicab and all similar transactions in commerce that are subject to weights and measures regulation, inspection and testing. The activities of the weights and measures official are highlighted by the concept that accuracy be present, value comparison is enhanced and equity prevails for each individual engaged in any transaction whether that be consumer or seller.

I am hopeful that these brief comments concerning weights and measures activities will help you understand our deep interest and involvement in the commercial measurement system in this country and, more specifically, our vital interest in a sound and logical approach to metric conversion. I will now move on to matters pertaining to our conference.

The National Conference on Weights and Measures serves as a national forum for the adoption and promotion of model laws, regulations, technical codes, test methods, enforcement procedures, and administrative guidelines. The regulation of weights and measures practices in the marketplace rests with State and local authorities, thus effective enforcement without hampering commerce across State boundaries requires uniformity and the national conference is the mechanism for a uniform and effective system throughout the Nation. Commercial weighing and measuring devices in service in Maryland meet the same requirements as devices in service in Florida because of the uniformity in regulations, codes, and test methods that have been fostered throughout the country by NCWM.

Most of the major accomplishments in the field of weights and measures are a result of NCWM action or recommendations by its membership. To name just a few: (1) Congressional authorization for the issuance of new and modern sets of reference standards and laboratory instruments to the States by the National Bureau of Standards (incidentally, these standards include both metric and customary weights and measures); (2) active support for the passage of the Fair Packaging and Labeling Act; (3) development of the Model State Weights and Measures Law and the Model State Packaging and Labeling Regulation; (4) adoption of specifications, tolerances, and other technical requirements for commercial weighing and measuring devices as pub-

lished in NBS Handbook 44; and (5) negotiations leading to membership by the United States in the International Organization of Legal Metrology. Conversion to the metric system will surely be added to this list and will be the paramount activity of all weights and measures officials during the next decade as is now the case in the United Kingdom, Canada, Australia, and New Zealand.

The United States is the only technologically advanced Nation with weights and measures regulatory programs legislated and administered at the State and local level and the system works primarily because of the success of the National Conference on Weights and Measures and the effort put into the National Conference by the NBS. Gentlemen, it costs this Nation less than \$50 million to regulate an estimated \$900 billion worth of commerce which is subject to weights and measures control. Weights and measures enforcement is cost effective and cost beneficial. We are confident that with adequate support for weights and measures programs the NCWM will be able to help maintain a high level of cost effectiveness and provide a steady flow of benefits to this Nation throughout the metric conversion process.

At this point, sir, I'd like to ask Mr. Andrews to continue with our testimony and express some thoughts that he has from our conference.

Senator FORD. Thank you, Mr. Thompson.

Mr. ANDREWS. Thank you, Mr. Chairman.

Because of the increasing use of the metric system in this country the National Conference on Weights and Measures created a Metric Planning Committee in 1973 to assist State and local officials as well as industry representatives. The purpose of this committee was to develop guidelines for the proper use of the International System of Units (SI) in the marketplace for those involved in this inevitable change.

At the same time standing committees of the conference were asked to review their publications for the purpose of eliminating any obstacles to use of the metric system. These publications include the model State law, regulations, and handbooks governing weights and measures devices and practices which have been adopted by most jurisdictions. I am glad to advise that the model State weights and measures law and regulations have now been or are being revised by the conference to provide for the use of metric measurements and to set forth requirements if the metric system is used.

The role of weights and measures officials is largely a reactive one in that they must be prepared to regulate the accuracy of quantity representations in the marketplace regardless of what system of weighing or measuring is employed. As commerce in this country has moved toward metric, officials have been required to prepare themselves for making accuracy determinations in either the metric or customary system. For guidance and training in such matters these officials look to the National Conference and to the Office of Weights and Measures (OWM) of the NBS.

As already pointed out, the vast majority of citizens in our country will have more exposure to the metric system in the marketplace than through any other contact. Quantity declarations at supermarkets, service stations, and variety stores will be their principal exposure. Weights and measures officials can render a valuable service by assuring that these quantity declarations are accurate and are represented in such a manner that confidence is instilled in the consumer rather

than the natural apprehension experienced by most individuals when confronted with something new or different. This can be accomplished best by these officials because they work closely with those industries involved in weighing, measuring, packaging, and labeling to establish regulations, specifications, and tolerances for industry guidance and because of their concern for developing consumer information which will assist the purchaser in making value comparisons. This will, of course, be especially important during the transition period.

The National Conference on Weights and Measures is currently providing leadership of the Weights and Measures Practices Sector Committee of the American National Metric Council. This committee provides information to assist manufacturers, packers, and distributors in converting their equipment, packages, and labels to uniform standards compatible with SI units and acceptable to the American consumer. The conference has for years maintained close liaison with organizations such as the American Petroleum Institute, the Milk Industry Foundation, National Association of Food Chains, National Canners Association, Scale Manufacturers Association, Meter Manufacturers Association, and many others whose individual members are associate members of the conference and are active participants. Through this close cooperation the conference is able to develop workable solutions to weights and measures problems and we already see evidence of this liaison paying great dividends in converting the marketplace to the metric system.

Although considerable progress has been made toward metrication in this country without any coordinated plan, Federal legislation is needed to provide coordination of the many sectors of our economy which are beginning to capitalize on the benefits of going metric. Also, we need a national commitment to provide the guidelines for an orderly conversion, which must include logical timetables and uniform adoption of metric practices in keeping with SI. This uniformity is necessary if we are to derive the maximum benefits possible under this international system of weights and measures.

The enforcement of regulations governing weights and measures in this country has historically been a State and local function with an assist from the Federal Government. We believe this to be a proper placement of this important responsibility of Government to its citizens. The nearer the point of sale a weights and measures inspection is made, the greater the assurance to the ultimate consumer. The creation of a "U.S. Metric Board" as proposed in H.R. 8674 is a very desirable feature since this board could provide the much needed national metric policy as well as guidelines for implementing the provisions of the policy. It is our recommendation that weights and measures enforcement be retained as near as possible to the operating level of the marketplace for maximum benefit to the consumers and we feel this can best be administered by State and local officials regardless of what system of measurement is used.

We are pleased to see that H.R. 8674 recommends consultation with the National Conference on Weights and Measures to assure that weights and measures officials are appropriately involved in metric conversion activities. This will give them an opportunity to contribute their knowledge and experience to developing metric legislation and

policy and to bring about timely amendments to weights and measures laws and regulations.

Manufacturers, packers, and distributors have found economic incentives to encourage their conversion to the metric system. They can often show on a balance sheet the financial advantages of metrication. No such tangible benefits have yet been demonstrated for the consumer, and this is one reason there still appears to be considerable reluctance on the part of the average citizen to voluntarily accept metrication. We feel there are benefits for the consumer provided sufficient educational opportunities are provided for them and also that the various segments of industry are willing to share their gains with them.

Such sharing of gains should be demonstrated to the consumer and weights and measures officials must be involved in this aspect of metrication to the extent necessary to prevent unfair competition by providing adequate regulations to assure equity for all concerned. In carrying out their daily responsibilities they will have a unique opportunity to serve as educators as well as regulators to help make metrication better understood and therefore more acceptable and beneficial to consumers.

In order to provide this unique service, weights and measures officials will have to receive additional training in the SI measurement system. This training should be planned within the National Conference on Weights and Measures and executed by the Office of Weights and Measures of the NBS. This valuable service which is offered by NBS will become even more important as we progress in metrication and we hope adequate provision will be made for expanding this service as needed.

Mr. Chairman, at this time we wish to comment on the report and proposed amendment submitted by the American Bar Association. While we find ourselves in agreement with many points made in their text and generally in sympathy with their intent, we feel compelled to oppose this and any other amendments which unnecessarily complicate and could delay this much needed legislation.

The American Bar Association urges the enactment by the Congress of temporary legislation, exercising the Federal power over weights and measures so as to provide an effective structural mechanism for converting customary units to metric units in statutes, regulations, and other laws at all levels of government. This is to be done on a coordinated and timely basis in response to voluntary conversion programs adopted and implemented by various sectors of society under the auspices and with the approval of the proposed U.S. Metric Board or similar agency. They further suggest the creation of a measurement czar whose metric conversion directives would preempt all inconsistent State laws. Their suggested amendment, however, does not offer any solution to the major problem of arriving at acceptable conversion plans.

We agree that voluntary conversion should take place on a coordinated and timely basis, but we do not believe that it is appropriate at this time to fuel the Federal preemption fire. We recognize that should State or local laws retard or prohibit the use of the metric system, it may become necessary for Congress, acting at the request of the Board, to exercise Federal power over weights and measures. Should such an occasion arise, we believe that you should and will take necessary ac-

tion. However, before considering preemptive Federal legislation, it is our hope that Congress will carefully examine the benefits which have accrued to consumers from State and local jurisdictions which have adopted model weights and measures laws and regulations developed by the National Conference on Weights and Measures. This is especially true of those laws and regulations governing technical considerations requiring constant review and input from all parties concerned to assure that consumers receive the benefits of new developments and current technology without being made the victims of ill-conceived and unproven devices and practices.

In addition, may we add that the States have not been dragging their feet on metrication but are pushing forward with "go metric" resolutions, legislative action, workshops, educational TV, metric committees, and metric road signs.

To us, it is wishful thinking to believe that a Federal measurement czar can wave his metrication wand and solve all our problems. Let us consider, for example, the area of the marketplace. Here, we believe that the key element will be the actions and support of over 3,000 weights and measures enforcement officials working with consumer groups, scale manufacturers, the petroleum and packaging industries, retailers, and many others in formulating conversion plans in conjunction with the Metric Board that will successfully effectuate conversion to metric usage in commerce.

H.R. 8674 does recognize the major problem as reflected by the duties of the Board which are set forth in section 10: "It shall be the function of the Board to devise and carry out a broad program of planning, coordination, and public education, consistent with other national policy and interests, with the aim of implementing the policy set forth in the act."

This section also recognizes that many interests, views, and conversion costs must be considered in developing conversion plans and programs which the Board will include in its annual report to the President and to both Houses of Congress. Additionally, such reports may include recommendations covering any legislation or executive action needed to implement the programs of conversion accepted by the Board. Developing conversion plans and programs will certainly be a major and difficult task but we believe H.R. 8674 is an excellent start and provides an effective structure for moving forward.

In conclusion, we would like to reiterate our strong support for the passage of metric legislation such as provided for in H.R. 8674. In addition, we wish to pledge the cooperation and assistance of weights and measures officials to the American public in this vital undertaking. The National Conference on Weights and Measures stands ready to accept the challenge that will come its way as the United States moves forward with metric conversion.

Mr. Chairman, we appreciate the opportunity to express our views to this committee and if you have any questions of Mr. Thompson or myself we will be delighted to try to answer them.

Senator Ford. Thank you, Mr. Andrews.

In your joint statement you minimize the potential dangers predicted by the American Bar Association representative in his testimony on Wednesday. If these develop, however, would you be more

inclined toward the adoption of the type of plan that he recommended? Do either one of you want to answer that or both?

Mr. ANDREWS. Mr. Chairman, we feel that the suggestion or the proposal of the ABA adds nothing to what the Board has the authority to do in the organic act, in the bill as it's presented. The Metric Coordinating Board certainly would have the responsibility to present any problem areas to the Congress for specific legislation and we feel that these things can best be handled by developing these needs as they arise rather than predetermining what we're going to find in a relatively unknown area.

Senator FORD. Aren't you placing yourself in the same position that we discussed with Mrs. Peterson earlier, namely, that it is the unknown that causes the fear that prevents us from moving ahead.

Mr. ANDREWS. We hope that the weights and measures officials will be recognized by the Metric Board to the extent that at least one member of the National Conference, a qualified member of the National Conference, will be selected to serve on that Board to provide the experience of weights and measures officials gained in the marketplace suggesting additional educational programs and the need to allay the fears of consumers. Because as stated in our testimony, we think the weights and measures official probably has a better opportunity to educate the general public in the marketplace than anyone else. He has a unique position there of serving as both educator and regulator during this transition period and through his input to the Board through what we hope will be one member of the Board he could suggest possible legislation in weak areas.

Senator FORD. Mr. Andrews, has the National Conference actually considered this issue of automatic conversion of the existing laws and rules and regulations?

Mr. ANDREWS. We have already asked each of our standing committees to examine their documents and through these standing committees to ask weights and measures officials to examine and identify any State or local documents that would need change and much of this has already been accomplished.

As one of the gentlemen testified earlier, we are really more in a holding pattern awaiting Federal legislation because there are some Federal statutes that themselves preclude the use of metric legislation and they will have to be amended.

Senator FORD. But has the National Conference considered this issue formally? You're in the process of having committees look at it and compiling some information, but I presume the Conference hasn't made a decision on the direction to take?

Mr. ANDREWS. We have made some specific decisions, Senator. For example, through our model law we have recommended proper symbols and abbreviations for certain metric terms to be used in those States that have adopted the model law in the marketplace where metric measurements would be declared. For example, on labels, if you use the metric system these are the symbols that must be used and, incidentally, they follow exactly the SI system. You heard one of the gentlemen testify earlier about there's some controversy about the spelling of meter "er" or "re". The conference has chosen to go with the international spelling "re", in the interest of uniformity, to

eliminate this vacillation back and forth between States, and we have actually passed that by the conference.

Senator FORD. It was suggested on Wednesday that delay in the conversion process would give rise to antimetric lobbying which would only hinder the process. Do you agree with that?

Mr. ANDREW. I think we can safely say that this will happen. It's been proven in other countries. I think the British are suffering considerably from this sort of thing.

Senator FORD. I'll put the same question to you two gentlemen as I have earlier. What type of time frame should we have in order to achieve total conversion or approximate total conversion?

Mr. THOMPSON. Mr. Chairman, we tend—at least I feel the previous speaker said it was difficult to give an overall picture, and I'm more inclined to agree with what I felt that you have suggested, that each sector program have a time frame rather than a time frame for the entire country. Did I understand you correctly?

Senator FORD. Professor Johnson and Representative McCauley testified that they felt the minimum time should be 5 years and the maximum time 10 years. Mr. Peyton suggested we could put a time limit on the Board and leave open-ended the time frames for the various sectors of the economy.

Mr. ANDREWS. Mr. Chairman, I think we would share that feeling because based on the limited experience we have already had in some conversions in this country for some sectors of the economy metric conversion is going to be a very simple task, and they might be converted by the end of the first year. Others will perhaps need a full 10-year period and perhaps even longer.

I'm placing great faith in the expertise of this Board to recognize these variations in requirements and provide for them, but the most important function of this Board I think would be to coordinate those efforts because it will not be possible for all to progress at exactly the same speed. I think it would work a terrible hardship on some sectors of the economy to say, "You must be converted in 5 years." I think perhaps it might even encourage a little foot-dragging if you set a 10-year period for others. Perhaps they would not feel inclined to go into this until they had to.

I guess I'm motivated somewhat, Senator, by the belief that this metric system is a good thing, and I think if properly sold to the American public they will go metric on a voluntary basis as quickly as possible once they learn about the system—and I think this is the key. I think Mrs. Peterson stated the case very well. I think the secret to all of this is education, and once the people are educated to the benefits of it they are going to recognize it and insist that the people they do business with go metric.

So I think it would be a mistake to set a hard and fast time frame. I think the Board in its infinite wisdom should be given that responsibility.

Senator FORD. All the witnesses today have encouraged that a member of their association or group be on the Board. What is your opinion about the Board? Do you think it should self-destruct at a certain point?

Mr. ANDREWS. I think I'd have to share Mr. Peyton's philosophy on that, even though I'm a bureaucrat myself. I'm a bureaucrat of

long standing, if they choose to terminate me at any time it isn't going to affect me greatly from a personal standpoint, so I have reached the point in life when I can take a little more philosophical look at the bureaucracy. I think that any bureau or board or commission that is created that doesn't have some termination point can figure out ways to self-perpetuate itself almost indefinitely. I would strongly recommend that some time frame be put on the Board.

Senator FORD. As a bureaucrat, how long did it take you to arrive at this decision?

Mr. ANDREWS. A great many years. I arrived at that decision the day I became eligible for retirement.

Senator FORD. At least you're honest. One final question.

Do you think that it might be advisable for the bill, if enacted, to contain a mandate to the Board to consider the issue of converting existing laws to their metric equivalent?

Mr. ANDREWS. I think it's quite possible, Mr. Chairman, that there will be some foot-dragging and I think we mentioned in our testimony that the Board may eventually have to come back to the Congress and say, "We are not getting compliance on a voluntary basis. This is actually working against the interest of the total economy and we're going to have to have some compulsory legislation." I think that's entirely possible, yes.

Senator FORD. I have no further questions.

Mr. THOMPSON. Thank you for the opportunity to testify.

Senator FORD. We appreciate your coming. I enjoyed your appearance and your honesty very much, Mr. Andrews.

Mr. ANDREWS. Thank you, sir. When you reach my age, Mr. Chairman, you can afford to be more honest.

Senator FORD. I hope being honest is not limited to older people.

The next witness is Mr. Carl Beck, National Small Business Association here in Washington. Mr. Beck, we're delighted to see you. You will be the wrap-up witness here this morning.

STATEMENT OF CARL BECK, NATIONAL SMALL BUSINESS ASSOCIATION, WASHINGTON, D.C.

Mr. BECK. I understand you have a tight schedule so I will be as brief as I can.

Senator FORD. That's part of the problem. You know Senators are never on time. I tried to change that but I found it's pretty hard to do here.

Mr. BECK. I have a few notes here.

Senator FORD. I hope you don't read them all.

Mr. BECK. I hope not.

My name is Carl A. Beck. I'm president of the Charles Beck Machine Corp. of King of Prussia, Pa., a small manufacturer of industrial machinery employing about 30 people.

Mr. Chairman, I have submitted a statement as you know. I would like the privilege of having it put in the record rather than reading it, even though it's short. I would just like to illustrate a few points.

Senator FORD. Fine, Mr. Beck. Your full statement and comments will be a part of the record. You may proceed.

Mr. BECK. Thank you very much. I have appeared before this committee and House committees for some years now on metric legislation and I'm certainly not going to repeat those things.

Senator FORD. You see a new face today, though.

Mr. BECK. That's right. Senator Inouye was here last time.

I would like to mention that these things are in the record and things that I have been saying for several years have been pretty well borne out, and they are now being accepted more and more, by more and more individuals, as being basically sound. I think that the most salient point that I would like to make is that we talk so much about the cost of metric conversion where we should focus more on the opportunities and benefits from metric conversion.

As I said in my statement, I think it's extremely important that we recognize that costs and benefits are not the same thing, and sometimes we can minimize costs (such as by shortening time frames) and not necessarily maximize benefits. I'm looking at it from the viewpoint of a small businessman. I happen also to be a member of the Board and Chairman of the Government Liaison Committee of the American National Metric Council, but I'm not speaking for them here. But in my role as chairman of this committee I have had an opportunity to be exposed to the government activities that are already underway relative to planning for metrication.

I think the example of the time it takes—I'm coming to your repeated question about conversion time—the time it takes is very difficult to forecast. The Federal Metrication Working Group, chaired by Mr. Stanley Doore of the Weather Service, has done an outstanding job in planning for metric conversion, and I think it's an outstanding example of how a problem should be attacked. But it does take a tremendous amount of time to do it well, to do it thoroughly.

Those of us who are small businessmen, as you know, some 97 or 98 percent of the businesses in this country, are constantly fearful, and with good reason. We know from previous legislation the large companies and the Government get together and by so-called consensus decide to do things, and the small businessman has problems because he isn't really represented in the consensus, though everybody would like him to be, himself included.

Regarding time frame particularly, as a respondent to the metric study conducted by the Bureau of Standards, we were a participant in that and there's no question that our best conversion period would be about 20 years, and to try to do it in 10 years would be horrendous and practically put us out of business, and we made quite a study of it.

I'd like to comment on the remarks of my good friend, Bill Zeiter, who gave you a very scholarly analysis and testimony here last Wednesday on the Federal law aspects. But I'd like to call to your attention that I don't think it's as simple as Bill Zeiter would have us believe.

I happen to have here, which I just last Friday got from Mr. Joe Ross of the American Law Section of the Legislative Reference Service, through the kind auspices of Congressman Coughlin, our second printout of all the measurement-sensitive customary terms in the U.S. Code. Having just received this, I have not yet had an opportunity to study it, but there are several things in here which I think are

quite significant in terms of the subject of the proposed legislation on the Federal level for metric conversion.

For example, if I might be facetious for just a minute, I don't see any reason in metric legislation why we need to have a constitutional amendment amending article I of the Constitution which says, in part: "in all cases whatsoever over such district not exceeding 10 miles square." This is the kind of law that I think we could live with, without having to revise. It's referring, of course, to the District of Columbia. So that sweeping legislation to change things may be totally unnecessary in some cases.

There are others that have to do with legal instruments. For example, in the U.S. Code, title 43, section 751, there is an article regarding "all lines shall be plainly marked upon trees and measured with chains containing two perches of $161\frac{1}{2}$ feet each, subdivided into 25 equal links and the chains shall be adjusted to a standard to be kept for that purpose." When we convert our legal measurements we have a problem of not going to this $121\frac{1}{2}$ percent that Mr. Zeiter recommended, but of being very specific in certain areas.

The term, as you might expect, for the word "grain" is used extensively, having to do with agricultural products and references to them, of course, and use of the word in terms of alcoholic beverages and so on, but very specifically there's one that we're very concerned about: "* * * the Bureau of Standards of the United States consisting of a 1 pound weight, and the requisite subdivisions and multiples thereof, from the hundredths part of a grain to 25 pounds. The Troy weight ordinarily employed in the transactions of such mints and assay offices shall be—"

Now until some of us—and I'm trying to take a——

Senator FORD. How much does a grain weigh?

Mr. BECK. It's an item of weight, *avoirdupois*——

Senator FORD. How much? Do you know?

Mr. BECK. Did I see Roy Clark here?

Mr. CLARK. 7,000 grains to a pound.

Senator FORD. Thank you very much. Now I know something I didn't know before.

Mr. BECK. There are a lot of surprises in here. Horsepower has some interesting references. It also refers to the pulling of canal boats by manual power or horsepower, which is not the kind of horsepower we're talking about. But we're talking about the licensing of vessels under a given horsepower or over a given horsepower. This is why we elected to undertake this search, this "FLITE"—Federal Legal Information Through Electronics—search of the U.S. Code, and I think we recognize that when it comes to the State level the problems become considerably more complicated because we don't have computerized State legislation and we certainly do not have the Code of Federal Regulations in the computer. But at least here is the Federal law, and we believe that all the measurement-sensitive terms—and a lot more that are irrelevant—are actually in this computer printout, and it's a place to start.

Therefore, I think we should not move too fast in trying to have sweeping legislation until we have analyzed the problem. We don't really know what questions to ask and we're beginning to give answers for unasked questions, so I think we should slow down on that.

I've frequently referred to the problem of statistics in various testimonies. I happen to be chairman of the Business Advisory Council on Federal Reports, and am quite concerned with the paperwork burden. I have been working with Mr. Hassel Bell and members of the commission—the new commission, which as you know met just last Friday for its first meeting, and lasts for 2 years. Here's an area where the proposed law—and I refer to it in my testimony—all three bills refer to surveying of information by the Metric Board. We question what kind of a paperwork burden this is going to create, because it's so undefined in the bill. But I feel it is important that somehow or other, regardless of what the bill says, we get into the legislative history some sort of understanding of what is expected of the Metric Board. We can create a tremendous amount of paperwork with very little effort by creating surveys regarding the progress of metric conversion, and as so frequently I've said, when we survey industry to find out how industry is progressing we tend to survey only the big industries, to reduce the burden on the small businesses, and they are not necessarily the same. It's like the man with one foot on a block of ice and the other in boiling water; on the average, he very comfortable. But when we're talking about metric conversion we're not talking about averages. We're talking about specifics.

In the Congressional Record on page H-3607 of the last Congress, May 7, 1974, there is a letter there to Representative Charles Mosher over my signature which says in part:

It is our understanding the Small Business Administration has determined that under existing authority it may make economic disaster-type loans under Section 7(b) (5) of the SBA Act. It is also our understanding that the Office of Management and Budget and the Commerce Department concur in this decision.

We have just in the last couple of days checked again with the Small Business Administration and are advised that they believe that since this is a voluntary conversion act as opposed to a less voluntary act, which was discussed in the House last year, that they would not have authority at present to make hardship loans for metric conversion.

May I emphasize we are not—I certainly, for one, am not—asking for any kind of special consideration for small business. We are not asking for handouts. We are not asking for grants, but authority for loans in those areas where a small businessman is faced with involuntary conversion because, as so many of them do, they have large customers who are converting to metric and they have no choice but to go metric. There may be, as for automobile suppliers, some heavy conversion costs. To have them denied access to Small Business Administration loans as a last resort for such involuntary conversion by environmental influences is perhaps unduly unfair to the small businessman. We are not suggesting a change in the law, either the House bill or the Senate bills, because I, for one, do not believe that this is going to be a major problem, but I would hope again that somewhere in the legislative history we might be able to establish that there are cases where the conversion will not be a voluntary conversion, and therefore would permit small businesses to submit applications for loans through the Small Business Administration for such a condition which is beyond their control.

Senator, in the shortness of time, I hate to try to make any more than those few points. There's so much that could be said. Having lived

with metric legislation for these many years, I feel that the House bill, particularly, is a good bill, and we are in favor of that. We do have these caveats. I do think that there's a tremendous responsibility on the Metric Board when it is formed to do a coordinating job. I think it's extremely important that for the sake of the country that they recognize the considerable service that's being provided by organizations like the American National Metric Council, and utilize the knowledge, experience, and findings of the metric council, for example, in its ongoing work as indicators and inputs to its own responsibilities.

I think that, in the last year or two particularly, metric conversion has begun to accelerate so much that there is a wealth of material available. I certainly, for one, believe that metric conversion is going to be a lot easier and a lot less costly than most people have thought for many years, but I do feel that if we are to go too fast we tend to ride roughshod over small business, which so frequently is not adequately heard, that it may do a real disservice to the country. In fact, as I said in the closing of my written statement, and as I have said for many years, and I believe it to be very true:

If the United States can complete the metric conversion process in a manner which inures to the economic advantage of small business—the 98 or 99 percent of the private economy—the conversion will have been a success; if this does not occur, the cost of conversion to the U.S. economy will require decades to be overcome, and may actually incur irreparable damage to the position of the United States in the economy of the world.

Those perhaps are strong words, but I think this is true, and as a small businessman having been involved in legislation and specifically in metric conversion and its problems for many years, I do not think it's an overstatement.

Thank you, Senator.

Senator FORD. Thank you, Mr. Beck.

You stated earlier with regard to a schedule for conversion that 20 years might be more appropriate, whereas I had been asking about 5 or 10 years. Do you agree with the approach that Mr. Peyton proposed in which we might put some sort of a time schedule on the Board, while leaving the various sectors of the economy more open-ended?

Mr. BECK. Yes, Senator. I said that the 20 years is the best period for our particular company and we do do business internationally. We are over 100 years old and we sell all over the world. But 20 years is the best period for our company. I do not think it is possible for the Congress to determine in advance how this problem is going to be resolved in terms of time frame. I think you have to build your overall timetable from your inputs from the individual timetables. I think, as has been said by the gentleman who appeared just before me, that, unquestionably, certain things will go very fast, and to put even a suggested period of 10 years would be detrimental and pejorative to that sector that would move fast. There will never be a completion. I think we all recognize this. There will never be a completion or "total" conversion, and to define what a "substantial" conversion is is a very difficult thing to do.

So that in some areas it will move very fast and in some areas I know it will take more than 10 years. I know that you cannot even get substantial conversion in some areas in 10 years, and in some areas you will never have conversion to metric except maybe in soft conversion. I think that this is a time frame that has to evolve.

I do share with Don Peyton his concern about ongoing commissions, another Government organization that never dies. I think we are all aware of that, those of us who are interested in economy in Government. But, on the other hand, I think it's extremely difficult for the Congress at this time to put time frames of any sort on the whole process or any parts of it because we don't know enough yet. I think there's a real responsibility for the Metric Board to determine such timetables as soon as possible in its life and set a time for its own demise.

Those of us who went to Australia and visited with the metric people in Australia, we or the American National Metric Council felt strongly, in our report on that conference, that there should be a timetable, but it should be set by the Metric Board. It should plan its own demise, in advance, as soon as it has enough information to know how long it should last.

Senator Ford. Mr. Beck, you said that some of the smaller companies should be eligible for loans for involuntary conversion.

Mr. Beck. Yes.

Senator Ford. Just give me very quickly in a minute or two the cost to a small company to convert to international business. Apparently you use the metric system now if you have been in business for 100 years and you're doing business with other countries, since practically all countries are on the metric system except us and four other hold-outs. What additional cost would it be to you to convert to the metric system? You said you wouldn't need a loan, but what if you had to go metric involuntarily today or Monday?

Mr. Beck. Well, our machines are sheet cutters, machines for cutting materials from rolls into sheets; papers, textiles, and so on. We have for years supplied machines to foreign markets to cut in increments of millimeters and centimeters, whereas our standard cutoff length selection arrangement is in inches and fractions of an inch for domestic consumption. So this kind of metric conversion is no major problem.

Parenthetically, we just shipped three large machines to Australia recently and they, by their request, were made to cut in inch lengths, not in metric lengths. So that metric isn't going as fast in Australia as you would think and I have some real feelings about that and about how small business has not yet been involved in Australia, and that is also in my section of the report on the Australian conference.

But for us to fully convert to metric, it means that we would be using metric shafts to fit the metric bearings—which have always been available and the metric shafts have not been available—metric fasteners, metric gears, modular instead of diametral pitch—I'm talking about internals.

Now there are two basic ways to meet this problem of manufacturing conversion. The one that I think should be highly recommended is what's called the black-box conversion. The inputs and outputs are in metric but the inside stays in customary units until such time as it is practical and economical to redesign the inside of the black box. This is what we're doing with our machines. They cut metric lengths but all the components are in customary units. However, as I said 4 or 5 years ago, when the Fasteners Institute began to work on the change to a new metric system of fasteners, this would cut our simple inventory in our small company from 18 types of thread/pitch combinations to

eight types of thread/pitch combinations. Here is a real potential saving, small as it is, in inventory, in ordering, purchasing, stocking, and so on.

Now, if this kind of conversion can be done this is what I mean by an opportunity to realize the benefits of metric conversion rather than just trying to minimize the cost. If this can be done in more areas, if Don Peyton and his people at ANSI can encourage this kind of hard conversion to new rationalized standards to simplify life, it is going to cut costs and industry in the United States is going to be helped.

If this is overlooked and we do just soft conversion, all we're doing is complicating the situation, even though we think we have converted.

To come back to your question, do you mean soft conversion where we measure a 2-inch fastener and say it really is 50.8 millimeters long, or are we going to new metric threads and dimensions and so on? So there are so many stages of metric conversion, to say when metric conversion is done is totally impossible. Did I answer your question?

Senator FORD. Yes, sir. I understand it a little bit better. I understand what you're saying about the problems that would face you. It could be an economic disaster to convert involuntarily. There is a problem, even though it could be economically helpful. It also could be an economic disaster if it's implemented too fast.

Mr. BECK. That's right. We all recognize that there is a large one-time conversion cost which we want to get through as inexpensively as possible, admittedly, but on the other hand, the only way this is going to work is that there's going to be a long-term economic benefit. To the small businessman, the large conversion cost, whatever its size may be, is considerable to him because he's small and he maybe needs help to get over this hump in order that the benefits repay him over a period of years.

Senator FORD. I don't have any further questions. You have done a very good job, and I appreciate it. We have talked about half an hour.

Mr. BECK. I am sorry—I didn't mean to take that long.

Senator FORD. I didn't either, but that's the way it goes. I will just apologize to my guests and tell them I was listening to a very interesting person. Thank you all for being here. Hopefully, we can come up with legislation that all of you will approve.

(The statement follows:)

STATEMENT OF CARL A. BECK ON BEHALF OF NATIONAL SMALL BUSINESS
ASSOCIATION

Mr. Chairman and members of the committee: My name is Carl A. Beck. I appreciate this opportunity to appear before you today and testify regarding pending metric legislation.

I am President of the Charles Beck Machine Corporation of King of Prussia, Pennsylvania, a small manufacturer of industrial machinery employing about 30 people. I am also Chairman of the Metrication Committee of the National Small Business Association, and I hope my remarks may assist in interpreting the impact of metric legislation on many kinds of small business in the United States.

I have appeared several times before Committees of Congress on this subject over the last several years, including this Committee during the previous Session of Congress. In reviewing from time to time what I have said in the past, I find that it is germane today as it was when previously presented. Since those comments are in the record, I shall not, of course, repeat them today. I would comment, however, that many individuals involved in metrication over the years

were prone to denigrate my comments then and have since expressed concurrence with my viewpoints. My basic tenet is that, important as it is to minimize conversion costs, a more primary objective should be to encourage metrication in a manner that maximizes benefits. They are not the same thing—and, in an effort to reduce metrication costs (by such actions as shortening time frames), we may be prone to denigrate the benefits to our policy which might accrue by a more thorough (and thus longer) conversion timetable.

I am a member of the Board and the Executive Committee of the American National Metric Council, and Chairman of the Government Liaison Committee of ANMC, although I would call to your attention that my remarks in no way are in behalf of or reflect the opinions of the ANMC or its members. But, in my role of Government Liaison, I have had an opportunity to be exposed to various Government activities now underway relative to planning for metrication. I have sat in as an observer, by invitation, at meetings of the Federal Metrication Working Group for Meteorological Services, chaired by Mr. G. Stanley Doore of the National Weather Service. In my opinion, here is an outstanding example of how thorough planning can be organized, with full consideration of all impacts of metrication on all related governmental and quasi-governmental groups, in addition to the private sector and the general public as well. I hope this group continues with the deliberate and complete analysis which it has exhibited to date—but it does take time. For Congress to opine at the outset how long such deliberations must or should require would be futile. I am particularly pleased that the House action on H.R. 8674 eliminated a fixed time schedule, no matter how "voluntary".

As a respondent to the National Bureau of Standards Metric Study, as I have mentioned in previous testimony, a ten-year complete conversion for the Charles Beck Machine Corporation would be astronomical in cost—but a twenty-year conversion period was calculated to be a very small fraction of that.

My good friend William E. Zeiter presented testimony to you on this past Wednesday regarding proposed legislative additions to cure legislative pitfalls during the conversion process. His example of the sale of gasoline, and its concurrent conversion problems, is well expressed, but the point he did not make was that, in the conversion process of the service stations, it is inevitable that the large volume and company-owned service stations in the large population centers will be converted first, and the smaller businessman out in the countryside will be the last to change (or have his pumps changed).

Through the kind offices of Representative Lawrence Coughlin, I have been working with Mr. Joseph Ross, Chief, American Law Division, Congressional Research Service. A preliminary computer search of the U.S. Code for measurement-sensitive terms has produced an unexpected plethora of references. A further analysis of these references, I believe, will indicate many uses of measurement-sensitive terms in customary language, which have no legal impact, are present for reference or adjectival description only, and can thus be ignored. A second group of terms may well need no enabling legislation because they are non-restrictive or non-delimiting in nature. Of the remainder, some can be converted directly, because there is an exact and relatively simple conversion factor, such as for length. Others have inexact conversion factors or conversion factors valid only to decimal places. The exactitude of conversion required in such cases may vary from application to application: an approximate rounding eminently satisfactory for some uses, but a much more exact conversion for others. We are used to talking in both milligrams (mg) and "kilos" (kg) when referring to ethical pharmaceuticals and drugs, but there may be other cases when exact conversion is critical.

I generally concur and agree with Mr. Zeiter's scholarly testimony, but have a concern that a broad mandate to the Board, to permit conversion rounding to within 12.5%, may be moving too fast and in a too sweeping manner. As an active member of ANMC, and familiar with the consensus principle Mr. Zeiter has outlined, I would agree that it is sound in principle, but yet I frequently find what appears to be a general consensus has sometimes proven to be a consensus between big business and big government, with the smaller businessman not involved as much as he should be.

The U.S. Code, helpful as an analysis of it can be, is not the total problem on the Federal level. Of considerable significance, if not more so, is the plethora of regulations issued by Agencies and Departments of the Government. As Chairman of the Advisory Council on Federal Reports, I am constantly aware of the continuing interpretation of legislative intent exercised by the various branches

of Government, including the regulatory agencies. A very good example of the problem is illustrated by the current legislation under consideration. Senator Pell's bill (S. 100) on page 12, line 3, refers to "conduct of research or surveys"; Senator Inouye's bill (S. 1882) on page 10, line 15, mentions "Collect, analyze, and publish information * * *"; and H.R. 8674 on page 10, line 11, has identical wording. Now, you have recently created a Paperwork Commission which began its two-year existence a week ago, charged, *inter alia*, with the reduction of respondent burden, which action we have and continue to heartily applaud. Yet, I ask how the United States Metric Board will interpret the above instructions. Will they use the information available to ANSI, ANMC, and other similar bodies, to measure the progress of metrication, or will they feel obligated to develop yet another series of questionnaires and surveys? If they do the latter, will they eschew getting information from the smaller businessman, to minimize burden, and thus obviate his input, and create statistics which thus preclude a true "consensus" incorporating the position or predicament of the small businessman? Although I ask the question rhetorically, I hope legislative history of this metric legislation will, at last, establish meaningful guidelines to the Metric Board in this area.

I have frequently said that statistics from the viewpoint of the small businessman is much like the man standing with one foot on a block of ice and the other in boiling water: on the average he is quite comfortable. The small businessman is afraid—not of going metric, since those knowledgeable of the SI metric system recognize the potential benefits, but of being forced to convert to SI usage in a manner or time frame which negates the potential benefits before they can begin to be realized. We supported the metric bill in the House during the last Session of Congress because, as read into the Record on the floor of the House, the Small Business Administration felt they had authority to make SBA loans to small business catastrophically or severely prejudiced by conversion activities beyond their control. I am not suggesting any such proviso in the current legislation, because I feel the House bill adequately provides for remedial action as necessary under Section 10, para. (i).

I would like to quote a sentence from my portion of the report on the North American-Australian Metric Conference. Referring to co-ordination of metric conversion in Australia, I said (page 63): " * * the smaller businessman has had practically no opportunity for either direct or indirect involvement, and thus is yet unable to identify his potential problem areas, let alone do any planning or forecasting of what his position in metric conversion may be." I sincerely hope that, with effective input to and from the American National Metric Council particularly, such conclusion will not be repeated for conversion in the United States.

Mr. Zeiter makes a telling presentation that no nation has similar problems in metrication. I am convinced that the United States, *especially* the small businessman, has much to gain from conversion to SI in the long run. But I hope we do not try to provide sweeping answers to questions we have yet to adequately fortunate. Unquestionably, the cost of metric conversion will be much less than originally envisioned by the majority of people, this has been demonstrated in other countries. But the benefits cannot be maximized without the deliberate and thorough planning of a comprehensive planning activity. In working with the U.S. Code, although only a part of the total picture, perhaps we can at least begin to define the problem areas before we proceed with problem-solving.

I take the liberty of repeating what I have said previously: "If the United States can complete the metric conversion process in a manner which inures to the economic advantage of small business (the 98-99% of the private economy), the conversion will have been a success; if this does not occur, the cost of conversion to the U.S. economy will require decades to be overcome, and may actually incur irreparable damage to the position of the United States in the economy of the World."

If we favor a procrustean approach of pre-ordained timetables, general solutions to many specific problems, look at average impacts instead of specific consequences, look to lower costs of speedy actions by Government and major industries, while eschewing maximizing long-term benefits, we may build a trap from which it will be difficult to extricate ourselves.

[Whereupon, at 12:10 p.m., the hearings were adjourned.]

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ADDITIONAL ARTICLES, LETTERS, AND STATEMENTS

TRANSPORTATION ASSOCIATION OF AMERICA,
Washington, D.C., September 26, 1975.

Senator WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: I understand your Committee is presently considering H.R. 8674 and other proposed legislation providing for conversion of the U.S. system of weights and measures to the metric system.

The Transportation Association of America generally supports this legislation. The Transportation Association of America (TAA) is a non-profit national organization whose members include carriers of all modes of transportation (air, motor, rail, water, pipeline and freight forwarder); users of the services of those carriers, and investors in the transportation industry. TAA is the forum wherein these diverse views may be reconciled on issues of major transportation importance for the benefit of the industry as a whole.

The members of TAA have adopted the following policy respecting this issue: "TAA supports the orderly conversion from the customary U.S. system to the metric system of weights and measures. If such a system is adopted it should be done on the basis of a nationally coordinated program."

On this basis TAA favors legislation which would provide for such an orderly, nationally coordinated program of conversion to the metric system, and urges that your Committee give favorable consideration to legislation which would accomplish this objective.

Thank you very much for your attention. We would like to request that this letter be made a part of your Committee's formal record on this legislation.

Sincerely,

PAUL J. TIERNEY,
President.

UNIVERSITY OF COLORADO,
Boulder, Colo., September 29, 1975.

ERIC H. M. LEE,
Staff Counsel, U.S. Senate,
Committee on Commerce, Washington, D.C.

DEAR MR. LEE: Thank you for your letter of August 25 requesting more information about my scientific and technical objections to the metric system. I am pleased to enclose two articles¹ "Is the Metric System the Best We Can Do?" and "Natural Units: Are They for Everybody?" Unfortunately neither article is really appropriate. The latter article was written for physicists and perhaps is unduly technical: The former article was written for Congressmen, but is two years old.

I am now working on a report which I believe will do justice to recent scientific and technical developments. I hope to have this report in your hands by early October when the Commerce Committee meets to discuss metrication.

Sincerely yours,

DAVID F. BARTLETT,
Associate Professor.

SEARS, ROEBUCK & Co.,
Washington, D.C., September 30, 1975.

Hon. WARREN G. MAGNUSON,
U.S. Senate,
Washington, D.C.

DEAR SENATOR MAGNUSON: I was most pleased to learn that the Senate Commerce Committee plans to hold hearings in October on legislation dealing with metric conversion in the United States.

¹ The articles are in the committee files.

Again I would like to emphasize Sears support for an orderly transition to the metric system, a change which will yield substantial benefits to the nation's export capability and balance of trade. We hope the Committee will be successful in reporting a bill which will win approval on the floor.

In connection with training our own buying and merchandising personnel, Sears has developed and put in use the enclosed metric converter. This is the kind of thing that Sears and many other companies are already doing and expect to continue at our own expense to help our employees and our customers adapt to the change.

We sincerely hope the current Congress will act favorably on metric legislation.

Cordially,

PHILIP M. KNOX, Jr.,
Vice President,
Governmental Affairs.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION,
Washington, D.C., October 2, 1975.

Hon. WARREN G. MAGNUSON,
Chairman, Senate Commerce Committee, Dirksen Office Building, Washington, D.C.

DEAR SENATOR MAGNUSON: It is our understanding that the Senate Commerce Committee will hold hearings October 8 and 10, 1975, on H.R. 8674, Metric Conversion Act of 1975, which recently passed the U.S. House of Representatives.

The National Electrical Manufacturers Association would like to take this opportunity to express support for this measure. NEMA, the principal trade association of the electrical manufacturing industry, has a membership of approximately 550 U.S. concerns producing products for the generation, transmission, and distribution of electricity in industrial, commercial, and residential applications.

NEMA supports the adoption in the United States of the metric system of units known as the international system of units (S.I.). Consonant with this objective, NEMA supports the parts of this measure providing that the implementation of the metric system be voluntary and orderly through the creation of a national coordinating board established by this Act. Additionally, H.R. 8674 is a supportable compromise between the Administration and labor versions presently pending before the Senate.

Therefore, NEMA urges the Senate Commerce Committee to report out a bill with the same provisions as those contained in the House passed measure. We also wish to thank the Committee for giving the subject this much needed attention.

NEMA hereby requests that this letter be included in the official record of the hearings.

Very truly yours,

ANDREA J. GILLIGAN.

AMERICAN PUBLIC WORKS ASSOCIATION,
Chicago, Ill., October 2, 1975.

Hon. WARREN G. MAGNUSON,
Chairman, Commerce Committee,
U.S. Senate,
Washington, D.C.

DEAR SENATOR MAGNUSON: The enclosed metrication resolution may be of interest in the hearings on metric conversion to be held by the Senate Commerce Committee, on October 8 and 10, 1975.

The resolution was recommended by the APWA Institute for Municipal Engineering, representing some 2,400 registered professional engineers, and adopted by the full American Public Works Association membership of 16,700 public works professionals at our recent International Public Works Congress and Equipment Show, in New Orleans.

Our Association stands ready to assist, in any way, in planning and implementing an orderly metric conversion in the public works sector.

Sincerely yours,

ROBERT D. BUGHER,
Executive Director.

Enclosure.

RESOLUTION No. 3—PUBLIC WORKS METRICATION

Whereas legislation is pending before the United States Congress to declare it to be national policy to convert to the metric system and to establish a United States Metric Board to coordinate programs designed to achieve voluntary conversion to the metric system, and

Whereas private industry in the United States has already made significant progress toward metrication, and

Whereas Canada has embarked on a metric conversion program which is expected to result in all sectors of the Canadian economy using the metric system by 1980, and

Whereas the American Public Works Association (APWA), through its Institute for Municipal Engineering, has, since 1970, been monitoring developments in metrication, and

Whereas the APWA is uniquely qualified to serve all segments of the public works field and conduct research and educational programs in cooperation with its Institutes for Professional Development, now therefore be it

Resolved That the membership of this Association does hereby call upon the Board of Directors of the APWA to establish a liaison relationship with the United States Metric Board or such other federal agency that may be charged with responsibility for the coordination of metric conversion efforts, and be it further

Resolved That the Board of Directors of the APWA take appropriate steps to develop a comprehensive plan for the coordination and implementation of metric conversion efforts by officials of public works agencies at the federal, state and local levels of government, and be it further

Resolved That allied organizations serving this field be invited to participate in this metrication coordination program.

AMERICAN FARM BUREAU FEDERATION,
Washington, D.C., October 6, 1975.

HON. WARREN G. MAGNUSON,
*Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.*

DEAR MR. CHAIRMAN: The attached statement presented by Mr. W. E. Hamilton, Chief Economist, to the Subcommittee on Science, Research, and Technology of the House Committee on Science and Technology reflects Farm Bureau's views with regard to metric conversation.

We should appreciate your making this statement a part of the record of hearings by your Committee, October 8 and 10, 1975.

Sincerely,

JOHN C. DATT,
Director, Congressional Relations.

Attachment.

STATEMENT OF W. E. HAMILTON, CHIEF ECONOMIST, THE AMERICAN FARM BUREAU FEDERATION TO THE SUBCOMMITTEE ON SCIENCE, RESEARCH AND TECHNOLOGY OF THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY

AN AGRICULTURAL VIEW OF METRIC CONVERSION LEGISLATION

I appreciate the opportunity to present an agricultural view of legislation to encourage an orderly conversion to the metric system of weights and measures.

I do not profess to be an expert on the technicalities of the metric system; however, I have had occasion to give some thought to the advantages of this system and the problems of converting American agriculture to metric measures. I was the only representative of an agricultural organization on the Metric System Study Advisory Panel, appointed by the Secretary of Commerce under the provisions of Public Law 90-472. In addition, I have had considerable experience in the preparation of informational material on metric measures for Farm Bureau members.

For the record, Farm Bureau is the largest general farm organization in the United States with a membership of 2,393,731 families in 49 states and Puerto Rico. It is a voluntary, nongovernmental organization, representing farmers who produce virtually every agricultural commodity that is produced on a commercial basis in this country.

Agricultural Measures

The measuring system now used by farmers is extremely complex. Farmers, of course, use the customary units of measurement which are familiar to everyone. But agricultural commodities are often bought and sold in terms of the quantity required to fill a standard container such as a box, crate, case, basket, lug, bag or barrel. As a result product weights are often converted into bushels or other units based on volume. For example, most grains are bought and sold in terms of bushels, but the number of bushels in a lot is determined by dividing the net weight by the number of pounds in a standard bushel of that particular grain. The number of pounds in a standard bushel varies with the density of the commodity. The density of individual lots is affected by growing conditions and such factors as variety and maturity. In the case of grains, this variation is recognized by the inclusion of a quality factor known as "test weight per bushel" in the official USDA grading standards.

A list of "Selected Units of Measure Used for Agricultural Products" is attached to illustrate the complexity of our present methods of measuring these products.

Adoption of the metric system would contribute to the simplification of agricultural measurements, however, it is to be expected that some of the complexity indicated by the attached list would continue to exist for a long time to come.

Farm Bureau's Position

Farm Bureau has long recognized the need for improving our measuring system—particularly in the case of grain. For a number of years Farm Bureau had a policy which called for use of the hundredweight as the standard unit for trading in grain. The purpose of this recommendation was to simplify the computations involved in the buying, selling and use of the various grains, and to facilitate the comparisons that are utilized by producers and users for decision-making purposes. This policy proved difficult to implement, primarily because of the resistance of some elements in the grain trade, and the fact that the use of the bushel as a measure of grain is a matter of deeply entrenched custom rather than a matter of law.

When it became apparent some years ago that there was a growing interest in the metric system, the American Farm Bureau Federation's delegate body dropped its recommendation on the use of the hundredweight as a standard measure for grain, and indicated support for "gradual adoption of the metric system." The American Farm Bureau Federation filed statements on H.R. 5749 and S. 100 in 1973. Both statements supported gradual adoption of the metric system and expressed the view that the federal government should not compensate anyone for any costs that may be incurred in the transition to this system.

Farm Bureau's support for gradual adoption of the metric system was reaffirmed at our 1974 convention with an added recommendation that farmers and ranchers be represented on the proposed National Metric Conversion Board.

All references to the metric system were eliminated from the statement of policies adopted at the 1975 annual meeting of the American Farm Bureau Federation. This action followed a discussion in our Resolutions Committee which indicated that the process of converting to the metric system is already underway and can be expected to continue. Thus, it does not necessarily indicate a reversal of Farm Bureau's previous support for gradual adoption of the metric system, but it does indicate that support for the adoption of this system does not have a very high priority with Farm Bureau leaders.

Important Considerations

The increasing use of the metric system both in other countries and in the United States has, thus far, had little impact on American farmers.

It is doubtful that a further shift to the use of metric measures would result in any substantial direct benefits to farmers in terms of effects on their operations.

Adoption of the metric system would produce a number of minor benefits for farmers by simplifying both the keeping of records and the numerous mathematical computations that are a routine part of a farming business, but the transition from a familiar system to an unfamiliar one would be painful.

Since farmers apparently have relatively little to gain from metrication, no one should expect them to take a leading role in the adoption of metric measures. On the other hand, if the conversion process continues in nonagricultural areas, as I anticipate it will, the time will come when it will be desirable, and probably necessary, to convert agricultural measurements to metric units.

The major impact adoption of the metric system would have on agriculture would be the confusion and inconvenience that are to be expected in the transition period when millions of people would have to learn to think in a new system.

While this may not be as serious a problem as many people are inclined to think, it is a very sizable consideration.

An intensive educational program would be needed to prepare farmers for the changeover. A part of the educational job that would be needed could be accomplished through the widespread distribution of published materials. This type of activity is already underway. A number of articles on the metric system have been published in newspapers and magazines that cater to farm audiences, and the Department of Agriculture now publishes crop report summaries in metric, as well as customary, units.

The costs of converting to the metric system probably are not nearly as great as many people believe. The costs would be extremely difficult to calculate under a program of gradual conversion. Such a program would permit many items of machinery and equipment to be converted as the purchase of new equipment becomes necessary in the ordinary course of business and the cost of normal replacements should not be charged to the conversion process.

The conversion of farm machinery and equipment to the metric system does not appear to present any serious problems. Some farmers already have had experience with imported machinery and automobiles built to metric specifications and it is my understanding that U.S. manufacturers are making increased use of metric measures in new designs.

The conversion of measurements to the metric system does not necessarily imply changes in the size or design of things; however, it can lead to changes in size and design. To the extent that sizes or designs are changed in the conversion process, farmers undoubtedly will experience some inconvenience and increased costs in the repair of farm machinery. The possibility of using old machinery as a source of spare parts will be reduced; some new tools may be needed; and it will be necessary to maintain duplicate inventories of frequently used parts and certain types of supplies, such as nuts, bolts, and screws.

The amount of farm equipment that would need to be converted or replaced on anything other than a normal basis under a full scale metric conversion would be relatively small. Farm scales probably are the most important example of equipment that would fall into this category.

As owners of a substantial amount of real estate, farmers have an interest in the massive effort that would be required to convert legal descriptions of real estate to the metric system; however, this presumably would be done gradually by experts over a period of years as land titles are transferred.

The conversion of agricultural commodity measurements to the metric system would require careful planning and a coordinated approach. In the case of grain, for example, it would be necessary to convert freight rates, storage and handling charges, grading standards, market news reports, and futures contract specifications, as well as actual measurement practices. If this were not carefully planned and implemented on a coordinated basis, the result would be utter chaos and a great many unhappy people.

A part of the problem is the fact that grain producers and people who have spent their lives in the grain trade have a great deal of knowledge on such things as yields, production, consumption, exports, price relationship, futures contracts, freight rates, boxcar capacity and other matters which would become technologically obsolete if the method of measuring grain were to be changed. This is the basic reason for the resistance that was encountered when efforts were made to make the hundredweight the standard unit of measure for grain.

Because of the many interrelated factors that are involved, Canadian grain interests apparently have decided that it is impractical to convert grain to the metric system on a gradual basis. Press reports indicate that the Canadian grain trade is to be converted to the metric system in a single day on February 1, 1977. The Canadian experience should provide useful guidance if, and when, a decision is made to convert the U.S. grain trade to the metric system.

Proposed Legislation

While the process of converting to the metric system is already underway there appears to be a need for a part-time government board to coordinate voluntary conversion activities. Many decisions need to be made to avoid confusion. There is a need for some mechanism to establish advisory committees composed of representatives of private groups and interested government agencies to consider conversion problems and their solution on a sector basis.

H.R. 254 appears to represent a suitable legislative approach, however, we would like to be assured that farmers will be represented on the proposed Metric Conversion Board.

H.R. 6154 appears to be similar to H.R. 254 except for differences in detail which generally are not of great concern to us. We do, however, think that there

is a great deal of merit in the language in Section 10(a) of H.R. 6154 which says that:

"The Board will take advantage of activities underway in the private sector so as not to establish, within its own organization and staff, provision for activities that would unnecessarily duplicate those being undertaken in the private sector . . ."

We are opposed to the passage of H.R. 6177 because this bill:

(1) Appears to represent a less positive approach than the other two bills, and

(2) Would require the federal government to assist in the payment of conversion costs.

Summary

In summary, it is doubtful that conversion to the metric system would result in any substantial direct benefits to farmers. It would produce a number of minor benefits after a transition period, but the transition would be painful. If the conversion to metric measures which already is underway continues in nonagricultural areas the time will come when it will be desirable to convert agricultural measurements to metric units.

Since it appears that farmers have relatively little to gain from metrication, it probably would be wise to postpone the conversion of agricultural measurements until the latter stages of the transition period. An intensive educational program would be needed to prepare farmers for the changeover. The conversion of commodity measurements would require careful planning and a coordinated approach. If a National Metric Conversion Board is established to coordinate conversion to the metric system, farmers and ranchers should be represented on this Board.

Selected units of measure used for agricultural products

	<i>Pounds per unit</i>		<i>Pounds per unit</i>
Bushels:		Bushels:	
Barley	48	Sunflower seed	24, 32
Buckwheat	48	Timothy seed	45
Corn, ear—husked	70	Dry lima beans	56
Corn, shelled	56	Other dry beans	60
Cornmeal	50	Lentils	60
Cowpeas	60	Dry peas	60
Millet	48-50	Apples	48
Oats	32	Peaches	48
Popcorn, on ear	70	California pears	48
Popcorn, shelled	56	Other pears	50
Rice, rough	45	Quinces	48
Rye	56	Hickory nuts	50
Sorghum grain	56	Walnuts	50
Soybeans	60	Jerusalem artichokes	50
Spelt	40	Lima beans, unshelled	28-32
Velvetbeans (hulled)	60	Snap beans	28-32
Vetch	60	Beets, without tops	50
Wheat	60	Carrots, without tops	50
Alfalfa seed	60	Cucumbers	48
Bluegrass seed	14-30	Eggplant	33
Broomcorn seed	44-50	Escarole	25
Clover seed	60	Horseradish roots	35
Cottonseed	32	Kale	18
Flaxseed	56	Onion sets	28-32
Hempseed	44	Parsnips	50
Hungarian millet seed	48, 50	Green peas, unshelled	28-30
Kapok seed	35-40	Green peppers	25-30
Meadow fescue seed	24	Potatoes	60
Mustard seed	58-60	Rutabagas	56
Orchardgrass seed	14	Spinach	18-20
Perilla seed	37-40	Sweetpotatoes	55
Poppy seed	46	Peanuts, unshelled:	
Rapeseed	50, 60	Virginia	17
Redtop seed	50, 60	Southeastern	
Sesame seed	46	runners	21
Sorgo seed	50	Spanish	25
Sudangrass seed	40	Castor beans	41
		Malt	34

	Pounds per unit		Pounds per unit
Hogsheads:		Bags:	
Tobacco:		Cabbage (open mesh)---	50
Maryland -----	775	Carrots, without tops, (open mesh) -----	50
Flue-cured -----	950	Turnips, without tops, (open mesh) -----	50
Burley -----	975	Sweet corn (mesh or pa- per) -----	45-50
Dark air-cured ----	1, 150	Flour -----	100
Virginia fire-cured--	1, 150	Florida and Texas grape- fruit (½ box mesh)---	40
Kentucky and Ten- nessee fire-cured--	1, 500	Florida and Texas or- anges (½ box mesh)---	45
Gallons:		Potatoes -----	50, 100
Caster oil -----	8. 0	Rough rice -----	100
Corn oil -----	7. 7	Milled rice -----	100
Cottonseed oil -----	7. 7	Baskets:	
Linseed oil -----	7. 7	Eastern grapes (4-quart climax) -----	6
Olive oil -----	7. 6	Eastern grapes (12 qt.)--	18-20
Palm oil -----	7. 7	Lettuce, hothouse (24 qt.) -----	10
Peanut oil -----	7. 7	Plums and prunes, ex- cluding California (½ bu.) -----	28
Soybean oil -----	7. 7	Hothouse tomatoes (12 qt.) -----	20
Tung oil -----	7. 8	Flats: Tomatoes (2 layers)--	21
Turpentine -----	7. 23	Short tons:	
Corn sirup -----	11. 72	Raw sugar beets -----	2, 000
Honey -----	11. 84	Raw sugar cane -----	2, 000
Maple sirup -----	11. 03	Crates:	
Molasses, edible -----	11. 72	Western apricots (4 baskets) -----	26
Molasses, inedible -----	11. 74	Blackberries (24-qt)---	36
Refiners' sirup -----	11. 45	Dewberries (24 qt)---	36
Sorgo sirup -----	11. 55	Western grapes (4 baskets) -----	20
Sugarcane sirup -----	11. 45	Pineapples -----	70
Cream, 40 percent but- terfat -----	8. 38	California plums and prunes (4 baskets)---	28-34
Milk -----	8. 6	Raspberries (24 qt)---	36
Bales:		Strawberriers (24 qt)---	36
Broomcorn (6 bales per ton) -----	333	Strawberries (12-pint)---	9-11
Cotton, gross -----	500	Asparagus -----	30
Cotton, net -----	480	Bunched beets (wire- bound) -----	45
Hops, gross -----	200	Broccoli (wirebound)---	20-25
Cigar-leaf tobacco -----	150-175	Cabbage (wirebound)---	50
Tierce: Lard -----	375	Cabbage (Western)---	80
Cases:		Cantaloups (Jumbo)---	83
Eggs, average size, (30 dozen) -----	47	Cauliflower (WGA)---	50-60
Cigar-leaf tobacco -----	250-365	Celery -----	60
Drums:		Sweet corn (wire- bound) -----	40-60
Brussels sprouts -----	25	Honeydew melons (jum- bo) -----	44
Rosin (net) -----	520	Onions, green, bunched--	60-65
Barrels:		Shallots (4 to 7 doz. bunches) -----	20-35
without sugar (50 gal.) -----	380	Sweetpotatoes -----	50
Frozen pack berries, 3+1 (50 gal.) -----	425	Tomatoes -----	60
Frozen pack berries, 2+1 (50 gal.) -----	450	Turnips, bunched -----	70-80
Cranberries -----	100		
Horseradish roots -----	100		
Potatoes -----	165		
Rice, rough -----	162		
Pockets: Rice, milled -----	100		
Sacks:			
Dry beans, excluding lima -----	100		
Dry onions -----	50		

		Pounds per unit	Boxes—Continued		Pounds per unit
Lugs:					
Apricots (Brentwood)---		24	Florida and Texas		
Avocados -----	12-15		oranges -----		90
Cherries (Campbell)---	16		California and Arizona		
Cherries -----	20		oranges -----		75
Western grapes -----	28		Peaches (California		
Olives -----	25-30		fruit box) -----		18
Peaches -----	20		Western pears -----		46
Tomatoes -----	32		Florida tangerines (¼		
Boxes:			boxes) -----		47½
Apples (northwest box)	44		Globe artichokes (½		
Apples (fiberboard cell			box) -----		20
pack) -----	37-44		Cauliflower (fiber-		
Bananas (fiber folding			board—2 layers) ---		23-35
box) -----	40		Lettuce (fiberboard)---		38-55
Cranberries (¼ barrel)	25		Butter -----		64
Figs, fresh (single			Cartons:		
layer) -----	6		California Desert Valley		
Florida grapefruit (1½			and Arizona grape-		
bu.) -----	85		fruit -----		32
Texas grapefruit (1½			Other California grape-		
bu.) -----	80		fruit -----		33½
California Desert Valley			California and Arizona		
and Arizona grape-			lemons -----		38
fruit -----	64		California and Arizona		
Other California grape-			oranges -----		37½
fruit -----	67		Green peppers (fiber-		
California and Arizona			board) -----		30-34
lemons -----	76		Lettuce (fiberboard)---		38-55
Florida limes -----	80				

NATIONAL RETAIL MERCHANTS ASSOCIATION,
New York, N.Y., October 7, 1975.

HON. DANIEL K. INOUE,
Committee on Commerce, U.S. Senate,
Washington, D.C.

DEAR SENATOR INOUE: On behalf of the National Retail Merchants Association ("NRMA"), I want to express our thanks for this opportunity to submit our views to the Senate Commerce Committee in connection with hearings you are chairing this week on the matter of conversion to the metric system of weights and measures. NRMA is a nonprofit trade association composed of approximately 3,000 members who operate over 30,000 department, specialty, and chain stores throughout the United States, and who employ well over 2 million people. On a current annual basis, sales of our members exceed \$80 billion. Two-thirds of our members are small merchants with sales under \$1 million annually. Because metric conversion will have a profound impact on retailing, NRMA is keenly interested in pending metric legislation.

NRMA is committed to a long-term, orderly and voluntary process of conversion which imposes minimum costs on businesses and consumers, and which provides for comprehensive and detailed education programs. In accord with these objectives, NRMA supports the principles of H.R. 8674.

NRMA endorses the establishment of a Metric Board of the kind which H.R. 8684 would mandate, and especially supports the provision in that bill for representation of "business" and "small business" on the Board. We are pleased with the latter specification because, as I indicated, the vast majority of our members are small businesses. We are concerned, however, that the composition of the Board—even though it is to include small business representatives—could reflect only manufacturing product categories, and exclude entirely representation of retailing concerns. NRMA urges that the Commerce Committee specifically provide for representation of the retailing industry on the Metric Board, because retailers will encounter difficult and unique problems during the process of metric conversion—problems which are quite different from those which manufacturers face. Our special concerns are these:

(1) Retailers will have to work with manufacturers to coordinate long-range planning. NRMA has already begun serious discussions with manufacturing industry trade associations with the aim of reaching agreement on an efficient

transition to metric measurements. This interchange is essential to coordinate appropriate production changes over appropriate periods of time. These informal discussions have proved useful thus far, but once an official Metric Board is established, such discussions certainly ought to occur under the aegis of the Board itself.

(2) Retailers will be the conduit between manufacturers and consumers in the complex process of public communication and education which metric conversion will require. Within the retail industry that process will entail considerable retraining of sales personnel, and extensive changes in advertising, packaging and displays. Retailing should be represented on the Board in order to provide authoritative advice and information regarding these changes.

(3) While it is true that both manufacturers and distributors must prepare effectively for ultimate consumer sales, retailers—and only retailers—deal with American consumers face-to-face at the final stage of the goods distribution process. Since metric conversion will significantly alter demands and requirements at the end of the distribution process, retailers ought to be represented along with manufacturers on the Metric Board.

We deeply appreciate your consideration of our views, and we would be pleased to discuss them further with you or with the staff of Senate Commerce Committee.

Respectfully,

JAMES R. WILLIAMS,
President.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., October 7, 1975.

HON. WARREN G. MAGNUSON,
*Chairman, Senate Committee on Commerce,
Dirksen Building, Washington, D.C.*

DEAR MR. CHAIRMAN: I understand that your committee will be having hearings on metric conversion legislation on October 8 and 10.

The enclosed correspondence from Mr. Alan Harper, Executive Member of the Australian Metric Conversion Board, points out the difficulty in considering a voluntary conversion plan.

If possible, I would like to have Mr. Harper's letter inserted in the hearing record for consideration by members of the Senate Commerce Committee.

Thanks very much.

Sincerely,

DONALD M. FRASER.

Enclosure.

METRIC CONVERSION BOARD,
St. Leonards, N.S.W. 2065, September 23, 1975.

Congressman DONALD M. FRASER,
*Congress of the United States,
House of Representatives,
Washington, D.C.*

DEAR CONGRESSMAN: Thank you very much indeed for sending me the pages of the Congressional Record containing your statement and the report of the debate on the Metric Conversion Act, H.R. 8674.

I was, of course, aware of the passage of the Bill in Congress and of the very gratifying voting figures but it was not until I read the Record that I realized just how strongly the Bill was supported on the floor of the House and that there was no spoken opposition to it.

Initially the event did not receive in our Australian papers the publicity it deserved (a brief announcement is attached) so I endeavoured to rectify this with comments for the press, a copy of which is also enclosed. This was taken up in some of our major newspapers.

The treatment given by the papers to this decision in the House of Representatives was in marked contrast to "Metric Bill Rejected" headlines used by the papers when the previous Bill was defeated. I think this is symptomatic of the general metric climate in Australia now, that it would be big news if USA decided *not* to go metric but merely a normal development, not worthy of headlines, that a Metric Bill has been supported.

Nevertheless, we can make very good use of the presumptive passage of the Bill, of the strong vote in favour of it, of the many "quotable quotes" in the text of the report of the speeches and of the fact that there were no speeches opposing it with those who still refuse to acknowledge that USA is well and truly on the metric path. Our small but vocal "Australian Anti-Metric Association" has lost another handful of feathers from its plumage and must be finding it increasingly difficult to remain airborne.

Our operation is still proceeding very well. I hope to send you our 1974/75 Annual Report shortly which summarises the position not only for the past year but to some extent for the five years since the Metric Conversion Board was appointed. In most of the technical areas conversion is either complete or headed for completion. More intractable are the sectors involving the public in the use of metric units in affairs calling for some decision-making—even if only as minor as deciding whether to buy one or two kilograms of sausages. While one can go a long way in these sectors with a wholly voluntary conversion, we have come to the same conclusion as South Africa, United Kingdom and Singapore that in such activities some degree of *control* of trading practices is necessary if a prolonged period of consumer confusion and trader disadvantage is to be avoided.

It is, of course, not possible to mount a wholly voluntary metric change in the sense that every individual has a free choice. Consider the conversion of statutory speed limits and other changes calling for embodiment in legislation. "Voluntary" in this context has to be taken to mean that the choice of a program and plan for conversion in a sector is made voluntarily by national leaders in that sector but thereafter it is supported by all the pressures that can be marshalled, through procurement, legislation, appropriate amendment of technical standards, adherence to the program by government and large organizations and so on.

Unless your Metric Board can enlist such support for the programs developed voluntarily, the agreement accorded many of these programs may in the event prove too fragile to ensure their implementation and aspects of your metric operation which provide their own incentives will get out of kilter with those needing some additional stimulus for their accomplishment.

By accident of history Australia is currently several years ahead of USA in metric conversion so I believe we can offer useful experience in situations in which there may be some parallel between the circumstances in our two countries. Please be assured we will be keen to make this experience as fully available as possible. I think the North American-Australian Metric Conference held here last April, in which you were unfortunately unable to participate, was a good indication of what we have to offer.

With kind regards,

Yours sincerely,

A. F. A. HARPER,
Executive Member.

VEGA PRECISION LABORATORIES INC.,
Vienna, Va., October 8, 1975.

Subject: Conversion to the metric system.

SENATE COMMERCE COMMITTEE,
Dirksen Office Building,
The Capitol, Washington, D.C.
SCIENCE AND TECHNOLOGY COMMITTEE,
Rayburn House Office Building,
The Capitol, Washington, D.C.

GENTLEMEN: In view of the inevitable fact that we will need to convert to the metric system, and hindsight tells us we should have worked on this problem much earlier, I would suggest that the Congress, its Committees, the Department of Transportation and others commence educating the general public on the use of the metric system. One way would be to erect signs along the highways indicating both the metric and english systems of kilometers and meters. We have noticed that some states have already adopted this system.

Also, I believe it is essential that a requirement be made that all the United States go on an international traffic sign basis if this has not already been suggested. This method would probably save many people from having automobile accidents, both in Europe by American drivers and in the United States by European drivers. The English language on some of our road signs is not the most easily understood.

Our company does a considerable amount of sales of equipments to foreign countries and the constant conversion and reconversion of metric and English results in a considerable amount of additional work and creates some differences in some of our specifications. It also makes us less competitive from the standpoint of standardization of replacement parts, technical manuals, literature and other items.

I hope the above suggestions are taken into consideration by your Committees in your discussions and serious thinking regarding the matter of conversion to the metric system.

Very truly yours,

D. M. KRUCHKO, *President.*

NATIONAL RETAIL MERCHANTS ASSOCIATION,

New York, N.Y., October 8, 1975.

Hon. WARREN G. MAGNUSON,
U.S. Senate,
Washington, D.C.

DEAR SENATOR MAGNUSON: The National Retail Merchants Association is writing to you in your capacity as a member of the Conference Committee which will consider energy labeling requirements embodied in S. 349 and in Title V, Part B, of the House substitute version of S. 622. These two measures address difficult and complex issues which were extensively considered by members of the Senate and House over the past several years. NRMA is appreciative of the exceptional care with which the Congress has approached this issue.

NRMA strongly endorsed the concept of energy labeling as one important means of encouraging energy conservation by consumers. We believe, however, that the energy-labeling legislation passed by the House will achieve that objective more effectively than the legislation adopted by the Senate.

The basic issue here concerns the precise nature of information on energy consumption which would be provided to consumers. S. 349 would require that energy efficiency of products be stated in terms of average dollar costs, either on a national or regional basis. The problem with S. 349 is that the cost of electricity varies widely, even within particular regions of the country, and it has been increasing rapidly in virtually all areas of the country. This complex pattern of varying and rising utility rates means that energy consumption information stated in dollar terms will be both confusing and inaccurate.

On the other hand, Title V, Part B, of the House substitute version of S. 622 would provide that the Federal Trade Commission shall require that certain classes of major household appliances be accompanied by labels which disclose the energy efficiency or energy use of the product, and the range of energy efficiency or energy use of other products in the class. The FTC would be authorized to consider requiring other types of information on labels, including the dollar cost of the energy used by a product, but only after finding that such information would be useful and technologically and economically feasible—presumably taking into account the confusions and inaccuracies which varying and changing utility rates would cause.

NRMA recognizes that the Senate Commerce Committee substantially altered the original version of S. 349, in part to do away with extraordinary problems which would have been involved in calculating detailed energy cost information for small geographical areas. We urge that members of the Conference Committee proceed further, however, and discard entirely the concept that the energy efficiency of products should be stated in dollar terms.

By way of background, NRMA is a voluntary, nonprofit trade association composed of approximately 3,000 corporate members who operate some 30,000 general merchandise retail stores with an aggregate sales volume of some \$80 billion annually. Two-thirds of our members are small businesses with sales under \$1 million annually. Our members range in size from large national chains to small specialty shops, and they employ two million workers across the nation.

Members of the National Retail Merchants Association very much appreciate your consideration of our views on this matter of concern to retailers and consumers alike.

Respectively,

JAMES R. WILLIAMS,
President.

THE AMERICAN INSTITUTE OF ARCHITECTS,
Washington, D.C., October 8, 1975.

HON. WARREN MAGNUSON,
*Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.*

DEAR MR. CHAIRMAN: On behalf of the American Institute of Architects, the national society for the architectural profession, I would like to express our support for legislation to establish a national program for conversion to metric weights and measures. Our remarks will be directed to S. 100, the Metric Conversion Act of 1975, and H.R. 8674, the House-passed bill.

Our support for conversion to metric weights and measures dates back to April 1970, when the AIA Board of Directors passed the following resolution:

Resolved, That the Board of Directors of The American Institute of Architects urges the completion of studies authorized by Public Law 90-472, particularly as these studies relate to the construction industry, and further urges that the metric system be adopted as the national standard of weights and measures in the United States of America.

A similar resolution was initially passed in 1944 by the AIR Board of Directors.

In October 1970, the American Institute of Architects participated in the studies undertaken by the Secretary of Commerce responsive to Public Law 90-472. Testimony urging adoption of the metric system was presented to the National Metric Study Conference on Construction.

The AIA is opposed to the concept of evolutionary metrication, or "let it happen naturally." Increasing use of the metric system without some program of coordination could cause difficulties which might eventually reach disastrous proportions. Under present conditions, it is the architect's responsibility to coordinate the activities of the various disciplines and skills within the construction industry and to interrelate manufactured building materials and components with each other and translate the whole, through construction documents, into a buildable structure. If parts of the construction industry were to begin to convert only as their particular needs required and completely without coordination, the architect's job would become virtually impossible.

Imagine the difficulties that would be encountered, for example, if gypsum wallboard suddenly came off the production line 120 millimetres by 2400 millimetres instead of four feet by eight feet as is now common, without a corresponding revision in codes to allow respacing of wood studs and a similar change in lumber sizes and lengths. The backbone of residential construction, the single-family wood frame house, would no longer be practical using these products. And architects and builders would be powerless to correct the situation. The spacing of the studs could not be changed until the load tables were revised and accepted by the 8,000 various local building codes and national model codes. It is entirely unlikely that any organization would expend funds to revise load tables until lumber sizes changed. There are dozens of such examples, many much more complex than the one we just mentioned. The result would be chaos.

If that portion of the construction industry which manufactures products used and specified by structural engineers were to convert to metric measure without a corresponding change taking place in the architectural products which fit that structural system, architects would find it difficult, if not impossible, to fit the two together. At the very least, the mating would be more expensive. The result could be steeply rising construction costs which neither the architect nor the engineer could prevent.

The American Institute of Architects believes in, and strongly supports, the concept of planned metrication as exemplified in S. 100. The effects on the architectural profession of a properly planned and well organized program of metrication would be much less severe than those which could result from evolutionary metrication. The optimum time period for architects to convert will be far less than the proposed time period of ten years, although no one is prepared to say exactly how long it would take. Architects have converted to the metric system for a single overseas project, where the metric system is in general use, but conversion time would be small, but could not even begin until the conversion of product sizes (or at least catalog sizes) and the revision of design tables and their acceptance by the various code groups was well under way.

The mere conversion of product sizes from existing dimensions to corresponding metric measurements will offer few, if any, benefits to architects and the construction industry. We believe that a "hard" conversion, in which sizes of construction products are changed to rationalized sizes, would provide significant advantages. A change to metric units of measurement could provide the

vehicle for the implementation of a system of dimensional coordination. Such a system would offer many benefits to all sectors of the construction industry.

Over the past decade, the increasing use of prefabricated products has resulted from the demand for a greater number of, and more speedily constructed, buildings. This has created a need for a simple and universally applicable technique to coordinate the dimensions of buildings and the products that go into them. Metric conversion can be a catalyst to apply an accepted policy on dimensional coordination on a national, and even international, scale.

The concept of dimensional coordination, quite simply, is based on the establishment of a direct relationship between the dimensions selected for the design of buildings and the sizes of components used in their construction.

There are specific benefits to all sectors of the construction industry through the use of dimensional coordination.

Architects would be provided with an increased range of interchangeable components for product selection. Drafting would be simplified and the number of details on drawings could be reduced. Replanning for substitution of alternate products would be simplified and/or eliminated. Standardized interpretation of construction documents would be facilitated.

Engineers would have a common dimensional basis for integration of their work within a building, and they could achieve a fully rationalized structure.

Estimators' computations should be simplified as they would be dealing with more standardized components and more standardized interpretations of drawings.

Contractors would be able to optimize efficiency of on-site labor by reducing cutting and fitting and by increasing the flexibility of building component assembly. They would have improved availability of products to sites through reduced fabrication and delivery time.

Manufacturers would obtain maximum economy in the production of components by the reduced variety of standard sizes manufactured. They would be able to develop and improve products by spreading their research and development funds over a smaller range of product sizes. They should also benefit from more efficient production runs.

Owners would benefit from the economies passed on to them by designers, contractors, and manufacturers.

Concerning planned metrication, it is our belief that the conversion should take place in a planned, ten-year period. Since the design process includes the coordination of materials, we feel that related materials and methods must be changed as simultaneously as possible and not just as materials and methods become obsolete. Thus the conversion will be more orderly, take less time, reduce the necessity for dual stockpiling and dual dimensioning, and allow the easier integration of dimensional coordination standards.

Specific problems that we believe may be encountered by architects and the other design professions include:

1. Converting the design thinking process to metric measure as the different sizes relate to human scale and proportion;
2. Re-educating personnel;
3. Re-equipping offices with new publications and new drawing and measuring equipment;
4. Obtaining information on the availability and sources of materials and components produced in metric measure.

Particular difficulties will exist for engineers because they must concern themselves with new units for the expression of mass, force, time, temperature, and flow, and revise formulas to employ the new units.

Other sectors of the industry will have their own specific problems. Some of these also will affect the design professions. As an example:

1. Manufacturers of construction products must develop new literature to provide design data in metric measure;
2. Price data must be developed for new units of measurement;
3. Technical and engineering standards, handbooks, and tables must be changed.

However, the existence of temporary difficulties resulting from a changeover to the metric system should not deter or delay the conversion.

These problems of the construction industry (which represents approximately ten percent of the Gross National Product) must be recognized in establishing a comprehensive metric plan. The membership of the National Metric Conversion Board authorized by Section 6(a) of S. 100 should be expanded to specify representation by the construction industry.

We also believe that as the conversion period proceeds, the Federal Government can play a significant leadership role through an orderly process of metric conversion in its own activities, as well as through its procurement programs. We support these provisions of S. 100.

The following recommendations concerning the construction industry should be considered by the Board in establishing a comprehensive national metric plan:

1. Make a detailed analysis of the programs and procedures adopted by the United Kingdom, Canada, Australia, and other Commonwealth countries in their metrication processes, including those methods related to dimensional coordination.

2. Set up some orderly, continuing mechanism to coordinate standards and codes within the conversion to the metric system. The recently-authorized National Institute of Building Sciences (NIBS) could well serve this function. NIBS will take the form of a non-profit, non-governmental corporation to (a) unify the promulgation of national standards and performance criteria for reference in local building codes, and (b) provide for the evaluation and subsequent dissemination of information on new and emerging building technology and processes.

3. Establish a mechanism to aid in conversion of design standards and codes to coordinate them with the dimensional coordination standards.

4. Influence building component manufacturers to coordinate their products so that they can interface with other components and materials in an orderly, modular fashion without the need for additional modification.

5. In connection with the dimensional coordination system, avoid only a direct conversion in numbers, but rather require standardization in metric sizes so that building components and materials relate to each other and to a logical framework for nominal dimensional coordination.

One orderly approach to planned metrication for the construction industry would be to make maximum use of mechanisms already in existence relative to metric planning and implementation. The experiences of other countries should be examined and used as guides to improve the process of overall conversion. The exploratory work currently underway by the Construction Industry Coordinating Committee of the American National Metric Council could be used as a starting point for metric conversion and dimensional coordination in the construction industry. In consideration of the work in progress, and given the impetus of legislative action, we believe that conversion could proceed in an orderly fashion.

We are pleased to see in S. 100 the following language: "To facilitate and encourage the development as rapidly as practicable of new or revised engineering standards based on metric measurement units in those specific fields or areas in the United States where such standards will result in rationalization or simplification of relationships, improvements of design, or increases in economy." We believe it is an excellent description of our special concerns and objectives.

In summary, the American Institute of Architects feels that conversion to the metric system has tremendous potential for the construction industry. A union of metrication and dimensional coordination would enable the development of a rational, discipline, and systematic approach to building and design. It can provide the incentive to upgrade codes and standards and provide a base for less expensive in-place costs.

Finally, if handled creatively and cooperatively, it will provide excellent opportunities for the further unification of the construction industry.

We stand ready to offer our services in assisting with the implementation of conversion to the international metric system. We would appreciate the inclusion of our letter in the hearing record.

Sincerely,

WILLIAM MARSHALL, Jr., FAIA,
President.

APPALACHIAN STATE UNIVERSITY,
DEPARTMENT OF PHYSICS,
Boone, N.C., October 15, 1975.

Mr. ERIC LEE,
Staff Counsel, Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR MR. LEE: I am commenting on the Recommendation of the American Bar Association, Section of Corporation, Banking and Business Law.

It appears that this recommendation is written to reinforce the idea that proposed Metric Conversion Act is too general and does not contain mechanisms to insure a speedy and economic conversion.

The recommendation goes to lengths convincing one not to trust the metric conversion experience of other countries, then ends with a recommendation modified directly from the Metric Conversion Act of the Australian State of Victoria. In general the ABA Recommendation fails to recognize five attitudes:

(1) the proposed legislation is a careful piece of work of many years, involving many individuals, sectors and is purposefully written in general terms. This is to allow the U.S. Metric Board to develop itself, by utilizing research, into the most effective body. It is reasonable to expect that some of the ABA Recommendations may be eventually developed by the Metric Board.

(2) Congress and the President, who will select the board members, undoubtedly know about the American National Metric Council's experience as well as other experienced individuals on whom they can call to provide leadership for a speedy and sound conversion plan.

(3) it is perhaps more efficient to allow different sectors to now plan their own conversion, rather than making specific demands on them by more rigid structures.

(4) the guiding light of metric conversion is economic feasibility and conversion is already being carried out, because legislation has not been forthcoming.

(5) in order to mandate changes without skepticism, the U.S. Metric Board should utilize existing bodies normally involved with implementing changes in weights and measures. For example: The National Conference of Weights and Measures has adequate jurisdiction in each of the states for carrying out consumer metric conversion.

The introduction of a Metric Czar is not necessary and would aid in identifying the conversion inconvenience with an individual, thus tending to promote anticonversion activity.

In summary, the most pressing issues raised by the ABA Recommendation are in fact answered if one considers the following:

(1) Because of the large number of diverse groups, the Metric Board should have the right to develop coordination plans as is dictated by economic feasibility and necessity. No doubt this will be a formidable task ahead of the U.S. Metric Board, but to now decide specifically how the board should coordinate metric conversion would seriously limit its effectiveness.

(2) The objections raised that the government will not fully participate in metric conversions appears to be unfounded when one reads the description of Presidential and Congressional Metric coordination plan approval mechanisms in the proposed legislation.

Sincerely,

THOMAS L. ROKOSKE,
Associate Professor of Physics.

Enclosure.

STATEMENT OF DR. THOMAS L. ROKOSKE, VICE CHAIRMAN, NORTH CAROLINA ADVISORY COUNCIL ON METRICATION, AND ASSOCIATE PROFESSOR OF PHYSICS, APPALACHIAN STATE UNIVERSITY

This year a quiet revolution is being carried out by some manufacturers in the U.S. export industry as they gear up to label and manufacture goods in metric units. The pressure for metric conversion by exporters is so compelling that it is beginning to cause ripples of metric conversion within the domestic industry. We must now accept the fact that the United States is "Going Metric." Metric conversion by industry has been caused primarily by three important facts: (1) U.S. export markets are being challenged by industrial nations which have developed technology equal to ours; (2) we are now the only major industrialized nation which has not planned for metric conversion, and have isolated ourselves with manufactured goods that cannot be easily maintained or repaired in foreign countries; (3) several nations have promulgated directives that prohibit the use of all but metric units in their commerce.

It is imperative that we have legislation to carry out metric conversion in the most economic manner, during these most difficult times. For if we fail to pass metric conversion legislation we are destined to be subject to a "new tariff" that shall have a deleterious effect on our future balance of payments. Even now there are reports of U.S. manufactured goods being rejected by foreign customs merely because they are produced in our customary units. A most important document which will be enforced in two years is the European Economic Community (EEC) Directive 71/345/EEC. (See the included document.) This document prohibits all but SI (International System) metric units in commerce

after December 31, 1977, in each of the EEC member states. Goods shipped after that date must be measured and described in metric units, although they may be manufactured in conventional units.

It is also important to realize that all segments of industry and education have begun planning and in some cases implementing metric conversion. Supporting these efforts are national organizations, Federally sponsored research grants, recently enacted State Metric Legislation and state government agencies such as: American National Metric Council, U.S. Metric Association, Interstate Consortium on Metric Education, Five State Consortium on Metric Education, and several State Metric Boards and many State Departments of Education. The report of the American National Metric Council on the *Management of Metric Implementation* and recent reports from the Metric Information Office of the National Bureau of Standards bears this out.

I recently directed an industrially oriented metric conference primarily attended by personnel from North and South Carolina. Two of the most significant findings were: 1) that most conferees were amazed at the progress which metric conversion had taken place in the U.S. Most had been under the assumption that conversion would occur in the future after Federal Legislation had been passed; 2) it was found that many new facilities now being planned in North Carolina will produce metric goods or have that capability. It is evident, then, that a need exists for a national metric board which will coordinate and develop time scales for conversion appropriate to particular sectors.

Moreover, it should be recognized that costs of metric conversion should in general be considered as a "one time business expense", and should be treated as such, rather than in a negative way as needing Federal subsidy. We have a vast reservoir of experience from other countries which have converted that indicates this is the only practical way to handle the costs. Another manner of expressing this is to say "Let the costs lie where they fall." This too was the conclusion of the Secretary of Commerce report to Congress in 1971, *A Metric America, A Decision Whose Time Has Come*.

It is well known that many U.S. manufacturers are now projecting savings as a result of metric conversion because they are able to use it as an opportunity for modernizing and economizing their manufacturing and for introducing new products. So if each sector views metric conversion as a positive step and plans wisely, benefits will accrue with time. Examples of such actions are: GM Chevette, a primary U.S. metric car, which has high efficiency in fuel consumption and is also an attractive export item.

Ford Motor Company has begun manufacturing a metric engine in Ohio thus alleviating the need for importing the engine. The American National Standards Institute is designing a series of optimum fasteners which will both reduce the number of sizes used in manufacturing and will improve their bearing strength. This will have the effect of significantly reducing the inventory of parts and will release needed capital. The wood industry is planning to revert to net sizes rather than nominal sizes. This will provide better control and will simplify some construction processes. We may have the introduction of Dimensional Coordination, a type of modular design and construction having a higher cost efficiency than with conventional techniques. Apparel manufacturers are proposing to size women's clothing similar to men's. This should save time in purchasing clothing and also increase catalog sales. Many plants now have both metric and English production lines so metric conversion will eventually eliminate the second manufacturing line and costs will be reduced.

Examples used here have been taken from either large industries or sectors which are changing as a whole, it must be recognized that there will be other groups that will not find metric conversion economically feasible. For them, it would be useful to have low cost loans available so that they may also take advantage of the opportunities. Other sectors may never find it feasible to convert and, of course, they should maintain their status quo.

Finally, there should be a massive public media campaign on metric conversion. My experience in teaching metrics has brought me to a realization that it will be the average person at home, not connected with an educational program that will be the most difficult to reach and motivate. It is my hope that "media education" might begin as early as possible and should impress the reasons for metric conversion. If we fail to motivate, we shall be up against a formidable mass of people that will bog the conversion attempts.

In conclusion it is my view that Senator Inouye's bill, S. 1882, contains the major policies necessary for an orderly and economical metric conversion.

STATE UNIVERSITY COLLEGE AT BUFFALO,
Buffalo, N.Y., October 16, 1975.

Senator WARREN G. MAGNUSON,
U.S. Senate, Chairman, Committee on Commerce,
Washington, D.C.

DEAR SENATOR MAGNUSON: Thank you for your letter of September 29, 1975, and your invitation for me to submit my remarks on metric conversion legislation to the committee. The copies of the three metric bills which you mailed to me have been carefully studied. Included please find a separate analysis of each of these three bills. Following the three separate analyses, please find my conclusions and recommendations to your committee.

Please allow me to begin with the statement that the metric debate is the longest living debate in the history of the United States Congress. It has continued for 200 years. Had Thomas Jefferson and John Quincy Adams had their way we would have been the first metric nation, not the last. The arguments against the metric system were then and are now not only ridiculous but a hindrance to our nation's progress. However, thanks to Thomas Jefferson, our nation has, from its beginning, enjoyed the simplest monetary system on our planet. It is decimalized and based on the concept of ten. Likewise, the metric system is decimalized and based on the concept of the numeral ten. The metric system is not only definable and precise, it is sanity; it is teachable. The use of fractions can be eliminated. Computations can be made by moving the decimal point. The complicated process of converting inches, feet and yards, etc., in our everyday measurements is eliminated. The metric system is to measurement what the decimal and base ten is to our monetary system.

A concern of your committee, no doubt, is to avoid those errors made by other nations during their metric conversion processes and those errors made by our own nation during its former attempts to convert to the metric system. With this in mind, each of the three metric bills presented to me shall first be discussed individually. After doing so, I shall attempt to present comments appropriate to all three bills or to metric legislation per se in the final Conclusions and Recommendations section of this document.

BILL S. 100, JANUARY 15, 1975, MR. PELL, ETC.

Comments

This bill seems to be the strongest of the three metric bills now being considered. If a metric bill is enacted, it indeed needs to be a strong one.

Page 6, item (B) lines 10 to 18.—In this section you may wish to consider mentioning specifically sequentially arranged sets of TV programs (films, video tapes or holographic storage) which contains simplified metric lessons for the lay public. These same lessons, once developed, can be adjusted and adapted for all media.

Page 7, Section (D) item (4) lines 20 and 21.—"to provide for the establishment of a national information program about metric conversion." Consideration may be given here for making provisions for specific industries, businesses or activities, e.g. the needs of the steel industry may differ from the needs of the automobile industry through obviously the two industries are closely related and interdependent.

Page 8, item (c) lines 9 to 11.—It seems appropriate here to recommend specific deadlines for discontinuing the traditional system of measurement by type of industry, business, or activity. The intent here is to assure metric usage on the functional levels of activity and avoiding mere verbal commitments to the metric system.

Page 8, item (a) line 20.—Here the bill differs from the other two bills in the number of members specified for the metric board. This item should not hold back the bill. An adjustment or compromise is recommended here if this item becomes an issue for the committee.

Page 12, item (a) lines 5 to 7.—These lines could read as follows: the preparation of reports and learning programs, etc.

Page 13, Sec. 12, item (a) line 8.—Here I would recommend keeping in mind specific criteria necessary for meeting the demands of the position.

BILL S. 1882, JUNE 5, 1975, MR. INOUE, ETC.

Comments

This bill is considerably weaker than the first (S. 100).

Page 3, line 7.—Is it fair to expect conversion without any Federal subsidies?

Page 3, lines 8 and 9.—"predominately, although not exclusively metric", also *lines 22 to 24* "with a view to making metric units the predominant, although not

exclusive, language of measurement." To keep these words and lines in the bill would be to repeat the failures of Napoleon and France during early French metric conversion attempts. This statement shall be explained fully in the final summary.

Page 8, item (d) lines 9 to 16.—There is no need to re-invent the wheel. Internationally established metric specifications exist in such English speaking countries as Canada, Great Britain and Australia. Similar technologies in these nations can and should be studied to our advantage.

Page 9, lines 1 and 2.—"increased use of metric measurment units." We either use the metric system or we do not use it.

Page 9, item g (2).—It may be appropriate to consider representatives from such agency (eg. HEW, NSF) on the board. Especially if the board shall have 21 members.

BILL H.R. 8674

Comments

The introductory paragraph 2nd line "and to establish a United States Metric Board to coordinate the voluntary conversion to the metric system." The words "voluntary conversions to the metric system" render this bill ineffective. Your grandfathers, if possible, would say it has no teeth. Your own kids might say, "it has no balls." This shortcoming is again reinforced on page 4 item (2) line 4 with the words "to encourage (voluntary participation) of the members of each affected sector and group in the Nation in the activities of the Metric Board."

Page 8, item (d) lines 4 to 11.—Again, how has the rest of the world resolved these problems?

Page 8, item (e), lines 12 to 15.—Which American designs embody superior technology? Our military and space programs have been metric for years.

Page 9, lines 1 to 4.—"to encourage retention of equivalent customary units, usually by wy of (dual dimensions), in international standards or recommendations." Again, a study of early French metric conversion reveals that such a policy may be ill-fated.

Page 9, item (1) lines 9 to 13.—This section should specifically include public schools, colleges and universities.

Page 9, item (2), lines 20 to 25.—The intent here is positive. The wording too is clear and precise. The procedure may be lacking.

Pages 13 and 14, Sec. 14, item (a) lines 25 to 26 and 1 to 3.—Again the criteria for meeting the demands of the position are lacking.

Although it is functionally too weak to succeed in the task of metric conversion, this last bill does contain some fine provisions.

CONCLUSIONS AND RECOMMENDATIONS

1. History teaches us that a commitment or bill to convert a nation to the metric system must be definitive, thorough and complete. The terms voluntary conversion to the metric system, voluntary participation and dual dimensions have no place in a metric bill. When the metric system is taught, it is taught as a primary language. No comparison is made with other systems of measurement nor is there a concern for conversion formulas. This is now law in the State of California and a policy of the National Education Association. Please allow me to quote the second paragraph on page 5 of *Mastering The Metric System*.

"The metric system did not receive total acceptance in France until much later. A major obstacle was Napoleon's imperial decree in 1812 that the metric system and the old French system exist side by side. The metric system was to be used in schools and in government offices, and the old French system was to be used in retail trade. The results of this decree was chaos. The decree of 1812 was repealed in 1837 by both houses of the French Parliament. The use of the decimal metric system was made law, with a system of fines for violators, and the general adoption of the metric system in rail commerce in France began."

Of the three metric bills presented to me for review, only the first, S. 100, January 15, 1975, Mr. Pell, etc. seems strong enough to succeed in fulfilling the task of metric conversion for our nation. The other two bills contain some fine provisions but they falter in their weakness. Some of these provisions may be added to S. 100 to make it even stronger.

2. Cooperation with international organizations concerned with metric evolution is imperative.

3. The nation should consider the use of elementary and secondary school facilities, as well as those of public colleges and universities, as metric learning centers for the entire communities which they serve. All adults in the com-

munities served by the facilities should be welcomed for afternoon and evening metric classes. Public schools at each of the mentioned levels should be included.

4. Metrication success in our country can be further assured if public school superintendents, colleges and universities are charged with proper and adequate preparation of teachers for teaching the metric system, thus, preventing the ill fate of the new math, which in my opinion was caused by a gross lack of teacher preparation.

5. A metric bill should include specific provisions for meeting the needs of all of those involved in the conversion; tradesmen and small businessmen.

6. Those outstanding metric teaching efforts in the private sector should be made available to the public and likewise.

7. Specific provisions for federal grants in the public sector should be considered, i.e. public school teachers and administrators on all levels of public education including the university.

8. Tax concessions and federal aid could be based on need or an incentive system in the private sector eg. labor, small businessmen may need some financial assistance. Some corporations may need incentives. Some large corporations may be willing or encouraged to help small businessmen; especially those small businessmen the serve.

9. Using Federal procurement to encourage metric conversion could be a successful tool for metric implementation as stated in H.R. 8674.

10. Each of the three bills seems to lack specific procedures for metric implementation. Perhaps the intent is to delegate the responsibility for specific metric implementation procedures to the metric board.

11. None of the three bills make mention of specific dates and deadlines to accompany specific steps to metric conversion. These dates may be generous and flexible but their function is vital.

12. All three bills provide for a director of the board. None of the three bills make mention of the criteria necessary for meeting the demands of the position.

13. A pre-specified length for existence of the proposed metric board may be desired. The intent would be to avoid another self perpetuating bureaucracy. This was done in Great Britain. Thus, you will have created an adhocracy as defined by Alvin Toffler, to fulfill a specific purpose within a given length of time e.g. 10, 15 or 20 years. After attrition and retirements, remaining employees could be placed with the National Bureau of Standards or similar permanent agencies.

According to my publisher, The New American Library, N.Y., every member of Congress has received a complimentary copy of MASTERING THE METRIC SYSTEM. A copy of the cover letter is enclosed. If my assumption is incorrect, please inform me so that I may send a copy to each member of your committee by air mail.

It was my pleasure to receive and fulfill this assignment. If I may be of any further assistance please know that I am at your service.

Respectfully, appreciatively and most cordially yours,

NED V. SCHIMIZZI,
Associate Professor,

Department of Curriculum and Instruction.

P.S.—Unless a strong definitive metric bills is passed at this time, there is really no need to supercede the S. 1866 metric bill. Our nation already has a weak metric bill (S. 1866) on its law books. It does not need another one.

U.S. SENATE,

Washington, D.C., October 17, 1975.

HON. WARREN G. MAGNUSON,
*Chairman, Senate Committee on Commerce,
Russell Senate Office Building, Washington, D.C.*

DEAR SENATOR MAGNUSON: Enclosed is a letter from a Vermont constituent requesting that his attached statement and that of Representative James M. Jeffords of Vermont be included in the record of Senator Inouye's metric hearings.

Your cooperation is deeply appreciated.

Sincerely yours,

ROBERT T. STAFFORD,
U.S. Senator.

Enclosure.

BATCHELDER ENGINEERING Co.,
Chester Depot, Vt., October 15, 1975.

Senator WARREN G. MAGNUSON,
Chairman, Senate Committee on Commerce,
Russell Senate Office Building Washington, D.C.

DEAR SENATOR MAGNUSON: Would you please accept the attached remarks of Representative Jeffords on the House floor and my statement to the House Subcommittee on Science, Research and Technology¹ for inclusion in the record of Senator Inouye's metric hearings.

Thank you very much indeed.

Cordially yours,

J. W. BATCHELDER.

Enclosures.

[From the Congressional Record, Aug. 1, 1975]

VETERAN VERMONT ENGINEER ON METRIC CONVERSION

Mr. JEFFORDS, Mr. Speaker, James William Batchelder, a Vermonter, has devoted over 50 years of his life to American industry. He has during that time formulated some very definite opinions about the metric system of measurement. His statement on the subject will be printed in the hearing record of the Subcommittee on Science, Research, and Development later this summer. However, since the House will soon be considering the Metric Conversion Act, I thought it appropriate to include some of his remarks in the Record at this time:

The awesome responsibility involved in deciding on a substantial change measurementwise is about proportional to the seemingly limitless ramifications of the effect of any such change. Quite obviously the resolution of the long standing metric, and now S.I., controversy cannot be resolved by the weight or numbers in a tug-of-war, but only on an objective basis of facts and practical down-to-earth realism, and by considering in depth and detail the application of measurements by the countless various segments of the general public. . . .

To counter any possible accusations of merely being a prejudiced launch pad, perhaps you will give the fullest consideration to the vast majority of Americans who have NOT requested metric (S.I.) expansion. It appears that this non-metric majority constitutes about 91 percent of the U.S. population, based on the 1973 Gallup Poll. . . . I know, no poll ever has been taken on the substantially different S.I. system, but it is a certainty that percentage-wise very few Americans ever heard of it, so could not want it. However, there are a number of other vitally important demands on Congress by millions of Americans which so far have not been forthcoming. . . .

I first used the metric system about 52 years ago and have ever since, off and on, including 3 years exclusively, designing and engineering continuous web, multi-color printing presses in New Jersey for a company who had bought out a French manufacturer. After 3 years, the company gave up metric in disgust and all subsequent models were inch-based. Thus my experience is unique in that I have lived in the metric Utopia and, as with everyone else in that company, I was very glad indeed to get back home. . . .

The reason that our technology is superior to that of all so-called metric countries is because our industry always sought improvements and if metric or S.I. represented an improvement, they automatically would have become predominant and the present metric or S.I. controversy would not have arisen. Anyone wishing to convert to metric or S.I. may now if he prefers. . . .

As is well known, P.L. 90-472 specifically directed the Department of Commerce to evaluate and appraise: (1) the desirability and practicability of increasing metric usage in the U.S.; (2) retaining and promoting by international use our customary measurement system and; (3) to evaluate the costs and benefits of alternative courses of action. . . .

For item 1, Congress receive . . . "a blueprint of how to deceive the American people and Congress." . . . Massive use was made of trick questions and shading the results to "make a plausible case for metric" never before accomplished because of the acute scarcity of supportable facts and reasons. . . .

As to item (2) above, the Department of Commerce disdainfully ignored "finding" anything good about our system which has enabled us to develop such a highly sophisticated technology, based thereon, that the so-called metric countries emulate and copy us. The only good words for our system which I have

¹ See page S33 through S41 of the House Subcommittee Report No. 12.

seen came not from Commerce but mostly from me, such as in the Washington Sunday Star and Daily News, May 27, 1973, entitled "Metric, Schmetric" a copy of which I have supplied to your Committee....

As to item (3) above, the estimated conversion cost of \$60 billion to \$100 billion was so utterly staggering that the Department of Commerce attempted to cover it up. Like other cover-ups of that era, this one leaked out in both the Senate and the House hearings, contained in the reports thereof, page 138 in the House report and pages 95, 142, and 189 in the Senate report. Obviously that cost has to be paid by someone and that someone inevitably will be U.S. taxpayers, consumers and constituents as a result of further inflationary conversion costs. That cannot be covered up either....

I encourage my colleagues to read the complete statement which will be printed in the report of the Subcommittee on Science, Research, and Technology of the Science and Technology Committee later this year.

AMERICAN PAPER INSTITUTE, INC.,
New York, N.Y., October 17, 1975.

Mr. ERIC LEE,
Staff Counsel, Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR MR. LEE: This is in response to Senator Magnuson's letter of October 1 requesting our views on metric conversion in connection with your consideration of S. 100, S. 1882 and H.R. 8674.

On December 23, 1970 I testified before the National Metric Study Conference, U.S. Department of Commerce, on the position of the pulp and paper industry with respect to metric conversion. Three copies of my statement are enclosed. In order to more accurately present the views of our industry, we made a careful survey of the industry to determine its views on this subject. I am enclosing a copy of the questionnaire we sent which was the basis for my presentation.

I am certain that the views of our industry have not materially changed since the statement attached was presented. As a matter of record, several parts of the paper industry have been actively studying conversion to the metric system and some have taken steps in preparation for the eventual enactment of such legislation. Our Printing-Writing Division has prepared a publication with respect to this subject, "Going Metric," three copies of which also are enclosed.

If I can be of any further assistance to you, please let me know.

Sincerely,

JOHN F. DARROW,
Senior Vice President.

Enclosures.

TESTIMONY OF JOHN F. DARROW, VICE PRESIDENT, AMERICAN PAPER INSTITUTE, INC., AT THE NATIONAL METRIC STUDY CONFERENCE No. 2, WASHINGTON, D.C., WEDNESDAY, SEPTEMBER 23, 1970

My name is John F. Darrow. I am testifying for the American Paper Institute, 260 Madison Avenue, New York, New York, of which I am Vice President.

The American Paper Institute is a non-profit national trade association of the pulp, paper and paperboard industry (hereafter referred to as the paper industry). Our 200 member companies produce more than 90% of the paper made in the United States. They also make many converted products from the paper they produce. A list of our members is attached.

The industry's manufacturing facilities—consisting of some 800 mills and 5,000 converting facilities—are located in practically every state. They employ more than 700,000 people, with an annual payroll of approximately \$6,000,000.—ranks among the 10 largest in the United States.

000. In terms of both capital investment and value of production our industry In order to obtain background information from our members with respect to my testimony here this afternoon, we prepared and sent a questionnaire on July 2, 1970 to the chief executive officer of each member company seeking replies to six broad questions. I am pleased to inform you that we have re-

ceived replies from approximately half of our members representing about 65% of the total sales of our industry. In a large majority of instances, these replies were prepared and sent by the principal executive officer of the company. This indicates the interest and importance which our members attach to this study of the metric system. (A copy of the questionnaire which was sent to our members is attached to the copies supplied to the officials of this Conference as a part of the record.)

II. SUMMARY AND CONCLUSIONS

By number, approximately 40% of our members use the metric system somewhere in their operations. By volume, it would be more than 50%. In most cases, such use is in research and development and general technical work, although five companies indicated that they use the metric system in the sale of highly technical papers. No company uses the metric system throughout its entire operations or in the main production process.

Practically every company stressed that conversion to the metric system would present problems, many major. These would include long-time dual inventory of spare parts; conversion of all types of records and statistics; and conversion or replacement of scales, gauges, and similar equipment. Conversion would be very costly, as I will explain later in my remarks.

Our survey indicates that a considerable period of time would be required for complete conversion to the metric system. Paper machines have a very long life and conversion, therefore, would be a lengthy process.

Most, but not all, of the respondents indicated that there would be long-term advantages in converting to the metric system, but in every case the disadvantage stressed was the high cost of conversion. This suggests to me, therefore, that consideration must be given in any legislation which might result from this overall study, to some form of tax relief for expenses of conversion.

Based upon our survey, I would conclude that certain long-term advantages could result for the paper industry under a planned national program to adopt the metric system, as outlined in "General Guidelines for Invitees to National Metric Study Conference," dated June 1970. These advantages, however, would be at a great cost, running into the hundreds of millions of dollars.

If a majority of United States industries and individuals favored the adoption of the metric system by the United States, I believe it fair to say that this effort would receive the support of a majority, but not all, in the paper industry. On the other hand, because of the many disadvantages inherent in such conversion, I do not believe that a majority in the industry would actively advocate such legislation.

III. DETAILED ANALYSIS OF OUR SURVEY

In our survey, six questions were asked. I would like to summarize the replies we received to each of these questions.

Question 1. "Does your company use the metric system in any part of its domestic operations? If so, please explain."

Fifty companies indicated that they did not use the metric system in any part of their domestic operations. However, 38 did use it to a limited extent, mostly in research and development, process control or laboratory testing. Some companies make limited application of the metric system because they have purchased European equipment which is calibrated in the metric system. As noted in my summary, 5 companies actually use the metric system in the sale of scientific papers and practically all export sales of wood pulp is on a metric ton basis.

The second question in our survey was: "What would be the major difficulties your company would encounter in converting to the metric system?"

The replies to this question went to the heart of the problem in as far as our industry is concerned. We are a heavy goods industry in which our paper machines frequently have a life of 25 to 50 years or more. Practically all of these machines are calibrated and adjusted to the English system. In a changeover to the metric system all kinds of gauges, recording instruments and controls would have to be changed or duplicated. Obviously, a dual inventory of replacement or spare parts also would be required in the plant. One of our companies estimated that it would take it 25 years before savings which resulted from the adoption of the metric system would equal cost of conversion.

The survey clearly indicated that education of our company employees would be an immediate, but certainly not an impossible, problem. The problem would be lessened if, as we assume, the metric system would be taught in all United

States schools during a transition period, preferably before any transition period in which industry was to convert.

Other difficulties which would be encountered would be comparing "old" statistics and records, specifications and blueprints. In addition, all kinds of weighing and measuring devices would have to be recalibrated or replaced. Converting equipment which measure length or weight of paper also would have to be modified or changed.

Our third question was: "What major difficulties would you anticipate would be created for your customers or consumers of your products?"

Our survey indicated that our customers would experience the same kind of difficulties as our manufacturers, although to nowhere near the same degree. In most instances, our customers would require more of an educational program although where converting equipment is concerned, such as printing presses, conversion would be required.

Our fourth question in the survey was: "How long a period of time would your company need to convert to the metric system?"

There can be no definitive answer to this question. For example, the teaching of company employees, the conversion of billing, etc., probably would require a relatively short period of time, certainly not more than two years.

Products probably could be converted in 5 to 10 years. On the other hand, as I previously indicated, the paper industry is a heavy equipment industry where its major machinery has a long life. Converting this equipment—which really means replacing it when it no longer has a useful life—would require from 25-50 years.

Our fifth question was: "Would there be advantages to you in converting to the metric system? If so, please explain."

A majority of our members stated there would be long-term advantages in converting to the metric system. However, a surprisingly strong minority saw no advantages to conversion.

Advantages most frequently cited were simplification, the universality of the metric system, its ease of use, its flexibility, and the suggestion that it would permit the purchase of more foreign equipment than is now the case. Companies concerned with export markets, which are a considerable number in the paper industry, pointed out that with the metric system they would be operating on one system rather than two as at present.

Our sixth and last question undoubtedly evoked the most thought. It was: "Would there be disadvantages which might result to your company if you adopted the metric system? Would the advantages outweigh the disadvantages? Please explain on the sheet attached."

Numerically, our industry appears to be about evenly divided as to whether the advantages would outweigh the disadvantages. In either case, practically all stressed the very high cost in such conversion. In fact, this very high cost appears to be the principal reason why many of our companies believe that the disadvantages outweigh the advantages.

Paper manufacturers which provide dispensers or containers would be particularly hard hit by conversion to the metric system. For example, all manufacturers of cartons, cans or cups, to name just a few, would have to change all of their dies and most of their processes in order to make containers under the new volume measures of the metric system. Manufacturers of towels, napkins, and other tissue products, which are dispensed by machine, would be similarly affected. In these instances one careful estimate is that it would take 5 to 10 years, at a cost of millions of dollars, for each company affected.

As I indicated in the summary of these remarks, this very high cost to our industry prompts me to recommend that some form of tax relief should be worked out if legislation to establish the metric system ever is forthcoming. I recognize that this could be subject to abuse but I am sure that the tax experts at the Treasury Department would be skillful enough to draft legislation with a minimum of loop-holes. Failure to provide such tax relief would, I am certain, create a heavy and undue hardship on pulp and paper manufacturers for many, many years.

IV. CONCLUSION

Weighing the advantages against the disadvantages *for our industry only*, conversion to the metric system would seem to have some, but not many, specific advantages. On the other hand, there would be many disadvantages, chief of which would be cost.

It is my personal opinion that it would be in the best interest of the United States if we were already on the metric system. Furthermore, I believe that, despite the many serious disadvantages which would be experienced in a conversion period, and despite the further fact that the metric system probably offers our industry relatively few specific advantages, the United States should begin now to plan an orderly conversion to the metric system.

Contrary to the recommendation in the "General Guidelines," I believe that the Planned Metrication, as it is called, should first be an 8 or 12 year period (school terms) of intensive education at all school levels and in all other areas, followed by a fixed period in which the economy then would convert.

As one of our members so aptly put it: "The United States cannot remain an island of obsolete and cumbersome measuring system in the world. It must convert some time to the more sensible measurement; it should have long ago, and every year it is put off will cost us more."

U.S. SENATE,
Washington, D.C., October 20, 1975.

HON. WARREN MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR MAGGIE: I understand that HR 8674 and other legislation dealing with conversion to the Metric System is before your committee. Mr. Bob Travis, who is responsible in my state of South Dakota for education about uses of the metric system has shared with me some of his views on this important topic. To me, his comments make a great deal of sense, and I wanted to share them with the Commerce Committee in hopes that they would help you in considering and marking up legislation in this area.

With best personal regards, I remain
Sincerely,

JAMES ABOUREZK.
U.S. Senate.

Enclosure.

DEPARTMENT OF EDUCATION AND CULTURAL AFFAIRS,
DIVISION OF ELEMENTARY AND SECONDARY EDUCATION
Pierre, S. Dak., October 6, 1975.

Senator JAMES ABOUREZK,
Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR ABOUREZK: Thank you very much for the prompt reply to my request for the copy of the pending legislation on Metric Conversion.

Following, are some of my thoughts regarding this legislation and our conversion to the use of the metric system.

Although you may expect some opposition to the adoption of the International System of Units as the metric system to be used, I strongly endorse this system as, by far, the best to adopt.

I notice that the legislation follows, very well, the recommendations of the National Bureau of Standards. I believe that this is appropriate.

The educational aspects of this Act seem to be well thought out. Hopefully, the necessary appropriations will follow rapidly.

Caution should be exercised in the selection of the members of the Metric Board to insure that some interest groups do not influence the Board to recommend unnecessary subsidies for conversion to the Metric System.

Many reports on the costs of conversion seem to be exaggerated when compared to actual costs of companies who have already converted, or are in the process.

Perhaps, one of the duties of the Board could be to recommend some type of goal or "time-line" for the conversion process. A given time oriented goal should not be mandated but would lend additional accountability to the process, and provide a better understanding of what is expected.

I greatly appreciate the opportunity to communicate my ideas regarding metrication.

Sincerely,

BOB TRAVIS.

AMERICAN PETROLEUM INSTITUTE,
Washington, D.C., October 20, 1975.

Senator WARREN G. MAGNUSON,
Chairman, Senate Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR SENATOR MAGNUSON: In our letter of October 1, 1975, the American Petroleum Institute confirmed that it would be pleased to comment on proposed metric legislation as requested in your letter of September 22, 1975. It is my pleasure to transmit our views to you.

The American Petroleum Institute supports federal legislation favoring adoption of the Metric (SI) System. This support was officially articulated by the API Board of Directors in 1972 in the following statement: "In recognition of increasing worldwide acceptance of the Metric (SI) System, the API supports immediate federal legislation initiating domestic conversion to Metric (SI) Units. This support recognizes the need for a coordinated and orderly conversion, executed in a rational manner to facilitate and encourage standardization efforts nationally that are also compatible with such efforts worldwide."

API policy was further defined in an April 9, 1973 letter to the Chairman of the House Subcommittee on Science, Research and Development of the Committee on Science and Astronautics. A copy of that letter is attached. API's policy remains essentially unchanged and, in our discussion of current proposed legislation, we will reemphasize two especially pertinent points of that letter.

Since 1973 and consistent with its metric policy pronouncements, the Institute has established guidelines for the soft conversion of all its documents by 1979. This means that metric equivalents will be shown preferentially and customary units secondarily. Of itself, this action will have a significant impact on the U.S. and perhaps foreign petroleum industries since API Standards, recommended practices and other technical publications apply to the full range of petroleum industry operations. Further, the Institute has published API Publ. 2563 (Chapter 15.1 of the Petroleum Measurement Manual), *Metric Practice Guide—A Guide To The Use of SI—The International System of Units*; API Publ. 2564 (Chapter 15.2 of the Petroleum Measurement Manual); *Conversion of Operational and Process Measurement Units To The Metric System* and Publ. 2564-2, *Suggested Format Guidelines For The Conversion of API Documents To The Metric (SI) System* (July 1974). These documents suggest preferred metric (SI) units for the petroleum industry, related conversion factors and simplified format approaches for the layman. I have included a copy of each for your review.

The Institute is a charter member of the American National Metric Council (ANMC), a voluntary, non-advocate metric coordination organization.

In general, the Institute suggests a national metric program as outlined in H.R. 8674, as passed by the House of Representatives. However, the Institute desires to offer several suggestions which, if incorporated in a Senate bill and sustained by the two houses, would improve national metric conversion policy.

H.R. 8674 establishes a United States Metric Board whose powers, in our judgement, could prove to be significantly less than desirable for effecting a rational, orderly changeover to metric. In its 1973 letter, the Institute suggested that such a Board "... be empowered to establish deliberate, carefully planned and coordinated schedules for mandatory conversion to SI units of Federal, state and local laws and regulations that are currently referenced to the customary system of units."¹ Further, the Institute said that "It is important that laws and regulations at all levels of government are converted within the time frame of the national plan to avoid massive confusion and inconsistencies."²

The Institute still advocates these two principles. They are ignored, however, in H.R. 8674. We think that their omission may have a devastating effect because adequate provision is not made to insure acceptable coordination between industries and governments. For example, the retail marketing of petroleum is regulated by Federal, state and local governments. Hence, metrication of gasoline pumps could involve several steps, each requiring separate legislative and regulatory actions. These are:

(1) State and/or local approval of gasoline sales by the litre.

(2) Rounding of the federal gasoline tax to the nearest metric equivalent rate.

¹ F. N. Ikard letter of April 9, 1973 to Subcommittee on Science Research and Development (Committee on Science and Astronautics).

² Ibid.

- (3) Rounding the state gasoline tax to the nearest metric equivalent rate.
- (4) Rounding the local gasoline tax to the nearest metric equivalent rate.
- (5) Rounding the FEA tankwagon price to the nearest metric equivalent rate.
- (6) Rounding the local regulated price markup to the nearest metric equivalent rate.
- (7) Hard conversion of pump accessories and components.

HR 8674 makes no provision for rationally achieving the above-listed steps within a given time period. In fact, it encourages only consultation with the National Conference on Weights and Measures and places the entire burden for rational changes on affected industries. This would require each industry, often working in an uncoordinated fashion with allied industries, to attempt, on a costly, piecemeal basis, to effect the change of the multitude of applicable federal, state and local laws and regulations. This is not desirable, nor is it an example of rational conversion.

As an alternative, the Institute suggests two items for committee consideration. First, it is imperative that a time limit for the National Conversion Board be defined within which it is expected to execute its mandate. The open-ended approach of HR 8674 invites non-compliance until 'the last minute' as may be dictated by special situations and the public mood. Put another way, the experience of conversion in other countries is that it is carried out most effectively when schedules are developed by all interests with the nation, and concurrently implemented by the private sector and appropriate agencies of government at all levels.

We, therefore suggest the adoption of a 10 year life for the Board to complete its task. This could be accomplished by amending HR 8674, Sec. 5 by adding the phrase: "within 10 years from the establishment of the Board" to the last sentence of Section 5.

Further, we suggest that the committee consider the principle of a conscious and orderly change to metric during the Board's life by the departments and agencies of the Federal government in cooperation with and in a manner not injurious to affected industries. This principle is contained in S 100, Sec. 3(a) (8) and is also acceptable as written.

Second, with regard to the problem of coordinating the changes required at the three levels of government, the Institute suggests that consideration be given to proposals which are often referred to as the 'Victor Solution.' This formula, based on an Act of Parliament, (Victoria), No. 8423, *An Act to Facilitate The Conversion To The Metric System Of Measurement Of Certain References To Physical Quantities* would require the Congress, under the terms of Article 1, 8 of the Constitution of the United States, to pass broad, pre-emptive metric legislation with regard to the States. Specifically, the Committee should consider a provision which would allow the modification of customary units in any law to a quantity expressed in the metric system, provided the change, if any, between the actual quantities as stated in the two systems does not exceed ± 12.5 percent.

This legislation should also require the Metric Board to identify all affected Federal, state and local laws in the particular economic sector being examined, consult the private companies of that sector, and determine the existence of a consensus before making a final recommendation to the Congress for the mandatory hard conversion of appropriate laws and regulations.

Additionally, such a recommendation should identify tax laws which while using ± 12.5 percent rule, might be raised inadvertently and without due process. The Board's recommendations should always provide a warning to all jurisdictions not to use the ± 12.5 percent solely as a convenient and subtle manner in which to increase taxes on petroleum products or other commodities and services. The Congress might consider steps to ease the consumer tax burden by providing offsetting tax relief in other sectors of the affected economy.

The Institute recognizes that its suggestions go beyond the apparent intention of HR 8674. It does so, however, because it also recognizes that the need for a rational orderly and systematic changeover within a given time period is the only way to avoid what could well become a chaotic situation.

Very truly yours,

FRANK N. IKARD.

Enclosure.

STATEMENT OF ANDRE NADASH, CONSULTANT

Chairman and Members of the Committee: Previously I presented a paper at the S. 2483 hearing explaining the worldwide status of acceptance of the metric system. Since this detailed report the number of non-metric countries, or not

going metric at the present, has been reduced to four: Brunei, Burma, Liberia and Yemen. All others have since declared to go metric and even though a metric bill has not passed as yet in the United States we are accepted by the metric or metric-going countries as going metric.

Industry realized the disadvantages of staying with the old outdated measurements and that—even with our most advanced technology—they were unable to compete in the foreign market. We lost our strength in the foreign market as many of these countries decided to buy metric products only. It was natural on their part to simply accept only metric measurements (SI) for import, for they wished to avoid confusion of dual measurements. Also, the European Common Market created the “Cencer” mark, which is not only to approve quality but will not be available on non-standard measurements.

South Africa, which naturally does not belong to the EEC, is most advanced in SI and to avoid any confusion, they don't even allow the importation of dual calibrated instruments, such as a thermometer with Fahrenheit and Celsius or a scale with pound and kilogram calibration, etc. All these countries are doing this only to protect themselves from the confusion that could arise in years to come if they don't take the necessary steps now and proceed toward the use of the worldwide accepted system (SI). This is not an anti-American action, even though some seem to think so.

In the future the whole world will use only one measurement—and this is metric. The system is easy to learn and understand and each individual needs to learn only the basic essentials included in the regular school curriculums. Those who go to higher learning naturally will learn more, but basically we don't need 200 million scientists. Learn only what you need.

I attended a meeting where a teacher opposed metric stating that if we go metric all lightbulb sockets have to be changed when lightbulbs become metric. Naturally, she had never heard of the so-called Edison thread (which is on our regular lightbulbs) and that this is a worldwide standard. A few non-standard sockets are still in existence, for example, in Great Britain. The strongest opposition came from the unions and small businesses demanding financial aid for unnecessary and highly overestimated tool replacements and who tried to make a simple procedure so complicated that they even want to tear down all buildings because they were not made in metric measurements.

In the October 8 and 10 hearings, one of the presentations was made by a knowledgeable lawyer who stated among other things that “No pipe shall have a diameter of less than 4 inches, could become, No pipe shall have a diameter of less than 10 centimeters”. I really consider the writer as a very knowledgeable lawyer but I strongly suggest to everyone to stay in his own field or profession in the process of metrication and thus avoid any type of confusion, misunderstanding or misrepresentation. I have been a very strong promoter of metric since a long, long time but I would not want to be involved in any part of the legal aspects. To solve technical correctness and legal procedures will be the job of the Metrication Board and to avoid pitfalls, misunderstandings and confusion in the future we need a knowledgeable Metrication Board composed of very carefully selected people from every sector of our life but not dominated or represented by members of giant industries or organizations, not even those with “prefabricated” metrication committees. Naturally, I have nothing against the lawyer gentleman; in fact, I would like to see him on the Board's legal sector to give advice to upcoming legal questions in all committees, such as technical, commercial, educational, etc.

The basic, however, of my recommendation is—as there is no question that we are going metric—a strong Board with knowledgeable people who know what to do and where the members stay within the problems of their own committee, and not the teacher to worry about the lightbulbs or the lightbulb factory worrying about teaching; the lawyer to worry about the pipe size or the pipe industry to be involved in law. Let all work in their own field and thus the pipe question becomes the problem of the proper committee, the members of which know that a 10 cm pipe does not exist, as pipes are measured in millimeters and, therefore, the correct size would be 100 mm. The centimeter is used only in clothing and body measurements. Proper planning and implementation can be achieved only with knowledgeable board members who assure that metrication will go smoothly and properly, as it is going now, and without sky-high additional expenses as predicted by the opponents. I recommend a well planned ten-year changeover period.

1976 is the 200th anniversary of the birth of our great nation and it was in the first half of our existence that the United States signed the Metric Treaty. If we

go full speed ahead now, we are still 100 years behind those countries which signed the Metric Treaty on May 20, 1875, and changed to metric immediately after.

As everywhere else, we have people who oppose new ideas. Some of them are well educated but shortsighted in that they can't visualize or accept advancements made in other countries. The whole world can't be wrong in accepting the change to metric. It far outweighs the old measurements in advantages and therefore gained worldwide acceptance. Some individuals are slow in adopting any new method, but once learned, they can't ever imagine why they didn't do it earlier.

I predicted many years ago that we would go metric and also pointed out the misunderstood conceptions of organizations who opposed a changeover. We are a great nation but even so we cannot afford to isolate ourselves and remain non-metric in a metric world. Let's not lose any more precious time. The sooner we change to metric the better. There is no other way.

CHRYSLER CORP.,
October 20, 1975.

HON. WARREN G. MAGNUSON,
*Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.*

DEAR SENATOR MAGNUSON: Thank you for letter of October 1, 1975, asking for our views on metric conversion legislation. We are pleased to offer the following general comment.

Having observed Congressional deliberations and the evaluation of U.S. metric conversion Bills since completion of the U.S. Metric Study, in 1971—we are in general accord with the legislative intent embodied in H.R. 8674 and S. 1882.

We believe the voluntary approach embodied in H.R. 8674 and S. 1882 is preferable to the mandatory requirements contained in S. 100.

As we understand H.R. 8674 and S. 1882, they place emphasis on U.S. voluntary changeover to the metric system, with the government's role seen as chiefly in providing for coordination and education functions. To assure metric implementation on a voluntary basis, these Bills do not stipulate a schedule or required time period for metric conversion, instead, they intend that timetables will be established voluntarily for best accommodation of metric change in the various areas and sectors. The Bills contain no compulsory powers which would force a business, an industry, or an individual to adopt and use the metric system. They provide specifically that the Metric Board would not have compulsory powers.

It is our understanding that the national metric policy which would be established by H.R. 8674 and S. 1882 covers four specific points. The policy under these four points would be: To plan to coordinate the increasing use of the metric system; to encourage voluntary participation of affected sectors or groups; to encourage efficiency and minimize costs to society; and to assist in developing a broad educational program which will assist all Americans in becoming familiar with the metric system.

We believe the nation's interests would be best served by metric legislation that emphasizes the coordination function of the Government's role, and which does not mandate the change, but aims at providing coordination based on voluntary participation.

We also endorse the concept of H.R. 8674 and S. 1882 that it would be unwise to mandate a conversion to the metric system within a specified time frame and to make it a goal for the conversion that the country becomes predominantly metric within that time period. This is in contrast to S. 100—which stipulates that "... it is ... policy of the United States ... to establish the metric system of measurement as the sole language measurement in the United States within 10 years from the date of enactment ..."

In terms of the philosophy and principles to be embodied in metric legislation, we concur with the congressmen and senators who support a moderate position on this matter. In our opinion, in principle, the metric law should be a facilitating mechanism, not a directing mechanism. Under this approach Congress would provide a national metric policy ... but it would be voluntary, not coercive. And, overall, the Law would provide for an orderly development and progress of a conversion process already underway in this country.

In regard to conversion costs, provisions for coordinated planning, role of Federal agencies, and utilization of existing private sector functions; we have studied the three Bills (H.R. 8674, S. 100 and S. 1882) that were enclosed with your letter ... and note that our views are in accord with the way these matters are

treated in H.R. 8674 and S. 1882 . . . which, we believe, are preferable to the provisions contained in S. 100.

We appreciate having had an opportunity to submit the foregoing material for consideration by the U.S. Senate Committee on Commerce, and for possible inclusion in the final record of the Hearings.

Very truly yours,

JOHN T. BENEDICT,
Manager, Technical Information.

CHAMBER OF COMMERCE OF THE UNITED STATES,
Washington, D.C., October 21, 1975.

HON. WARREN G. MAGNUSON,
*Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.*

DEAR MR. CHAIRMAN: On behalf of the business community, the Chamber of Commerce of the United States urges approval of H.R. 8674, which would declare a national policy of coordinating the increasing use of the metric system in the United States, and establish a United States Metric Board to coordinate the voluntary conversion to the metric system.

The basic issue is whether to provide government leadership for coordination of the changeover to the metric system, or to permit changeover with no government leadership at all.

There is a need at this point in the changeover process to go ahead with the creation of a Metric Board to provide an appropriate mechanism to coordinate the actions in which federal, state, and local governments, along with the private sector, have common interests.

Section 3 of H.R. 8674 would establish a workable policy for initiating the government role of coordination. While some provisions of S. 100 and S. 1882 would set in motion many of the needed actions, H.R. 8674 most clearly fits our perception of what is necessary.

We urge the Senate Committee on Commerce to approve H.R. 8674.

We request that this letter be included as part of the hearing record.

Cordially,

HILTON DAVIS,
General Manager, Legislative Action.

H.F. No. 1047, CHAPTER No. 474

AN ACT Relating to standards of weight and measure; providing for the gradual implementation and instruction concerning the metric system of weights and measures

Be it enacted by the Legislature of the State of Minnesota:

Section 1. (Citation.) Sections 1 to 3 may be cited as the metric implementation and standards act".

Sec. 2. (Purpose and policy.) In recognition of the facts that (1) only about one dozen countries in the world have not yet adopted or begun to implement the metric system of weights and measures; (2) the United States is one, and the only major industrialized nation, of that remaining number; (3) the secretary of commerce of the United States, pursuant to a two-year study under the Metric Study Act of 1968, has recommended that the United States now begin a deliberate change to the metric system; (4) economists and other students of international trade recognize the pressing necessity of such a change if this country is to maintain and improve her rightful place in the world trade community; and (5) as the continued economic growth of this state and its local industry is inextricably linked with the ability of the United States to hold and competitively serve foreign export markets, it is, therefore, declared to be in the best interest of the state of Minnesota and her citizens that this state now begin the gradual but deliberate implementation of the metric system of weights and measures.

Sec. 3. (Implementation of metric system.) Subdivision 1. (Commissioner of Administration.) The commissioner of administration shall have general supervisory authority over the implementation of the metric system in the State of Minnesota. The commissioner of administration shall promulgate such rules and regulations as may be necessary to plan for the gradual implementation in

the commerce of this state the metric system of weights and measures. The rules and regulations promulgated by the commissioner of administration pursuant to this subdivision shall :

(1) Provide for the full conversion of the commerce of this state to the metric system when this system has been fully adopted as national standards by the Congress of the United States ; and

(2) Insure that all state departments, divisions, agencies, boards and commissions having any authority and/or responsibility in matters concerning standards of weights and measurement in this state shall forthwith initiate planning for the gradual conversion to and implementation of the metric system of weights and measures in this state.

Sec. 4. The commissioner of education shall in consultation with the commissioner of administration develop and implement a plan of public education on the metric system of weights and measures. The commissioner of education shall implement the plan.

MINNESOTA PLAN FOR METRIC EDUCATION

One of the basic skills needed by all citizens in our society is the ability to make, use and interpret measurements of many sorts. The United States is moving in the direction of adopting the *Le Système International d'Unités* (SI) of metric weights and measures. Subsequently, the Minnesota Legislature passed an act, Minnesota Laws, 1974, Chapter 474, Metric Implementation Standards, which delineated a purpose, policy, and implementation for metric conversion, when conversion to metric units is officially legislated into federal policy.

Pursuant to Chapter 474, Sections 3 and 4, the Commissioner of Administration shall have general supervisory authority over implementation, and shall, with the Commissioner of Education, collectively plan for the development and implementation of public education to the metric system of weights and measures by M-Day.¹ Said plan follows :

A. In-Service Training of Teachers :

1. A developing and, in certain academic areas, an ongoing project is presently instituted with about 50% of elementary and secondary mathematics teachers having undergone the aforementioned training under Minnesota Department of Education (MDE) guidance in 1972. By M-Day, plus one year, 90% of elementary and secondary teachers in Minnesota public schools shall have undergone related training in metric measurements.

2. In-service material shall be available for teachers not already trained in metrics. (To be accomplished by December 31, 1975.)

3. The Minnesota Department of Education shall actively encourage all teachers and school administrators to familiarize themselves with metric usages by July 1, 1976, and to include metrication on agendas for teachers' meetings. School and district educational administrators shall also be encouraged to foster metric education in their schools and districts according to the metric plan as delineated under C.1. of this document.

B. Pre-Service Training of Future Teachers :

1. Minnesota Department of Education shall contact all teacher-preparing institutions in Minnesota and urge pertinent Education Departments to teach metric education to all future teachers. (To be accomplished during the fall of 1974.)

2. Minnesota Department of Education shall initiate action which will lead to the inclusion of metric education as a requisite for the Education's approval of programs leading to certification of elementary teachers and secondary mathematics teachers. *All* applicants for teaching certificates shall be able to measure metrically and be familiar with common metric terms and ideas. (Such initiation to be accomplished by July 1, 1975.)

¹ NOTE.—M-day is the date of federal legislation enactment or July 1, 1976, whichever is earlier.

C. Classroom Implementation:

1. Timetable for implementation:

Activity	Initiated by target dates		
	Primary	Intermediate	Secondary
50 percent of teachers teaching metric and customary side by side.	1974-75 school year....	1975-76 school year....	1975-76 school year.
90 percent of teachers teaching both systems side by side and 50 percent of teachers teaching metric as predominant system.	Year following M-day..	M-day plus 2-years....	M-day plus 2-years.
90 percent of teachers teaching metric as predominant system and 50 percent of teachers teaching customary system only incidently.	M-day plus 4-years....	M-day plus 5-years....	M-day plus 5-years.
90 percent of teachers teaching customary system only incidently.	M-day plus 8-years....	M-day plus 8-years....	M-day plus 8-years.

2. At the earliest possible time following approval of this Plan by the Commissioners of Administration and Education, it shall be submitted to the State Board of Education for adoption into regulations and directives and implementation, and shall, thereafter, be forwarded to teachers and school administrators for further implementation.

RICHARD L. BRUBACHER,
Commissioner of Administration.
 HOWARD B. CASMEY,
Commissioner of Education.

STATE OF MINNESOTA

MINNESOTA STATE BOARD OF EDUCATION—A RESOLUTION ON METRICATION

Whereas, the Congress of the United States has made a finding that—(A) the metric system of measurement is in general use in industrially developed nations and its use is increasing; and, (B) increased use of such metric system in the United States is inevitable, and such a metric system will become the dominant system of weights and measures in the United States; and

Whereas, the Minnesota Legislature has directed the Commissioner of Education and the Commissioner of Administration to develop and implement a plan of public education on the metric system of weights and measures and has directed the Commissioner of Education to implement such plan; and

Whereas, a Minnesota Plan for Metric Education has been developed and approved by the Commissioner of Education and the Commissioner of Administration; and

Whereas, the use of the *Système International* (SI) has been accepted as the measurement system to be used; therefore be it

Resolved That the Minnesota State Board of Education endorse the provisions of the Minnesota State Plan for Metric Education, namely that school and district educational administrators encourage metric education in their schools and districts, that in-service opportunities in metrication be made available for teachers, that teacher-preparing institutions in Minnesota be urged to teach metric concepts to future teachers, and that the metrication timetable be adopted to insure that 90% of the teachers will be teaching the customary system of weights and measures only incidentally by 1984; and be it further

Resolved That copies of this resolution and the Minnesota Plan for Metric Education be forwarded to the Governor, to the Commissioner of Administration, to each Superintendent of Schools, to the Presidents of all teacher-preparing institutions in Minnesota and be made available to the teachers in Minnesota.

STATEMENT OF AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AMERICAN SOCIETY OF MECHANICAL ENGINEERS, INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, AND NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Four of the Nation's largest engineering societies join together in this Statement on pending legislation providing for metric conversion. These organizations are: the American Institute of Aeronautics and Astronautics, with 26,000 members; the American Society of Mechanical Engineers, with 70,000 members; the Institute of Electrical and Electronics Engineers, a 140,000 member group; and the National Society of Professional Engineers, with 72,000 members. These societies, with a total membership of 300,000 individual members, appreciate the opportunity to present their views to this Committee.

The impact of a change to the SI system will be felt in all branches of engineering. The impact will be felt in the immediate future, particularly when America's traditional preeminence in technology will be severely threatened by a few foreign nations and the U.S.'s ability to compete in world markets will be increasingly challenged.

The decision which faces the Congress is not one to be treated lightly. Every large industrial nation except the United States is now either predominantly metric or committed to become so. Thus, more and more of the world's manufactured goods are produced in a metric environment and in accord with metric standards. The members of the European community, for example, have agreed to use only SI units in international commerce.

This worldwide trend results in difficulties for the U.S. manufacturing industries in two ways: 1) as a trade barrier and 2) as a contributor to inconvenience and inefficiency in operations of United States plants at home and abroad manufacturing the same products. In order to mitigate these difficulties U.S. manufacturers and design and consulting engineers have been increasing their use of metric measurement and, no doubt, will continue to do so.

Professional engineering's input should be accorded the most careful consideration by Congress. This is not a position which engineers have often claimed for themselves. American engineering societies have for more than a half century, been participants in the International Organization for Standardization (IOS) and the International Electrotechnical Commission (IEC), (the two principal voluntary international standards associations), and no group may speak more authoritatively to questions of measurement and standardization than these engineers. We urge continued United States support for International Standardization through the American National Standards Institute (ANSI) which is the U.S. Member of IOS and its affiliate, the U.S. National Committee for IEC.

Against this background, the engineering societies joining in this presentation make the following points:

1. They support the systematic conversion of the fundamental measurement system within the United States from the (so called) Customary Units to the SI Metrication Units, through a coordinated national plan. Already many engineering-oriented industries have made the decision to make this conversion regardless of national metric policy. They, along with many other sectors of commerce, labor, academia, consumers and government bodies, have organized the American National Metric Council (ANMC) for the purpose of beginning national planning programs for voluntary implementation of the metric system, sector by sector. The ANMC is endorsed by and is working closely with the engineering community represented by the societies joined in this Statement.

2. They support the concept of an independent commission, appointed by the President, which would be responsible for recommending, developing, and directing a voluntary conversion plan. The commission should be composed of representatives from the public, the government, industry, commerce, engineering, education, the professions, etc. It should be authorized to establish advisory committees in any of the many disciplines which will require special attention. In this regard, the commission should work closely with, and avoid duplication of, the already established coordinating and planning services of ANMC. The commission should foster United States participation in continuing development of the international system of metric units.

3. They support planned national changeover to the metric use based on the rule of reason. This is a most complex matter, the impact of which varies greatly from industry to industry, and the time period for conversion in each industrial area should be left for development by the commission. It would ap-

pear most desirable, therefore, that substitution of metric measurement be accomplished in such a way that it becomes the predominant, but not the exclusive measurement language within a target date of ten years establishment of the conversion commission.

4. They urge the intimate participation of leaders of the engineering professions in the activities of the commission. In particular, engineers urge that such a far-reaching change in American engineering practice should be determined firmly upon the hard economic realities of American industrial and trade requirements. The costs and benefits of increased metric use are extremely difficult, if not impossible to evaluate in dollars and cents. In any attempt, however, to make such an evaluation the meaningful comparison is between increased metric use by plan and by no plan, rather than between increased use and no such increased use, because the latter course is not available. Metric use will continue to increase regardless of what action the Congress takes with respect to metrification. Careful analysis leads to the conclusion that the costs and benefits of increased metric use by plan would be more favorable than those incurred through continued drift into non-uniform mixed usage.

5. They urge the initiation of a pervasive and immediate educational program at all levels of American schools, from kindergarten through graduate school. In particular, it should be recognized that with the decision of the United Kingdom to "go metric" America's preeminent position in the dissemination of many international scientific and technical books and periodicals is increasingly in jeopardy.

6. Finally, on the subject of subsidies, there does exist a division amongst engineers themselves. Engineers in the context of our profession have no strong views on subsidies. The personal cost to the individual professional engineer is relatively small. Engineers recognize, however, that some industrial companies, correctly forecasting the wave of the future, have anticipated the advent of the metric system, and have invested substantial amounts of their own resources in facilitating this conversion. By traditional American economic doctrine, such companies should be rewarded by a preferred position in the market place. On the other hand, some companies, in other industries, particularly those faced with years of double stockpiling of components, may be severely harmed by foreign competition during the conversion interval. There is some danger that subsidies will result in non-economic change, merely for the sake of securing government funding. This would be evidently unfair, and would add to the burden of costs of the changeover to all citizens. It would be indeed gratifying if the engineering method of analysis, of which engineers think so highly, gave clear unequivocal answer to this dilemma. Since it does not, it is the belief of engineers that this matter should be reserved to the commission which should make recommendations to the Congress, and for which the Congress could supply funding on an industry-by-industry basis.

In conclusion, the engineering societies joined in presentation of this Statement approve the initiation of a program of metric conversion; they look upon increased metric use by plan as an opportunity, not a problem; they support the establishment of a supervisory commission with sufficient powers, and with sufficient flexibility to assure a successful conversion program, both as regards time scale and as regards cost to the varied segments of industry; and they urge the immediate initiation of a nationwide program of education in the metric system. Finally, engineers urge the Congress to recognize that the profession of engineering has, potentially, the most significant and the most realistic input to the planning of such a conversion program. Engineers urge that any structure which may be established to effect this conversion provide ample opportunity for informed input from the engineering societies.

29.10.71

Official Journal of the European Communities

No L 243/29

COUNCIL DIRECTIVE

of 18 October 1971

on the approximation of the laws of the Member States relating to units of measurement

(71/354/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Article 100 thereof;

Having regard to the proposal from the Commission;

Having regard to the Opinion of the European Parliament¹;

Having regard to the Opinion of the Economic and Social Committee²;

Whereas the laws which regulate the use of units of measurement in the Member States differ from one Member State to another and therefore hinder trade; whereas application of the rules relating to measuring instruments is closely linked to the use of units of measurement in the metrological system; whereas, in these circumstances and having regard to the interdependence of the rules concerning units of measurement and those concerning measuring instruments, it is necessary to harmonise laws, regulations and administrative provisions to ensure harmonious application of existing and future Community directives relating to measuring instruments and methods of metrological control;

Whereas units of measurement are the subject of international resolutions adopted by the General Conference of Weights and Measures (CGPM) set up by the Metre Convention signed in Paris on 20 May 1875, to which all the Member States adhere; whereas, however, units of measurement, and in

particular their names, symbols and use are not identical in the Member countries;

HAS ADOPTED THIS DIRECTIVE:

Article 1

1. Member States shall make the provisions of Chapter 1 of the Annex binding within five years of the date of entry into force of this Directive.

2. Member States shall, with effect from 31 December 1977 at the latest, prohibit the use of the units of measurement listed in Chapter III of the Annex.

3. The units of measurement temporarily retained in accordance with the provisions of Chapter II or Chapter III of the Annex may not be brought into compulsory use by the Member States where they are not authorised at the date when this Directive enters into force.

Article 2

The obligations arising under Article 1 relate to measuring instruments used, measurements made and indications of quantity expressed in units, whether for economic, public health, public safety or administrative purposes.

Article 3

This Directive shall not affect the use of units which it does not prescribe but which have been laid down by international intergovernmental conventions or agreements in the field of air and sea transport and rail traffic.

¹ OJ No C 78, 2.8.1971, p. 53.

² OJ No C 93, 21.9.1971, p. 18.

Article 4

1. Member States shall put into force the laws, regulations and administrative provisions needed in order to comply with this Directive within eighteen months of its notification and shall forthwith inform the Commission thereof.

2. Member States shall ensure that the texts of the main provisions of national law which they adopt in the field covered by this Directive are communicated to the Commission.

Article 5

This Directive is addressed to the Member States.

Done at Luxembourg, 18 October 1971.

For the Council

The President

A. MORO

ANNEX

CHAPTER I

UNITS OF MEASUREMENT WHICH ARE DEFINITELY AUTHORISED

1. SI UNITS AND THEIR DECIMAL MULTIPLES AND SUBMULTIPLES

1.1. SI base units

Quantity	Unit	
	Name	Symbol
length	metre	m
mass	kilogramme	kg
time	second	s
electric current	ampere	A
thermodynamic temperature	kelvin	K
luminous intensity	candela	cd
amount of substance	mole ¹	mol

¹ SI base unit adopted by the International Committee of Weights and Measures (CIPM) on 7 October 1969 for approval by the next General Conference of Weights and Measures (CGPM).

Definitions of SI base units:

Unit of length

The metre is the length equal to 1 650 763.73 wavelengths in vacuum of the radiation corresponding to the transition between the levels $2p_{10}$ and $5d_5$ of the krypton-86 atom. (Eleventh CGPM (1960), Resolution 6).

Unit of mass

The kilogramme is equal to the mass of the international prototype of the kilogramme. (Third CGPM (1901), p. 62 of the Conference Report).

Unit of time

The second is the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the caesium-133 atom. (Thirteenth CGPM (1967), Resolution 1).

Unit of electric current

The ampere is that constant current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section and placed 1 metre apart in a vacuum, would produce between these conductors a force equal to 2×10^{-7} newton per metre of length. (CIPM (1946), Resolution 2 approved by the Ninth CGPM (1948)).

Unit of thermodynamic temperature

The kelvin is the fraction $1/273.16$ of the thermodynamic temperature of the triple point of water. (Thirteenth CGPM (1967), Resolution 4).

Unit of luminous intensity

The candela is the luminous intensity, in the perpendicular direction, of a surface of $1/600\,000$ square metre of a black body at the temperature of freezing platinum under a pressure of 101 325 newtons per square metre. (Thirteenth CGPM (1967), Resolution 5).

Unit of amount of substance

The mole is the amount of substance of a system which contains as many elementary entities as there are atoms in 0.012 kilogramme of carbon-12.

Note: When the mole is used the elementary entities must be specified and may be atoms, molecules, ions, electrons, other particles or specified groups of such particles.

1.1.1. Special name and symbol of the SI unit of temperature for expressing Celsius temperature

Quantity	Unit		
	Name	Symbol	Value
Celsius temperature	degree Celsius	$^{\circ}\text{C}$	$1^{\circ}\text{C} = 1\text{ K}$

Celsius temperature t is defined as the difference $t = T - T_0$ between the two thermodynamic temperatures T and T_0 where $T_0 = 273.15\text{ K}$.

1.2. Other SI units

1.2.1. Derived SI units

Units derived coherently from SI base units are given as algebraic expressions in the form of power products of the SI base units with a numerical factor equal to 1.

1.2.2. SI units having special names and symbols

Quantity	SI Unit		
	Name	Symbol	Derivation
plane angle	radian	rad	m/m
solid angle	steradian	sr	m ² /m ²
frequency	hertz	Hz	s ⁻¹
force	newton	N	m · kg · s ⁻²
pressure, stress	pascal ¹	Pa	m ⁻¹ · kg · s ⁻²
energy, work, quantity of heat	joule	J	m ² · kg · s ⁻²
power	watt	W	m ² · kg · s ⁻³
quantity of electricity, electric charge	coulomb	C	A · s
electric tension, electric potential, electromotive force	volt	V	m ² · kg · s ⁻³ · A ⁻¹
electric resistance	ohm	Ω	m ² · kg · s ⁻³ · A ⁻²
electric conductance	siemens ¹	S	m ⁻² · kg ⁻¹ · s ³ · A ²
electric capacitance	farad	F	m ⁻² · kg ⁻¹ · s ⁴ · A ²
electric inductance	henry	H	m ² · kg · s ⁻² · A ⁻²
magnetic flux	weber	Wb	m ² · kg · s ⁻² · A ⁻¹
magnetic flux density	tesla	T	kg · s ⁻² · A ⁻¹
luminous flux	lumen	lm	cd · sr
illuminance	lux	lx	m ⁻² · cd · sr

¹ Proposed by the CIPM for approval by the next CGPM.

Units derived from SI base units may be expressed in terms of the units listed in Chapters I and II, and of those listed in Chapter III so long as these remain in use.

In particular, derived SI units may be expressed in terms of the special names and symbols in the above table. For example: the SI unit of dynamic viscosity may be expressed as m⁻¹ · kg · s⁻¹ or N · s/m² or Pa · s.

The SI unit of power may be called volt-ampere (symbol 'VA') when it is used to express the apparent power of alternating electric current, and var (symbol 'var') when it is used to express reactive electric power.

1.3. Prefixes and their symbols used to designate certain decimal multiples and submultiples

Factor	Prefix	Symbol	Factor	Prefix	Symbol
10^{12}	tera	T	10^{-1}	deci	d
10^9	giga	G	10^{-2}	centi	c
10^6	mega	M	10^{-3}	milli	m
10^3	kilo	k	10^{-6}	micro	μ
10^2	hecto	h	10^{-9}	nano	n
10^1	deca	da	10^{-12}	pico	p
			10^{-15}	femto	f
			10^{-18}	atto	a

The names and symbols of the decimal multiples and submultiples of the unit of mass are formed by attaching prefixes to the word 'gramme' and their symbols to the symbol 'g'.

Where a derived unit is expressed as a fraction, its decimal multiples and submultiples may be designated by attaching a prefix to units in the numerator or the denominator, or in both these parts.

Compound prefixes, that is to say prefixes formed by the juxtaposition of several of the above prefixes, may not be used.

1.4. Special authorised names and symbols

1.4.1. Special names and symbols of decimal multiples and submultiples of SI units

Quantity	Unit		
	Name	Symbol	Value
Volume	litre	l	$1 \text{ l} = 1 \text{ dm}^3 = 10^{-3} \text{ m}^3$
Mass	tonne	t	$1 \text{ t} = 1 \text{ Mg} = 10^3 \text{ kg}$
Pressure, stress	bar	bar	$1 \text{ bar} = 10^5 \text{ Pa}$

1.4.2. Special names and symbols of decimal multiples and submultiples of SI units which may be used only in specialised fields

Quantity — Size	Unit		
	Name	Symbol	Value
Area of farmland and building land	are	a	$1 \text{ a} = 10^2 \text{ m}^2$
Mass per unit length of textile yarns and threads	tex ¹	tex ¹	$1 \text{ tex} = 10^{-6} \text{ kg/m}$

¹ The character * after a unit name or symbol indicates that these have not yet appeared in the lists drawn up by the CGPM or CIPM.

Note: The prefixes listed in item 1.3 may be used in conjunction with the units contained in the tables of items 1.4.1 and 1.4.2.

The multiple 10^2 a is, however, called a 'hectare'.

2. UNITS WHICH ARE DEFINED ON THE BASIS OF SI UNITS BUT ARE NOT DECIMAL MULTIPLES OR SUBMULTIPLES THEREOF

Quantity	Unit		
	Name	Symbol	Value
Plane angle	revolution*	1	1 revolution = 2π rad
	grade* or gon* ²	g* gon*	1 ^g or 1 gon = $\frac{\pi}{200}$ rad
	degree*	o*	1° = $\frac{\pi}{180}$ rad
	minute of angle*	"	1' = $\frac{\pi}{10\,800}$ rad
	second of angle*	"	1" = $\frac{\pi}{648\,000}$ rad
Time	minute*	min*	1 min = 60 s
	hour	h	1 h = 3 600 s
	day*	d*	1 d = 86 400 s

¹ No international symbol exists at present although there are national symbols and abbreviations, such as tr, ag.

² The symbol * should disappear in favour of gon. The matter will be reviewed by 31 December 1977.

Note: The prefixes listed in item 1.3 may only be used in conjunction with the names grade and gon and the symbols only with the symbol gon.

3. UNITS DEFINED INDEPENDENTLY OF THE SEVEN SI BASE UNITS

The unified atomic mass unit is 1/12 of the mass of an atom of the nuclide ¹²C.

The electronvolt is the kinetic energy acquired by an electron passing in a vacuum from one point to another whose potential is 1 volt higher.

Quantity	Unit		
	Name	Symbol	Value
mass	unified atomic mass unit*	u*	...
energy	electronvolt*	eV*	...

The value of these units, expressed in SI units, is not exactly known.

Note: The prefixes listed in item 1.3 may be used in conjunction with these two units.

4. UNITS AND NAMES OF UNITS PERMITTED IN SPECIALISED FIELDS ONLY

Quantity	Unit	
	Name	Value
vergence of optical systems	dioptré*	1 dioptré = 1 m^{-1}
mass of precious stones	metric carat	1 metric carat = $2 \cdot 10^{-4} \text{ kg}$

Note: The prefixes listed in item 1.3 may be used in conjunction with the above units.

5. COMPOUND UNITS

Compound units are formed by combining the units in Chapters I, II and III *with the exception of those listed in items 1.4.2 and 4 of Chapter I and item 8.1 of Chapter III* (units permitted in specialised fields only). The use of some of such compound units, where these are not derived SI units, will be examined by 31 December 1977 with a view to deciding whether their use should be restricted or prohibited.

CHAPTER II

**UNITS OR NAMES OF UNITS, THE AUTHORISATION OF WHICH IS TO BE REVIEWED
BY 31 DECEMBER 1977**

6. CGS UNITS

Quantity	Unit		
	Name	Symbol	Value
force	dyne	dyn	1 dyn = 10^{-5} N
energy	erg	erg	1 erg = 10^{-7} J
dynamic viscosity	poise	P	1 P = 10^{-1} Pa · s
kinematic viscosity	stokes*	St*	1 St = 10^{-4} M ² /s
acceleration due to gravity	gal*	Gal*	1 Gal = 10^{-2} m/s ²

7. OTHER UNITS

Quantity	Unit		
	Name	Symbol	Value
wavelength, atomic distances	ångström*	Å*	1 Å = 10^{-10} m
effective cross-sectional area	barn*	b*	1 b = 10^{-28} m ²
mass	quintal*	q*	1 q = 10^2 kg
pressure	standard atmosphere	atm	1 atm = 101 325 Pa
activity of a radioactive source	curie	Ci	1 Ci = 3.7×10^{10} s ⁻¹
absorbed dose	rad*	rd*	1 rd = 10^{-2} J/kg
equivalent absorbed dose	rem*	rem*	1 rem = 1 rd
exposure to ionising radiations	röntgen*	R*	1 R = 2.58×10^{-4} C/kg

Note: The prefixes listed in item 1.3 may be used in conjunction with the units contained in items 6 and 7, apart from the quintal.

CHAPTER III

UNITS, NAMES AND SYMBOLS WHICH ARE TO DISAPPEAR FROM USE AS SOON AS POSSIBLE, AND AT THE LATEST BY 31 DECEMBER 1977

8. QUANTITIES, NAMES OF UNITS, SYMBOLS AND VALUES

8.1. Volume (forestry and timber trade)

Festmeter*	$1 \text{ Fm}^* = 1 \text{ m}^3$
Raummeter*	$1 \text{ Rm}^* \left. \vphantom{\begin{matrix} 1 \text{ Rm}^* \\ 1 \text{ st} \end{matrix}} \right\} = 1 \text{ m}^3$
stère	$1 \text{ st} \left. \vphantom{\begin{matrix} 1 \text{ Rm}^* \\ 1 \text{ st} \end{matrix}} \right\}$

8.2. Force

kilogramme-force*	$1 \text{ kgf}^* \left. \vphantom{\begin{matrix} 1 \text{ kgf}^* \\ 1 \text{ kp}^* \end{matrix}} \right\} = 9.806\,65 \text{ N}$
kilopond*	$1 \text{ kp}^* \left. \vphantom{\begin{matrix} 1 \text{ kgf}^* \\ 1 \text{ kp}^* \end{matrix}} \right\}$

8.3. Pressure

torr*	$1 \text{ torr}^* = \frac{101\,325}{760} \text{ Pa}$
technical atmosphere*	$1 \text{ at}^* = 98\,066.5 \text{ Pa}$
metre of water (conventional: $1 \text{ mH}_2\text{O}$)	$1 \text{ mH}_2\text{O}^* = 9\,806.65 \text{ Pa}$
millimetre of mercury* (conventional: $1 \text{ mmHg} = 13.5951 \text{ mmH}_2\text{O}$)	$1 \text{ mmHg}^* = 133.322 \text{ Pa}$

8.4. Power

Pferdestärke*	$1 \text{ PS}^* \left. \vphantom{\begin{matrix} 1 \text{ PS}^* \\ 1 \text{ pk}^* \\ 1 \text{ CV}^* \\ 1 \text{ cv}^* \end{matrix}} \right\} = 735.498\,75 \text{ W}$
Paardekracht*	$1 \text{ pk}^* \left. \vphantom{\begin{matrix} 1 \text{ PS}^* \\ 1 \text{ pk}^* \\ 1 \text{ CV}^* \\ 1 \text{ cv}^* \end{matrix}} \right\}$
cheval vapeur*	$1 \text{ CV}^* \left. \vphantom{\begin{matrix} 1 \text{ PS}^* \\ 1 \text{ pk}^* \\ 1 \text{ CV}^* \\ 1 \text{ cv}^* \end{matrix}} \right\}$
cavallo vapore*	$1 \text{ cv}^* \left. \vphantom{\begin{matrix} 1 \text{ PS}^* \\ 1 \text{ pk}^* \\ 1 \text{ CV}^* \\ 1 \text{ cv}^* \end{matrix}} \right\}$

8.5. Quantity of heat

calorie	$1 \text{ cal}^* = 4.186\,8 \text{ J}$
thermic*	$1 \text{ th}^* = 4.186\,8 \times 10^6 \text{ J}$
frigorie* (for measuring a quantity of heat withdrawn from a system)	$1 \text{ fg}^* = 4.186\,8 \times 10^3 \text{ J}$

8.6. Luminance

stilb	$1 \text{ sb} = 10^4 \text{ cd/m}^2$
-------	--------------------------------------

Note: The prefixes listed in item 1.1 may be used in conjunction with the units contained in items 8.2, 8.5 and 8.6, with the stère (item 8.1), with the torr and with the metre of water (item 8.3).

9. SPECIAL CASE WITH REGARD TO TEMPERATURE

The name 'degree Kelvin' and the symbol '°K' may be used instead of 'Kelvin' and the symbol 'K' until 31 December 1977.

Think ***NOTHING***...
but metric
in



US METRIC ASSOCIATION, INC.

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MISS POLY-METRIC

HEIGHT 162 cm

MASS (weight) 54 kg

BUST 92 cm

WAIST 61 cm

HIPS 90 cm

THIGH 44 cm

CALF 32 cm

ANKLE 20 cm

m
US
METRIC
ASSOCIATION



HOW BIG?

square metre
 m^2

AREA OF VOLKSWAGEN DOOR
= 1 square metre

4 metres long

AREA OF FOOTBALL FIELD
8000 square metres

30 metres

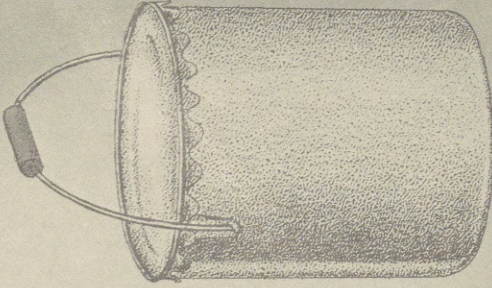
1 SLICE BREAD
1 square decimetre
1 cm thick

POSTAGE STAMP
500 mm²

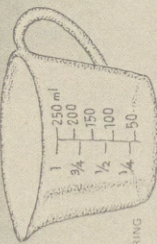
HEAD OF PIN
2 mm²

ONE square centimetre

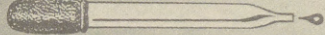
100 mm² = 1 cm²; 10 000 cm² = 1 m²; 10 000 m² = 1 ha; 100 ha = 1 km²



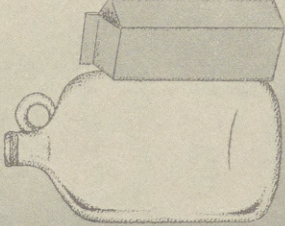
20 litres - a little more than 5 gallons



METRIC MEASURING CUP ... 250 ml



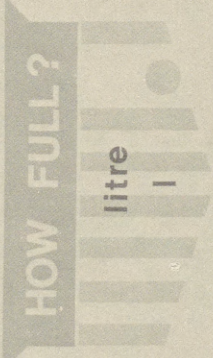
EYE DROPPER
1 millilitre



4 litres, a little more than a gallon



1 TEASPOONFUL
5 millilitres



litre



1 litre, a little more than a quart

HOW FULL?

1 cubic metre (m³) - 1000 litres (l) = 1 kilolitre (kl);

1 litre (l) - 1000 millilitres (ml);

1 cubic centimetre (cm³) - 1 millilitre (ml)

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HOW HEAVY ?

kilogram
kg

1000 g = 1 kg, 1000 kg = 1 t



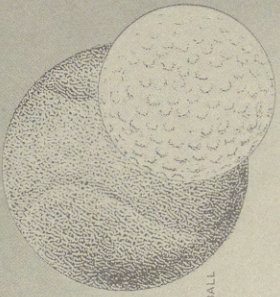
RAISIN 1 gram



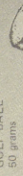
PAPER CLIP... 1 gram
(over 1 mm (1/32 in))



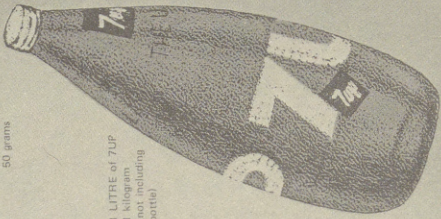
5 cent piece, 5 grams



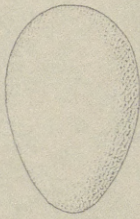
TENNIS BALL
50 grams



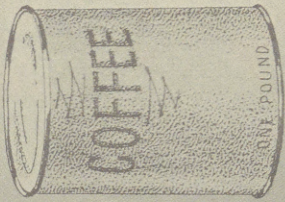
GOLF BALL
50 grams



1 LITRE of 7UP
1 Kilogram
(not including bottle)



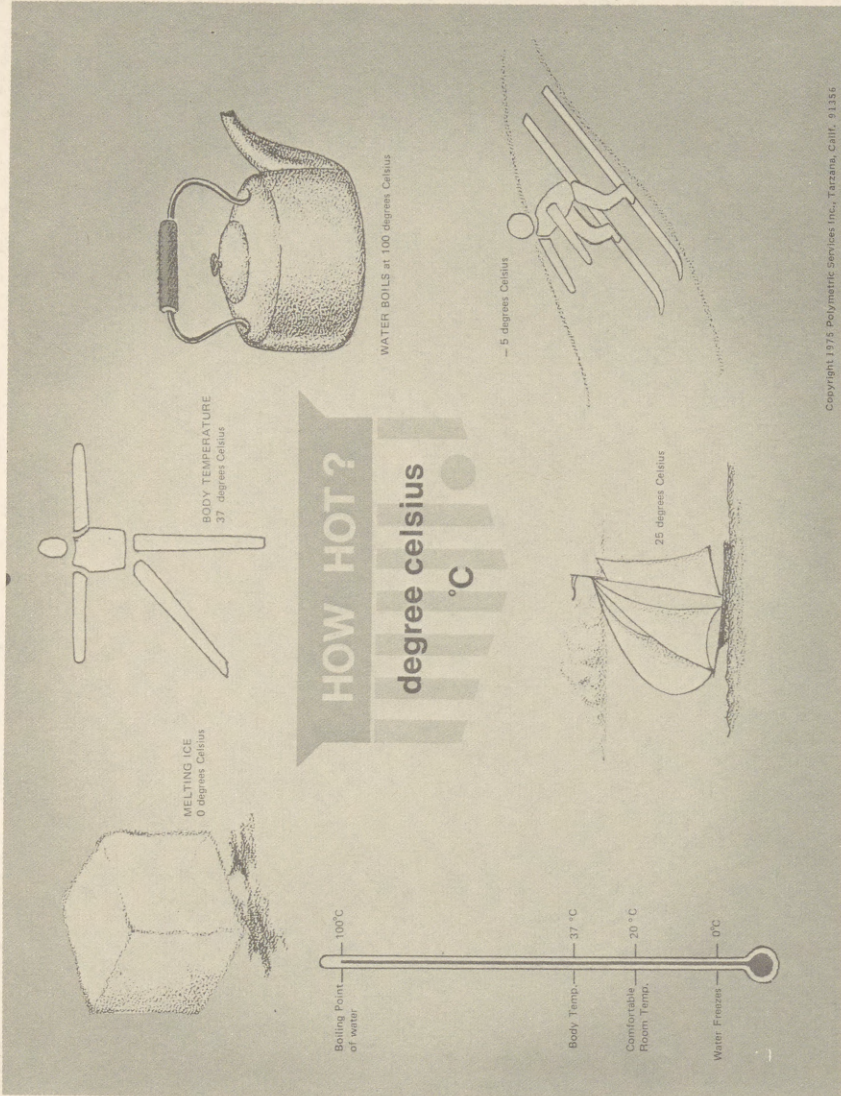
MEDIUM EGG
50 grams

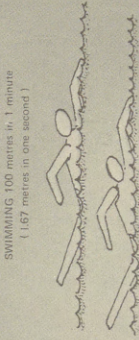
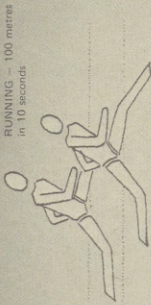
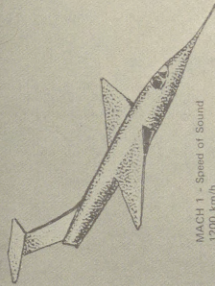


500 grams
(a little more than a pound)

THIS CALENDAR
50 grams

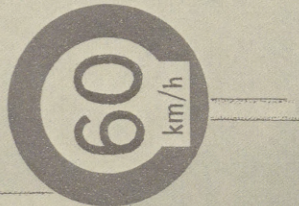
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APPROXIMATE
EQUIVALENTS

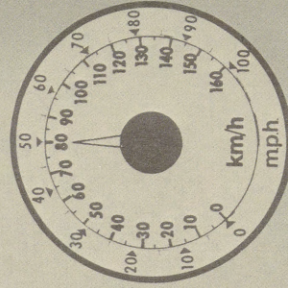
SPEED
LIMIT
35
M.P.H.



HOW FAST?

metres/second
m/s

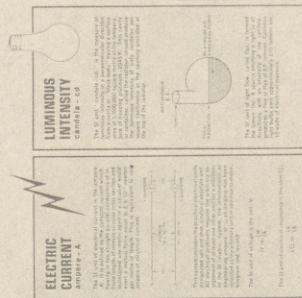
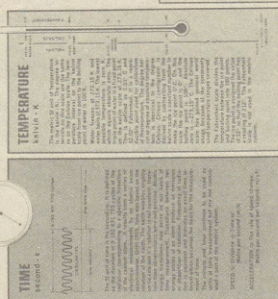
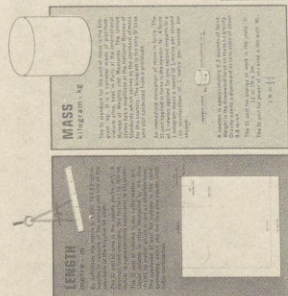
EQUIVALENT SPEEDS
AUTO



0.4470 m/s = 1.609 km/h Approximate

The Seven Metric Base Units of Measure

Forty nations, including the U.S.A., participate in the SI (Système International d'Unités). A universal metric system of units for physical measurements. The system is based on seven base units, which are defined in terms of physical constants. The most significant result of adopting a coherent set of units for SI is the introduction of the new unit of force, the newton. In the new ruling, there is now by definition only a special name for a volume equal to one cubic decimeter. The original relationship between mass and volume is no longer recognized. In common everyday language, the litre probably will continue to be used. See tables for all SI units, derived units and multiple units.



This chart illustrates the seven base SI units of metric measure. Any problem expressed numerically can be solved by use of one or more base units. They replace dozens of antiquated, often unrelated and confusing U.S. units. Five of the seven metric units can be reduced or increased in multiples or submultiples of ten. Standard prefixes are added to give names for quantities of a particular unit that differ by multiples and submultiples of ten. Example: centimetre (cm), millimetre (mm), kilometre (km). The movement of a single decimal point will solve many problems. The decimal system is related to metrication just as it is to the U.S. monetary system. Each are examples of base ten simplicity. The base unit of temperature and the unit of time are the two exceptions to the decimal rule. Six of the base units derive from a reproducible, physical phenomenon rather than any arbitrary physical objects. The kilogram is the only unit still dependent upon a prototype.

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U.S. METRIC ASSOCIATION...

ADVOCATE OF METRIC FOR OVER HALF A CENTURY!

The purpose of the association is to furnish a national medium for uniting the efforts of individuals, societies, educational & research institutions, professional associations and government agencies interested in promoting the use of the International System of Units (SI) in the United States of America.

Become an individual or corporate member of USMA. For details, send your name and address to: The U.S. Metric Association, Sugarloaf Star Route, Boulder, CO. 80302.

Additional copies of this calendar available for \$2.50 each.



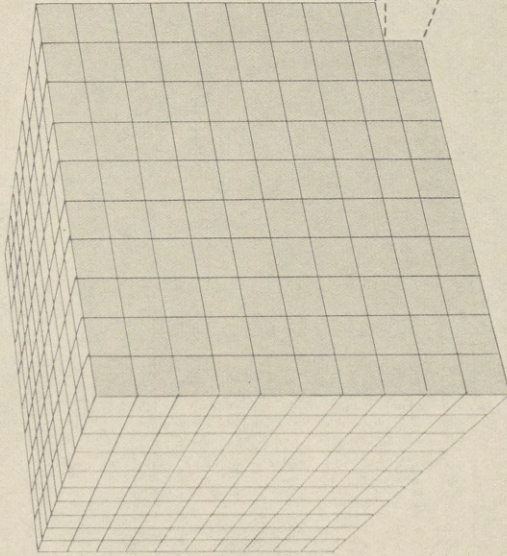
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SI GLOBAL TRENDS

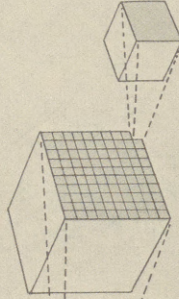
Adherence to the International (SI) System of Units in countries observed first hand by the Polymeric Services, Inc. staff is surprisingly uniform.

Only one English speaking country in the world, the USA, has a small industrial metric group organized to change the spelling of the base unit metre and the unit litre.

This effort is viewed as an attempt to nationalize an *international* measurement system and defeats the world wide uniformity of the SI. The "metric bible" SP 330, a translation of the complete SI by the U.S. Department of Commerce and HMSO recommends the metre/litre spellings.



TEN TIMES TEN TIMES TEN METRIC IS DECIMAL



[The following information was referred to on p. 124:]

NATIONAL EDUCATION ASSOCIATION,
Washington, D.C., December 24, 1975.

HON. DANIEL K. INOUE,
*Russell Senate Office Building,
Washington, D.C.*

DEAR SENATOR INOUE: This letter sets forth the National Education Association's (NEA) reaction to the American Bar Association's testimony on Metric Conversion before the Senate Committee on Commerce. At the close of the NEA's testimony, you asked Mr. Richard Cortright who testified on behalf of NEA to respond to the testimony of Mr. William E. Zeiter of the American Bar Association. Mr. Cortright had not heard Mr. Zeiter's entire testimony, therefore, a written response was requested by you.

The NEA appreciates the fact that the ABA has suggested that a legal structure be employed in which voluntary conversion to the metric system in the United States take place smoothly and efficiently. The ABA holds that careful legal safeguards need to be built into the proposed legislation in order to safeguard the public from undue federal government involvement. The NEA agrees that legal safeguards should be a prime consideration of the legislation and subsequent regulations.

As the ABA has pointed out in its testimony, experience in metric conversion in other nations does not provide sufficient data for the American scene because of legal structural peculiarities existing in the United States. The complexities of our governmental system warrants careful study of the effects of metric conversion in the United States upon our legal structure.

The NEA supports the smooth and efficient adoption of metric conversion in the United States. The NEA also support ABA's attempt to ensure that legal safeguards be considered for the protection of the public.

Sincerely,

JAMES W. GREEN,
Assistant Director for Legislation.

○

