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**U.S. Metric Board**

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SUMMARY  
REPORT  
JULY 1982

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# From The President Of The United States

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THE WHITE HOUSE  
WASHINGTON

March 9, 1982

Dear Mr. Chairman:

I want to thank the past and present members and staff of the U.S. Metric Board for your service to the Nation in reducing the obstacles to voluntary metrication. You have succeeded in your objective of educating the American people about the meaning of metric measurements in everyday life.

I appreciate your cooperation in the orderly phaseout of the Board's activities as part of my program to reduce government spending and streamline its operations.

As you know, the Secretary of Commerce will be responsible for my Administration's continued support of voluntary metrication. I am sure that Secretary Baldrige and his staff will appreciate any advice you and the Board may have to offer with respect to his enhanced responsibilities.

Let me assure you of my support for the policy of voluntary metrication expressed in the Metric Conversion Act of 1975.

Finally, I want to personally thank you for your career of service to the Nation in the field of metrology.

With best regards,

Sincerely,

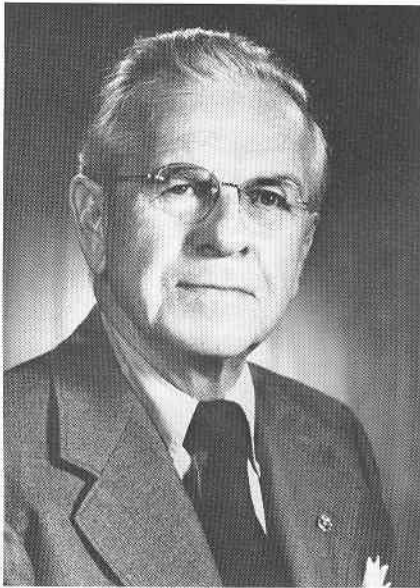


The Honorable Louis Polk  
Chairman, U.S. Metric Board

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# Foreword From The Chairman

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It was only within the last decade or so that the U.S. Government, spurred by private industry's interest in foreign trade, began to confront the problem of being the only major industrial nation that does not use metric as its predominant system of measurement. All of this country's English-speaking trading partners had made the commitment in the early 1970's to change to the metric system. These concerns caused some people to believe that the time had come for a national policy on metrification for the United States.

The concept of a coordinating board for the Nation's metric conversion activities received serious consideration by the Congress as early as 1971, when America's interest in the metric system was strong. The impetus for legislation creating the U.S. Metric Board stemmed from a congressionally commissioned 1971 study report by the Department of Commerce, entitled "A Metric America: A Decision Whose Time Has Come." The report recommended a coordinated national program to convert to the metric system over a period of ten years. Following several years of debate in Congress, the Metric Conversion Act of 1975, Public Law 94-168, was passed. The Act represented a compromise between those advocating mandatory conversion and those wanting to do nothing at all about the ever-increasing use of metric measurements. It called for the coordination of voluntary metric conversion with no target date, and it established the U.S. Metric Board to serve as a clearinghouse of metric information, to conduct research, to coordinate metric activities in public and private sectors, and to educate the

people about the effects metric conversion would have on their everyday lives.

Although the Act was passed in 1975, the Senate did not take action to confirm President Ford's nominees for the Board by the time he left office in early 1977. It was not until 1978 that the 17 members of the Board were appointed by President Carter and confirmed by the Senate. A change in administrations was the major cause for delay, but considerable momentum had been lost when the full Board first met in August 1978.

Some of the initial issues the Board had to confront were those raised by an October 1978 self-initiated report by the General Accounting Office (GAO), entitled "Getting a Better Understanding of the Metric System—Implications if Adopted by the United States." The report asked questions about the costs of conversion and the public attitude that the changeover to the metric system was a foregone conclusion. It raised concerns that the voluntary aspect of change was not being understood. The Board members themselves, who represented a variety of constituencies—labor, small business, manufacturing, consumers, retailers, educators, scientists—had differences of opinion about the desirability of metric conversion, and more importantly, about their role in carrying out their mandate.

In August 1979, after consultation with varying governmental sources and constituencies, the Board adopted a resolution which clarified its interpretation of the Act. The resolution stated, in effect, that the Board must maintain an objective stance on

metrication—it can neither advocate nor discourage conversion.

It soon became evident that voluntary conversion and the Board's policy of neutrality were confusing the American people—whether they were for or against the change. Some still believe the country is being forced to convert, while others are impatient with the slowness of progress. Both sides have looked to the U.S. Metric Board for answers.

While some metric excitement for a changeover has matured, industries are still making the conversion when it is in their best interest to do so. Two recent examples are the chemical and allied products and the instruments industries, which developed conversion plans that were endorsed by the Board in January 1982. The Board has received comments from the private sector that the absence of clear government policies and goals for metric conversion is causing some companies to hesitate in making commitments to metrication, even though these times could be ideal for change. The Administration is providing industries with incentives to undertake critical capital investments that will have long-term impacts on productivity in the U.S. and competitiveness abroad. More easily than in the past, industries can convert to the metric system as part of the general rebuilding and retooling process.

The Administration has decided to discontinue the U.S. Metric Board as part of its overall efforts to reduce Federal spending and operations. Simultaneously, it indicates that this action should not be interpreted as a lack of support for voluntary metric

conversion or the Board's past activities. To the contrary, metric conversion will continue to take place in this country. And the Administration plans that Federal interest and involvement will continue under the direction of the Department of Commerce.

This third report to the Congress is a summary of the U.S. Metric Board's four fiscal years of activities. The report is divided into four sections. The first section lists the Board's findings and recommendations for the future. In the second section, each Board member discusses the metric conversion issue from the perspective of the constituencies he or she represents and from personal experiences while serving on the Board. In the third, the Board's activities in carrying out the mandate of Congress are summarized. The fourth section contains a series of tables depicting the status of metrication in the Federal Government and the States, a chart showing the U.S. Metric Board's funding during its four fiscal years of existence, and a selected list of U.S. Metric Board publications.

It was a great privilege to serve as Chairman of the U.S. Metric Board in these challenging times. Each Board member did an excellent job representing his or her constituencies, which sometimes resulted in conflicting positions. Our country holds dear this spirit of individual independence, liberty, justice and freedom of speech. You will notice that the report reflects this spirit.

What has been challenging, rewarding, and at times formidable, is that we all have different perspectives, different governmental and private sector experiences, and different views about the metric system.

This was as Congress intended, for we were selected to serve because our backgrounds were diverse. Yet despite these differences, we have been able to work together to achieve substantial progress, as this summary report will also show—in educating the American public, in discovering through research the impact of metric conversion on various segments of our society, and in facilitating coordination of metric activities among the Federal, State and private sectors.

I welcome this final opportunity to thank sincerely the members of the Board and the public, as well as those in government, industry, education, and many other fields, who have supported constructively the Board's efforts.



Louis F. Polk  
Chairman

# Findings

The following findings are based on the Board's retrospective look at what it has learned over the last four years about metrication in the United States.

## **The present policy of maintaining a dual system of measures for trade and commerce is confusing to all segments of American society.**

Some segments of the economy have been metric for decades, others will convert for economic or marketing reasons, and some will probably never change voluntarily. Total conversion is practical for certain parts of the economy.

## **Voluntary metric conversion by industry occurs primarily in response to marketplace demands and usually on a company-by-company basis.**

Business converts when it wants to penetrate or maintain international markets, when it sees a marketing advantage in producing metric products, and when it wants to gain or keep customers who are converting to metric for their own purposes. Plans for industry-wide metric conversion appear to have little or no influence unless economic motivation is already present.

## **The costs of metric conversion have not been excessive.**

Large corporations' conversions have resulted in long-term savings; small business conversions have usually been made at low cost. This supersedes and corrects the findings regarding costs in the October 1978 GAO Report, "Getting a Better Understanding of the Metric System—Implications if Adopted by the United States."

## **Large segments of industry have metric capability.**

More than half of the Fortune 1000 companies have metric production capability. Small business has a widespread but shallow capability to produce metric products. When conversion problems occur, the small business community solves them by using its own resources.

## **Past perceptions of the difficulty of metric conversion have no basis.**

There is convincing evidence that fears of huge expenses and other insurmountable problems with conversion are groundless.

## **There are no substantial legal barriers to metric conversion requiring Federal preemptive action.**

Any remaining barriers can be removed by State and local administrative or legislative action in response to voluntary metrication efforts.

## **There are no substantial technical problems with metric conversion.**

Complex problems that are perceived in metric conversion have not been substantiated. Standards-making organizations are able to respond to industry's metric needs.

## **The labor force has little difficulty adapting to conversion.**

Minimal training in metric measurement is needed to sustain efficiency and safety. Some workers, however, incur expense in buying metric tools.

## **Consumers accept conversion according to their own interests.**

If economic necessity or advantage is foreseen by consumers, conversion is more likely to be accepted. Resistance at the retail level, however, can be expected because of consumer inertia, lack of understanding, and perceived inconvenience.

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# Recommendations

Metriation in the United States is an ongoing process. The Board offers the following recommendations for consideration by Congress and the Administration in continuing governmental involvement in future metric activities.

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## **The Metric Conversion Act of 1975 should continue to be administered.**

In the absence of the U.S. Metric Board, a government agency, preferably one that receives information from diverse segments of the economy, should perform the functions required by the Act. As metric conversion increases substantially, an independent agency should be re-established to administer the Act and insure that all interests are represented.

## **National policy on metric conversion should be reassessed.**

Research and national debate is required to determine if voluntary metrication is in this country's best interests, if complete or partial conversion should be mandated, and if we can compete efficiently in domestic and world markets using two systems of measurement.

## **Research should be conducted on economic sectors where metric capability may be critical.**

Measurement may be used as a nontariff trade barrier. Metric capability may enhance foreign trade possibilities, thus supporting the President's Economic Recovery Program.

## **The Federal Interagency Committee on Metric Policy and the National Council on State Metrication should be continued.**

These organizations assure that members of the private sector can deal with a single Federal organization that represents Federal metrication interests and a single State organization which can speak for metric activities occurring in the States. In addition, these organizations provide networks that facilitate uniform action and exchange of metric information among Federal agencies and among the States.

## **The functions outlined in the Board's Private Sector Planning Guidelines should be continued.**

Governmental assistance to private sector conversion planning is necessary, as is the review and endorsement of industry conversion plans.

## **Government public awareness, consumer and education programs should be continued selectively.**

As metric conversion occurs, targeted publicity and education efforts are necessary to facilitate public understanding and acceptance.

## **The States should consider enacting uniform metric conversion legislation.**

Although a new national structural mechanism to convert customary to metric units in laws and regulations is not presently required, uniform State legislation, such as the Uniform Metric System Procedure Act, will minimize regional differences as conversion occurs.

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## **Board Members Reflect . . .**

*Each Board member represents a particular constituency and has brought his or her expertise and outlook to bear on metric issues in this country. Their statements follow and provide their perspectives on metrification as they reflect on their service on the Board.*

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## **Louis F. Polk**

President, Louis Polk, Inc.

Chairman, U.S. Metric Board



### **The Importance of Measurement and Measurement Systems**

This is a welcome opportunity to express my views. To me, the metric question should not be whether metric is liked or disliked, but whether objectively our country should use the best measurement system presently available worldwide.

What further can be said to register indelibly the depth, breadth and overriding importance of measurement to the individual or government everywhere? From birth to burial, measurement is forever with us—weight, height, temperature, blood pressure, pulse, breath—you name it—they are all inseparable from us. Transportation, farming, communication and education are all a part of it. And then there are products—house appliances, automobiles, military products, bicycles, even horseshoes and film, aircraft, ships, submersibles, oil and gas drilling platforms, etc., and the associated operating policies, like “quality control,” “size uniformity and repeatability” to assure product performance, and “preventative

maintenance." And we shouldn't overlook the environment—ice, rain, snow, pollution, wind, waves and currents.

Venturing further, "measures" are inseparable from medicine, health, chemistry, highways, bridges, rivers, dams. Then there are the simple acts, like not stumbling when stepping up or down street curbs, or partaking of a friendly toast without spilling it down our shirt. In the latter case, reasonable patience is a virtue.

All these and hundreds more involve measurement and touch us directly or indirectly, constantly, until measurement becomes commonplace. Then we take it for granted and forget its importance or existence. Yet measurement is ignored at peril to life and treasure—for example, air and spacecraft, or precision ball bearings must be produced with unbelievable accuracy—and some persons may never realize or agree with that. People, individually or in concert, cannot avoid being measuring machines. If we must disagree about measurement systems, let's avoid being disagreeable. One of mankind's greatest discoveries, ranking with "fire" and "the wheel," occurred when some person first realized he or she was actually measuring, and what it meant for the future.

There is an inescapable ratio between the quality of measurement and degree of performance. And that includes "productivity" performance. Even a relatively small five percent improvement, when multiplied by the millions of people involved, results in a tremendous rise in total national productivity—in the shop and at production lines, at design boards and computers, in research, in the home,

on the highways, in the sky and space, on or under the sea.

No rational means or methods should be overlooked to assure that our future citizens have the opportunity, and do utilize, maintain and continuously upgrade all measurement norms and forms to the best standard of "measures," whatever the name of that standard may be. Absence of such a policy and commitment risks hobbling and handicapping all future generations. It is high time that all of us recall that we are less than 18 years away from the 21st century. New competitive factors, new advances and changes of every kind in every science and engineering discipline are coming at us from all points of the compass. They come from people of good will, as well as from those who are naive or hostile or both.

Industries must take steps, as many have voluntarily, to move economically wherever changes are necessary—to coincide with other industry changes so that the outcome is nonconflicting, natural, unobtrusive and less expensive. Within a variety of industries, changes to the metric system can be undertaken at times when they would normally be making a product change anyway. This absolutely minimizes and, in some cases, adds nothing at all to costs, and frequently offers simultaneous ways to reduce costs. There are actual completed examples that confirm all this.

There may be some inconveniences, and they should be minimized. Centuries ago, it was inconvenient for the Western World to change from Roman numerals to the present Arabic figures. Thank heavens that early world persevered

and progress prevailed. There doubtless may be exceptions which seldom will require change. Certainly there is no need to change just for change's sake, but there is a great big world out there that no longer always waits for us and cannot be ignored. History shows mankind's progress has been paced by the increased ability to divide or multiply respectively our units of measure finer and finer, as well as further and further. For modern examples, look to present developments in genetics and space, or computers. Our fellow citizens will be well advised to flex their minds to recognize reality and come to terms with the inevitable. The North American Continent then would be positioned for a place of leadership.

It will be very helpful when more U.S. citizens gain the insight and wisdom of the Founding Fathers. I have no doubt that they will do so. All can share that confidence. There are many serious priorities in these crisis-laden days—high among them is an easily ignored everyday necessity for the best in "measures." Our Founding Fathers recognized this necessity in Article I, Section 8, Clause 5 of our Constitution.



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# Sydney D. Andrews

Director, Division of Standards  
Florida Department of Agriculture  
and Consumer Services

## Representing the National Conference on Weights and Measures and Standards-Making Organizations

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The vast majority of my constituency is pro-metric, as am I, and felt that passage of the Metric Conversion Act of 1975 was a signal by Congress to encourage, facilitate, and even promote voluntary use of the metric system in this country. If this were not the case, no new legislation was needed, because voluntary use of the metric system had already been made legal by an act of Congress in 1866, and was still in force.

The study by the Department of Commerce on metrication in the United States, authorized by Congress in 1968 (Public Law 90-472), revealed that it was not only feasible, but in the best interest of our country to change to the metric system through a coordinated national program. The conclusions of this study were based primarily on the informed views of citizens in virtually every walk of life, because thousands of individuals, firms, and organizations participated in the study.

The recommendation to Congress based on this study was immediately challenged by forces both in and out of Congress which organized to oppose passage of a metric conversion bill. In order to get any legislation on metrication passed, compromises were made during the legislative process which resulted in an act with no positive commitment to metrication on the part of Congress, or the Federal Government. Also, the Act is ambiguous and subject to many and varying interpretations—even by different members of the U.S. Metric Board which it created. All of this has resulted in most of the people I represent being disappointed in the Act, as well as the performance of the Board.

The National Conference on Weights and Measures, which is one of my major constituencies, is made up of measurement practitioners from both the public and private sector. Many of them are knowledgeable in both the metric and customary system, and they have consistently gone on record favoring the metric system for its coherence, simplicity and ease of use for commercial weights and measures in the marketplace. They have individually and collectively done much to further the cause of voluntary metrication in this country.

The majority of standards-making organizations in this country support voluntary conversion to the metric system, and many have already produced metric standards when needed. There is little the Board can or should do in this regard other than help identify needs and coordinate the efforts of those involved. The Board has established contact with the over 400 standards developers in this country offering its services in that role. The objectives stated in the Metric Conversion Act dealing with standards have been pretty well met by those developers who have produced metric standards.

Resistance to going metric is frequently based on exorbitant cost estimates, yet invariably those who make the conversion find their actual outlay is only a fraction of the original estimates. Often cost avoidances are made possible by metrication, which substantially reduces overall expenditures. A study authorized by the Board on the consequences of metric conversion for small manufacturers revealed that with the advent of computer-controlled manufacturing and electronic readouts for

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machines, the costs of conversion to metric have become trivial for most companies. The report also stated, "... investments in metric conversion are routine, insubstantial, and difficult to isolate from other business costs."

While cost should always be an important consideration, experience has shown that exaggerated cost estimates are no longer a reason to resist metrication. Instead, we should concern ourselves with the cost of *not* going metric. Surely, the most expensive course of action is to continue indefinitely operating on a dual system of measurement. This is not only uneconomical but inefficient and confusing.

Congress must eventually decide what system of measurement is to predominate in this country. In view of the use of metric by virtually every other country in the world, as well as the increasing use of metric in this country—and our growing dependence on world trade—it is inconceivable they would not choose the metric system. Once that choice is made it is hoped that adequate resources will be provided to plan, coordinate and implement the system in an orderly fashion, and on a timely basis.

I share the disappointment of my constituency in both the Metric Conversion Act and the Board's lack of positive action supporting metrication, but the Board has done some good things which I hope will be preserved and continued. It has conducted several fine research projects and studies which have produced valuable information and answered many questions that needed to be explored. Because I believe metric conversion in this country is inevitable, I

hope this information will not only be preserved, but updated from time to time and disseminated to those who can benefit from it.

Also, two very important and necessary groups were sponsored by the Board, which I hope will be continued. They are the Interagency Committee on Metric Policy (and its Metrication Operating Committee), and the National Council on State Metrication (NCSM). I feel it extremely important that the metric policies, plans and activities of the Federal agencies be coordinated, and the Interagency Committee on Metric Policy is the logical place for this interaction. In the absence of the U.S. Metric Board, coordination of metric activities in the several States is even more essential, and the NCSM is well constituted to do this. I sincerely hope these two organizations, both of which are already in place, will continue to be sponsored by whatever agency of the Federal Government is assigned the responsibility of carrying out the provisions of the Metric Conversion Act.

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# Francis R. Dugan

President, Dugan and Meyers  
Construction Company,  
Cincinnati, Ohio

## Representing the Construction Industry

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I have been a member of the United States Metric Board representing the construction industry since the Board's beginning some four years ago. If this Board is eliminated by an act of Congress or by action of the Executive Branch, I would like to leave behind these thoughts.

**First** of all, I believe that Congress was right in deciding on a planned and coordinated approach to metric conversion and requiring a U.S. Metric Board to monitor the progress.

**Secondly**, I believe that Congress was ill-advised to expect that conversion could or would be accomplished in an orderly fashion with a voluntary approach.

**Thirdly**, given the 1975 Act which created a U.S. Metric Board consisting of 17 private citizens representing all facets of American society, and which made conversion activities voluntary, I believe the Board and its professional staff have done an outstanding job of identifying the pertinent issues, conducting appropriate research, and disseminating knowledge of metric measurement to interested parties—all with a minimum use of government funds.

As far as my constituency goes, I am sure that the construction industry, because of its diverse interests and the multitude of individual firms of all sizes, will, under a voluntary approach, be the very last sector to implement conversion to metric measurement—if at all. However, based on my study of progress in the other English-speaking nations and my knowledge of the constructor and

designer mentality, I believe that conversion, if mandated with a reasonable schedule, would be virtually a non-event. My industry would adapt very readily, as the hallmark of construction is change, and to us change is an everyday occurrence.

**Finally**, U.S. industries are converting to metric measurement in order to compete in world markets and operate their businesses with one measurement system. Most of the rest of us are comfortable with our customary measurement system, which means that today we actually have two measurement systems to deal with in the U.S.

I believe that the Congress should address the issue squarely at the earliest opportunity, as well as rethink the voluntary versus a mandated schedule for conversion.

There is and will continue to be a need for a mechanism for completing the conversion process which, on a voluntary basis, may take many years. So my hope is that the President and Congress will admit that the need exists and create a viable successor to continue the work of the U.S. Metric Board.

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# Thomas A. Hannigan

Administrative Assistant to the  
International Secretary of the  
International Brotherhood of  
Electrical Workers (IBEW)

Representing Labor

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In 1973, the tenth AFL-CIO Constitutional Convention endorsed a metric resolution which supported the voluntary approach to metric conversion and opposed any national commitment to the metric system. The principles of this resolution formed the basis for the Metric Conversion Act of 1975.

These principles have served the Nation well, and there is no need to change them. No individual or organization that wanted to use the metric system has been prevented from using it. On the other hand, no individual or organization that did not want to change was required to change. In addition, U.S. Metric Board research has revealed that with the present low level of metric activity, there have been few major problems associated with conversion.

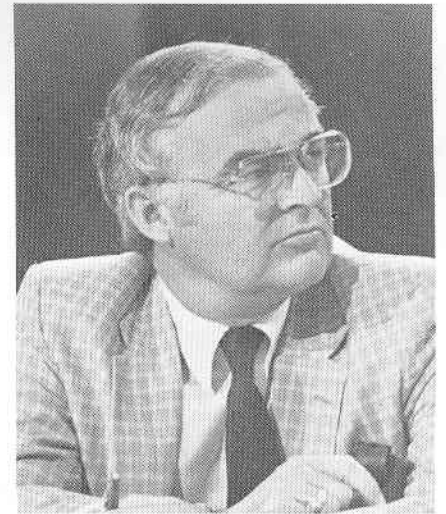
It is very important, however, to realize there is a great deal of misunderstanding regarding present national policy on metric conversion. This misunderstanding, because of incorrect and inaccurate information, is a costly and wasteful cause of many unnecessary and unwanted metric initiatives. In order to minimize this waste and inefficiency, an intensive effort must be made to be sure commerce, industry and the public fully understand national policy. The task is a difficult one, since there are many reasons for the confusion surrounding national measurement policy.

The history of the Metric Conversion Act of 1975 clearly reveals that Congress repeatedly rejected a policy of the Federal Government facilitating and encouraging conversion. The GAO reports that the 1975 Act and its legislative history show

that national policy is not to prefer one system over the other, but to provide for either to be predominant on the basis of the voluntary actions of those affected. This has been the policy since 1866, when use of the metric system was first authorized. Clearly, a national decision to convert to the metric system has not been made.

The differing interpretations of "voluntary" conversion are the cause of confusion and misunderstanding regarding our present national policy. Throughout the metric debate there has been repeated reference to "voluntary" conversion. This cherished bromide has had universal support. Both metric zealots and metric critics seem in agreement on the need for "voluntary" conversion. Our English-speaking allies contend their approach to conversion was "voluntary," but they obviously had an entirely different approach to conversion than we have. They announced that conversion to the metric system within ten years was in the national interest and thus the various sectors merely had a choice of how to convert. Thus, there was no opportunity to determine whether or not to convert.

Great emphasis was always placed on the concept of "voluntary" conversion, in spite of the fact that metric advocates were fully aware that freedom to choose measurement systems would never succeed in achieving predominant use of the metric system. This fiction was absolutely necessary, however, to entice organizations into the conversion process. The prevailing metric rationale was that any metric initiative was desirable even if undertaken under false pretext. Their assumption was



that the sum of all individual conversion—informed, uninformed or misinformed, would ultimately lead to a point of no return, at which time compulsory metrication could be justified. Apparently metric advocates were convinced the end justifies the means, no matter how costly.

"Voluntary" means being brought about by one's own free choice or acting on one's own accord. This was the intent of Congress when it enacted the Metric Conversion Act of 1975. It granted the U.S. Metric Board no authority to mandate conversion. Any form of compulsion would have to be approved by the U.S. Congress. In this "free choice" approach to conversion, competition forces decisions to be made in the marketplace and public opinion influences the legislative process. This approach is totally consistent with our free enterprise economy and our democratic form of government.

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# Thomas A. Hannigan

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Complete "free choice" conversion is critically important—first and foremost, because it represents the will of the American people. Thus, it is the most politically acceptable and consistent with tradition. Second, it is the most efficient and effective, because only those organizations that have incentive to change will change. Decisions will be made in the marketplace, not by government bureaucrats. Unnecessary, unwanted, unreasonable and/or uneconomic conversions will not be required, thus minimizing disruption, dislocations and costly waste. Conversion in the U.S. would truly be a private engineering and marketing decision influenced only by public interest.

As a result of this misunderstanding of national policy and the confusion which surrounds voluntary conversion, several Federal agencies have established the metric system as the preferred system of measurement. The following excerpts from the GAO metric report explain the situation quite well:

*"Metrication activities of Federal agencies vary widely with no consistent approach to them . . . some agencies have proceeded on their own and are in effect advocating metrication . . . these individual actions seem to be inconsistent with the intent of the Metric Conversion Act of 1975."*

Some Federal agencies have, in effect, decided that the metric system is the preferred system of measurement and are taking initiatives to

encourage, facilitate and mandate its use. This is a classic example of national policy being made at the bureaucratic level. The choice of measurement systems is a critical national issue and should not be left to Federal bureaucrats. Congress must take immediate action to remedy this situation. There are just three alternatives available to Congress as far as the choice of measurement systems is concerned:

(1) It can establish the metric system as the preferred system of measurement. This approach involves establishing goals and target dates to be metric. In brief, this is not a "free choice" approach to conversion, since it requires that the use of the metric system be mandated in order to achieve target dates.

(2) Establish the U.S. customary system as the preferred system of measurement and continue the practice that has been in existence since 1866 of permitting the use of the metric system for anyone who wants to change. This is a "free choice" approach to conversion.

(3) Continue our present policy of not favoring either system but letting the marketplace and the accumulation of individual decisions determine which is to be the preferred system of measurement. This is also a "free choice" approach to conversion.

As a result of the confusion and misunderstanding associated with our present policy, I feel it is no

longer an acceptable approach to determining a preferred system of measurement. In addition, in light of the growing body of evidence, which indicates a very low level of metric activity in the U.S. and declining worldwide interest in conversion, it is no longer an appropriate alternative.

I, thus, recommend that Congress establish the U.S. customary system as the preferred system of measurement and continue the practice of permitting the use of the metric system for anyone who wants to change. This is a "free choice" approach to conversion, completely consistent with existing AFL-CIO policy. Its major justification is that it gives clear direction to Federal bureaucrats that they are not to facilitate, encourage or mandate conversion. If, at any time in the future, there is sufficient evidence to indicate that use of the metric system has increased to a point where it has popular support and/or there are obvious and measurable inefficiencies associated with permitting the use of two measurement systems, Congress can adopt the first option.

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# Frank Hartman

Retired—Former Federal Liaison  
Representative for the Michigan State  
Department of Education

Representing State and  
Local Government

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The passage from alpha to omega in metric conversion is beset with as many perils as Jason encountered in his quest for the Golden Fleece. Omega is, and will always remain unattainable. (Jason got the Fleece.)

I submit we have reached zeta, the sixth of the twenty-four Greek letters. Multitudes will counter that we are not 25 percent converted from customary units to metric units, but I remain steadfast on this declaration of opinion. There is perhaps a smattering of zealous Americans who would pipe to the masses that we exceed one-fourth conversion to metric, but I would be assailed by objective distrust of these leakings. There is nothing scientific about the 25 percent factor, but it is a good basis for debate, and, besides, I like zeta.

The President of the United States has spoken (*Roma locuta est*) and the U.S. Metric Board will become non-functional after September 30, 1982. The Board shall enter obscurity by command. I propose an epitaph:

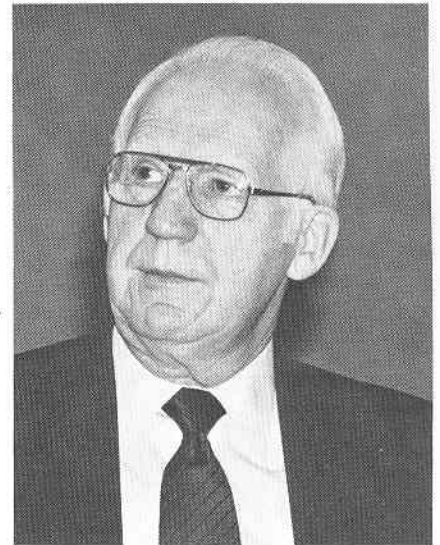
**Est Quaedam Fiere Voluptas  
(There is a Certain Pleasure  
in Weeping)**

The U.S. Metric Board has earned the right to be remembered by the President and the Congress. It took ten years to create the Board and it lived four years. One might muse that our uniqueness lies in the inverted gestation experience.

In our brief four-year life span, we have seen metric measurement prosper. Attesting to this prosperity are the sale of gasoline by the liter; metric containers for soft drinks, wine, and distilled spirits; automobile manufacturing nearly totally metric; and education improving the stance of metric conversion in school buildings throughout the Nation. Countless brushfires are dotting the landscape as the proponents of metrication espouse its benefits. There is no reservation within me that we shall be a metric America (75 percent, or from alpha to sigma) ten years hence. I conjure no way it can be arrested. The international community is calling America to get in step. We have kept world trade on tilt, especially in recent years, and are being challenged for our transgression of economic graces.

I hasten to grant respect for the opposition forces of metric conversion. In sheer numbers, the opponents have a crushing edge. The odds are probably 8-2 or 7-3. Resistance to change and fear combine to create the present overwhelming margin of opposition. Tact, patience, and education will erode the anti-metric fortress.

I have offered nothing of technical significance—I leave that to my esteemed colleagues. My observations



are philosophical and are liberally braced with personal opinion. I accept the fate of the U.S. Metric Board. We are the victims of the economy. I am honored to have served at the pleasure of the President and the consent of the Congress. One day, when everything is rolling again, the U.S. Metric Board may gain reinstatement and financial support.

Meanwhile, let the Department of Commerce carry on. I think it belongs there, if it cannot remain an independent agency. Commerce is a grand old department. I thank President Carter and the Congress for my term of service, an honor I shall wear proudly for my lifetime.

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# Bruce Johnson

Chairman, Electrical Engineering  
Department  
University of Nevada

Member-At-Large

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Public Law 94-168—The Metric Conversion Act—was written as a compromise between big business, already beginning metric conversion, and small business and labor, which had many fears and apprehensions concerning the unknown effects of metric conversion. A major emphasis of the mandates of the Act (Sections 6-1, 2, 7, 8, 9, 10, 11) is to conduct research—to determine if the fears and apprehensions are real or imagined. In the four years of its existence, the Board has done its job. The results are in. It is now time for Congress and the Nation to proceed in a more positive fashion with metric conversion. It is time for a national policy to convert to the metric system.

A survey of the Fortune 1000 companies revealed that 63 percent sell products that are either made to metric dimensions or carry metric information on the labels. Yet only 6 percent of the sales of the Fortune 1000 are from products that are made to metric dimensions. A recurring theme from among industry leaders is the increasingly uncertain direction of metric conversion in the United States economy. Industry is hesitating to make major metric capital investment decisions in the absence of a clear signal of intentions from the Federal Government. Even the U.S. Metric Board has continually received conflicting signals from Congress during the past four years. While there are few legal barriers to metric conversion, there are many legal impediments and annoyances. Even though metrication is neither a major issue nor problem for standards-writing organizations, barriers to the development and use of metric standards have been cited, and some organizations are concerned about the threat of foreign origin standards displacing U.S. non-metric standards.

On the other hand, the fears and apprehensions expressed by small business and labor are not borne out by actual events according to the Board's research. A series of studies on small business concludes that "metric production is no big deal for small manufacturers." There is a widespread but shallow capability to produce products to metric dimensions. Frequently the metric product is actually made to conventional dimensions on conventional equipment. Investments in metric production are routine, insubstantial and difficult to isolate from other business

costs. Surprisingly, there is little sector planning and coordination in either the large or small business arenas. A series of studies on the impact of conversion on labor indicates that, in general, there is no problem. Metric tools are being supplied by management as needed. The exceptions are the maintenance and repair shop and tool and die makers, where the workers normally own their tools. Not only is the tool acquisition a burden, but there is also a significant loss in productivity during the conversion process as mechanics repair items containing both metric and conventional parts. This situation will only be remedied by an accelerated pace of conversion.

Although not specifically studied by the Board, there is growing evidence that the United States is handicapped by living with a dual measurement system. Even though the conversion costs have generally been small for those who have converted, the overall costs to the Nation of maintaining two systems of measurement may be more burdensome than expected and will become increasingly so with the passage of time. It is time for Congress to make an important decision. It is time for the Federal Government to assist the private sector with a national policy to make the metric measurement system the predominant system. It is time for increased sector planning with timetables for conversion. It is time to repeal Public Law 94-168 and replace it with an act that will bring about a metric America for the 21st century.

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# Sandra R. Kenney

On-Air Promotion Director, Maryland  
Center for Public Broadcasting

Member-At-Large

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The U.S. Metric Board has made Public Awareness and Education one of its top priorities in its four-year existence.

With a small budget for educating and informing all U.S. citizens, we've done an outstanding job in this area. Our public forums across the country have brought together disparate points of view about metrication. At these meetings, also, the remarks from representatives of all sectors of our economy have, in turn, kept the Board apprised of metric activity, trends and opinions. The public forum format has also provided a focal point for the media, enabling us to keep the public well informed . . . part of our mandate.

A number of well-produced radio and television public service announcements have aired across the country. In many locations they have run almost continuously since their delivery to stations nearly two years ago! The public service announcements and short radio programs from the U.S. Metric Board have offered

free pamphlets and educational materials. Because the response from the public has been so overwhelming, it is evident that a similar program must continue through a government agency and private organizations and industry alike. The public has shown that it *wants* to know about metric.

Public awareness and education cannot be ignored, whether the U.S. Metric Board is allowed to continue or not. Congress itself cited the necessity to educate and inform the public in the Metric Conversion Act, which formed the Board. And, whatever direction metrication takes — whatever decisions the Congress makes regarding the Metric Board and conversion to metric in this country—the public's need to know must remain a top priority.





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# Andrew Kenopensky

National Automotive Coordinator  
International Association of  
Machinists and Aerospace  
Workers—AFL-CIO

## Representing Labor

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It is my firm belief that the U.S. Metric Board and its staff have served the country well in meeting the mandates of the law, as well as providing research data and pertinent information that was nonexistent prior to the implementation of the Metric Conversion Act of 1975. The data have been and will continue to be valuable to all segments of the population confronted with the decision to convert to the metric system or not to convert.

In the early stages of the Board's formation, 17 citizens were appointed by the President, coming from diverse backgrounds, representing all segments of American society, including small and large business, State and local governments, science, education, construction, engineering, industry, labor, and consumers. In the process of implementing the provisions of the law, much discussion and disagreement occurred. Individuals with different experiences and viewpoints, as well as Board members representing their constituencies, through the democratic process prescribed by the Board's policies, established programs that directly reflect all viewpoints and interests represented on the Board, which

will be of significant benefit to our country in years to come.

The U.S. Metric Board and its staff should be commended for a job well done in disseminating metric information to the general public, providing awareness of metric activities taking place throughout the U.S. and the effects of metric conversion, and remaining neutral in providing facts to allow citizens, consumers, workers, and businesses to form their own opinions and conclusions on the vital issue of metric conversion.

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# Joyce D. Miller

Vice President and Director of  
Social Services  
Amalgamated Clothing and Textile  
Workers Union

Member-At-Large

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At my confirmation hearing, some four years ago, I stated that the education of the general public would be a key role for the new U.S. Metric Board. I feel now that we have done an extremely fine job in this regard through the press, use of radio and television public service announcements, our appearances as a full Board in some 16 major U.S. cities, our co-sponsorship of National Metric Week, the many media interviews undertaken by Board members around the country, and our phenomenal correspondence with thousands of our constituents, young people, civic groups and a wide variety of organizations since the U.S. Metric Board became operational.

I am proud of the job we have done. Within a very limited budget, our Board and staff have made every effort to meet the mandates of the Metric Conversion Act of 1975. I feel strongly that the American consumer has been protected during our tenure.

While it is undeniable that any true metric momentum that may have existed in the U.S. in the 1970's has certainly diminished, the U.S. Metric Board has stimulated considerable debate of the issue in the States we have visited.

I have represented labor, consumer groups, and women's groups on the Board. These constituencies will continue to be concerned about the "inevitability" of the United States joining the rest of the world in measuring metrically. I think we need and we will have a dual system for some time to come—perhaps decades.

Regrets? I have a few—it is unfortunate that the American public will,

when the U.S. Metric Board is discontinued, no longer have an independent agency as a focal point for their numerous requests for information and assistance. I regret that the Board will no longer serve as a coordinating body for the public and private sectors' metric activity. I trust that if our functions are transferred to the Department of Commerce, the needs of the general public will continue to be met, albeit in a much reduced fashion.

I believe it was most worthwhile, indeed, for the entire membership of the Board to travel from its headquarters in Washington, D.C., to 16 major cities between February 1979 and January 1982, to alternately hold its regular bimonthly meetings. Our public forums, which we held in conjunction with those meetings, gave us a real opportunity to hear from our own constituents and the general public firsthand. This grass roots participation was a worthwhile experience for all concerned.

As with any national discussion, metric has its share of extremists on both sides of the issue. What impressed me most were the presentations from the audience during the "open mike" sessions of our forums.

I applaud the thoughtful remarks of young and old alike, of homemakers and small business persons, of consumers, of working people, of retired persons, teachers, and members of organized labor. They eloquently expressed both the impatience and dismay, support and reticence, enthusiasm and concern—relevant on both sides of the issue. We heard



from hundreds of individuals who came in person. We reached many thousands more through our media appearances prior to each public forum. We brought the metric issue to the people and I commend our Public Information Department.

I have tried to represent the needs of workers within the apparel and textile industries. Labor shall continue to watch carefully the role that the Federal Government may seek to play in America's future metrication process.

In the future, surely a "Metric Board" or similar body will be needed to plan, coordinate and direct the effort—it is only a matter of time.

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# Glenn Nishimura

Consultant, Arkansas Consumer  
Research

## Representing Consumers

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This statement will attempt to accomplish two objectives—first, it will serve as a minority opinion on the "Findings" section of this summary report and, second, it will briefly document the consumer activities of the U.S. Metric Board.

### **Selected Findings Are Misleading**

In several crucial respects the "Findings" section of this report is seriously misleading. Clarifications and qualifications of statements should have been included in that section to prevent misinterpretation, especially by future policymakers. Three "Findings," paraphrased below, are of most concern:

#### *1. Dual system confusing to all segments of society ...*

While the Board has found confusion in American society, it is incorrect to imply, as this does, that all segments of society desire a commitment to one system. Small businesses and selected industries, for example, have made it clear to the Board that they are comfortable with the voluntary nature of the Act and, after evaluating their own situation, have decided that conversion is not in their best interest. For them, a dual system of measurement is preferable to mandated conversion. They are not confused.

The more appropriate finding here would be that industry and commerce have reacted reasonably, that time will not necessarily dictate conversion to metric for all industries, and that at the present time, total conversion is neither practical nor necessary.

#### *2. Cost of conversion not excessive ...*

Clearly, the conversion experienced in the United States and studied by the Board occurred in a voluntary environment. An extrapolation of this "Finding" to conversions in a mandatory environment would be seriously flawed. In that sense, the GAO report should not be so lightly tossed aside.

#### *3. Perceptions of difficulties have no basis ...*

Similarly, though few difficulties were encountered under the voluntary legislation, it is unreasonable to discard all perceptions of conversion difficulties as groundless.

I object to the above findings, because I fear that they will be used to support a move to mandatory conversion at this time. The findings are stated in a manner that would allow such misuse. Actually, the experience of the Board in regard to those three findings strongly supports continuation of the national policy of voluntary conversion.

### **U.S. Metric Board Consumer Activities**

The U.S. Metric Board, since its inception, has demonstrated a sensitivity to the needs of American consumers. Through its deliberations and by its actions, the Board has established a record of achievement in this area.

From the mandates provided by the Act grew several important documents that have had a direct impact on the Board's programmatic approach to the needs of consumers.

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Space allows only a listing of these documents:

- Consumer Policy Statement (February 1979)
- San Francisco Resolution (August 1979)
- Private Sector Metric Conversion Planning Guidelines (Federal Register—9/16/80)
- Consumer Participation Plan (Federal Register—1/19/81)
- Report on Consumer Plan (August 1981)
- Board Action on Consumer Plan (September 1981)

Each of these documents reaffirms the Board's philosophical approach in responding to consumer needs and provides a solid foundation from which future activities should emerge. In compliance with the Act and its policy statements, the Board carried out many activities targeted at consumers. These are discussed in the Public Awareness and Education section of this report.

### **Consumer Reactions**

Consumers obviously have a stake in metric conversion. Consumer products measured in metric measurements already dot the marketplace, with the anticipation that the family of metric products will continue to grow. Conversion processes in the private sector should be fair to consumers. Specifically, the metric changeover should not be used to smokescreen price hikes or quantity reductions. Consumer participation in the conversion process can help foster consumer acceptance of that conversion.

The Federal Government, by its actions, should not violate the voluntary philosophy central to the Act,

unless more important considerations override. Conversion by either the public or private sector should be cost effective, and not merely prompted by a meaningless desire for complete conversion to one measurement system—a goal that I believe will never be realized, that is clearly not public policy, and that is certain to be unnecessarily costly.

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# Dennis R. Smith

Chairman, Department of  
Mathematics, Middleboro Public Schools  
Middleboro, Massachusetts

## Representing Education

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In the Hearings held for my confirmation before the Senate Subcommittee on Science, Technology and Space in June 1978, I stated:

*"I believe that increasing use of the metric system is inevitable and in the best interests of our country . . . There are going to be problems. It will inconvenience some people, and it will have a certain cost. But the benefits of universality and ease of use will ultimately make the metric change worth that cost."*

These statements are more true now than they were four years ago. Much progress has been made in both the corporate and retail marketplaces, as well as in education.

Educators have continued their teaching and usage of the metric system, encouraged by seeing more and more use of the metric system in their everyday lives.

Influenced to a great extent by programs emanating from the Department of Education's Metric Education Program and by the National Council of Teachers of Mathematics, publishers of standardized tests and textbooks have been encouraged to include metric terms as a matter of course. Most States either require that the metric system be taught or include metric questions on State-mandated tests. Whereas many math textbooks formerly used the English system and perhaps had a metric section at the end, the majority of mathematics texts since 1978 have used mostly, and sometimes exclusively, metric units.

At the 16 public forums the Board has held over the past four years, we have repeatedly heard from students and teachers about the value of using the metric system. Each class which is graduated from this Nation's high schools has a better familiarity and knowledge of metric terms than the previous one. There is no turning back. As our population becomes comfortable with metric units, they will accept and even demand their usage, not necessarily because the metric system is better or easier, but because the use of two measurement systems does not make sense.

The question of "when" is still open. I believe that the development of reasonable timetables could make a difference in what the total cost of conversion will be. If industry anticipates metrication and includes it as a part of regular production innovation,

the cost will be minimized. Voluntary conversion can work if some goals are set and a firm national commitment is made. If major decisions are made with the expectation that on a certain date the metric system will be predominantly used, the inconvenience and disruption will be minimal. Without a clear-cut commitment, however, metrication could take 50 years.

Educators, both as individuals and through their organizations, have supported metric conversion for decades because the metric system is easier to use and teach. That support included advocacy of the Metric Conversion Act of 1975. The general perception had been that the U.S. Metric Board, through Public Law 94-168, would create a climate in which the metric system would be accepted by the general public. I believe that the Board's public awareness and education programs have been effective in this regard, but that more actual conversions must occur to avoid a lengthy, complex, and unnecessarily expensive conversion period.

I believe that the Metric Conversion Act of 1975 could be a vehicle for effecting a reasonable metric conversion in this country if the President and the Congress would show firm support for metric conversion and the Act. Although words like facilitate, encourage, promote, assist and commitment appear in the Act, there have always been questions regarding what Congress really intended. Our citizens need a definitive decision.

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# Satenig St. Marie

Divisional Vice-President and  
Director of Consumer Affairs,  
J. C. Penney Company

Representing Retailing and  
Business Organizations

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In these times of economic uncertainty, it is difficult to focus on metric usage as a high priority in business. Taxes, jobs, inventories, and more, demand immediate and sustained attention. Short-range problems must be solved if economic recovery and improved productivity are to become a reality.

However, if long-range business opportunities are to be considered, and of course they must, then metric usage, especially in the context of free trade, becomes a reality that must be accepted and assimilated into business planning.

Both retailing and the Chamber of Commerce supported voluntary conversion to metric measurement in 1975 when Public Law 94-168 was enacted. That support has not changed. When the immediate problems of the economy have been brought into line, and increased international trade will surely play a role, then these business organizations will continue to support the need for a U.S. Metric Board, or similar organization, to coordinate and encourage the increased use of the metric system of measurement. To support this function, Public Law 94-168 will likely need to be changed to further encourage conversion, even though the potential of increased foreign trade with all other industrialized nations that are already on the metric system will be a motivating factor.

Retailing, especially, is an industry that will be very interested in the progress of metric measurements in goods and services, since it has direct contact on a daily basis with the consumer who will be ultimately affected by this new language of measurement.

One of the major contributions made by this Board has been research that addressed the metric issues outlined by Congress and the surveys to determine the current status of metric conversion activities in business. We will not benefit fully from the research that has already been done unless there is a group that is responsible for follow-up on the recommendations coming out of the studies. Perhaps there can be a cooperative effort between the private sector and the Department of Commerce to study the U.S. Metric Board research to determine implications for further action both by business and government. In this way, the current research studies by the Board can be utilized to determine what we now know about the potential impact of metric conversion and what gaps exist that can be studied to make reasonable recommendations. Long-range, this can only serve the best interests of our economy and our Nation.



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# Roger E. Travis

President,  
Roger E. Travis Associates

Representing Small  
Business

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It has been a great pleasure to represent small business on the United States Metric Board for the past four years. There are an estimated 11 million non-farm businesses in the United States of which over 98 percent, 10.8 million firms, qualify as small businesses. Eighty-two percent of these small firms have receipts of less than \$100,000, and almost 80 percent employ fewer than 10 people. Collectively, however, small firms provide over 58 percent of U.S. business employment, create 87 percent of new jobs, and directly and indirectly provide livelihood to over 100 million people. Needless to say, this vital sector of the economy cannot be ignored when national policy decisions are made regarding metric conversion.

The basic underlying theme that has surfaced during all of the Board's public forums, media exposure, and research activities is that **Small Business supports voluntary metric conversion activities but will vehemently oppose any attempts by the Federal Government or other groups to impose mandatory conversion.**

Since the Board's inception, I feel one of our major accomplishments has been to create a greater awareness regarding the meaning of Public Law 94-168, and allay the fears and misconceptions that our national policy was to convert. Our public forums and various other media activities have contributed greatly to this meaningful accomplishment.

A major portion of the Board's research activities and resources were devoted to studies relating to the impact of metric conversion on the small business community. The basic

underlying result surfacing from the studies was that while little conversion activity existed outside the manufacturing sector, when conversion did occur, it was initiated by customer demand, it was accomplished with very little adverse impact, and it occurred only when an economic gain was hopefully to be derived.

Another major area of extreme importance to the small business community is the efforts of Federal Government agencies regarding metric conversion. While not totally pleased with the results to date, I feel the Board accomplished a great deal by surfacing the issue continually in public. These efforts probably contributed greatly to educating agencies as to the Nation's policy and prevented unnecessary and costly conversion by Federal agencies that were tempted to change for the sake of changing without any economic gain to the economy. Such potential conversion may have been a very costly venture for over 200 million Americans.

The Board, being composed of 17 private citizens representing various constituencies, serves a valuable function in providing useful input on the direction of metric conversion. If the Board is abolished, small business will lose this valuable mechanism for safeguarding against unnecessary Federal agency metric conversion activities, and small business must find another mechanism to prevent policy decisions on this vital subject from being made by Federal bureaucrats. Such a decision

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process could adversely affect small business in the area of procurement, as well as have a detrimental effect on the entire Nation. The most viable alternative at present appears to be to have small business associations and trade associations constantly monitor metric activities of the various agencies to ensure input at the beginning of any proposed conversion activities.

The small business community should use its collective efforts to assure that metric conversion activities are initiated voluntarily by the private sector and that taxpayer dollars are not spent on implementing conversions which are initiated by Federal or State government, sometimes even disguised as educational programs.

The U.S. Metric Board and Public Law 94-168 have served the interests of the small business community well. The law was enacted through the proper legislative process after extensive hearings. Until such time as the law is amended or repealed, the small business community should

safeguard its being changed or interpreted by bureaucratic fiat.

The small budget of the U.S. Metric Board over four years (under 10 million dollars total) has been a wise expenditure for the small business community and the Nation. These expenditures have brought the issues and questions before the public and provided a direction for the country. The question remaining before the small business community is not whether or not metric, but how much metric and when? The small business community should provide these answers with input at the beginning of the process and not be dictated to by self-serving interest groups or misleading propaganda such as "metric conversion is inevitable."

The small business community, with its ingenuity, creativity, flexibility and perseverance, should and will provide the answers.



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# Adrian G. Weaver

Director of Product Safety, IBM

Representing Business  
and Industry

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I am convinced that predominant use in the United States of the International System of Weights and Measures in trade and commerce is in the best interest of this country and its economic health. I strongly support the concept of voluntarism in order to permit each sector of our society to make intelligent, timely, cost-efficient decisions on when and how to evolve to the common system used in most of the other countries of the world. The manufacturing industry, and the great number of people from that industry who have supported me during my period of service on the U.S. Metric Board, believe that the voluntary approach is best.

At the same time, my experience on this Board has taught me that a stronger sense of direction from Congress is necessary if significant, efficient progress is to be made. Change in the basic lifetime habits of a society is nearly always viewed with concern, particularly if the benefits of the change are not clearly understood and articulated. Thus, the current voluntary program, with no definitive national goal for conversion, has fallen prey to endless debates examining the "perceived" national goal as viewed by persons opposing the change. Clearly, the Congress and the Federal Government must have a unity of purpose and goals before effective leadership at the Federal level can expect to coordinate meaningful and productive plans from the several States and the private sector.

At some future point, the Congress will have to consider the metric conversion issue again. I would urge that Congress explicitly set the goal of predominant use of the metric system in the trade and commerce of the United States, and make that a real national commitment by setting a target date. It does not really matter if that date is ten years or fifteen years. The fact of setting a date will provide the reality required for all sectors of our society to produce effective conversion programs.

A mechanism now exists in the Interagency Committee for Metric Policy, the National Council on State Metrication and in the private sector

(American National Metric Council, U.S. Metric Association, and others) for coordinating the Federal, State and private activities for metric planning. These organizations provide an in-place resource for responding to the ever present need for information, advice, and direction. A focal point in the Federal Government should be designated with sufficient resources to assure that these organizations can make responsible contributions.

In my opinion, under Public Law 94-168 and its limited mandate, the Board has made commendable contributions. Hearings held by the Board during the energy crisis in 1979 helped focus the industry and the country on the alternatives available for dealing with technical problems which prevented displaying the whole cost of gasoline sales on the pump when prices went over \$1.00 per gallon. Responsible research programs have developed better understanding of basic problems (and in some cases non-problems) that would constrain the ability to voluntarily use the metric system. Public awareness programs have contributed to the knowledge of the metric system by the American consumer, and groups have been created at the Federal and State level to provide for interaction with the private sector on metric usage issues that affect our society as a whole.

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# U.S. Metric Board Activities

*The basic program areas of the U.S. Metric Board are divided into three parts: Public Awareness and Education, Research, and Coordination.*

*Each program area's activities for four fiscal years are summarized and provide information on problems and successes, and in some cases*

*possible future directions for the Federal Government to consider in its continuance of the policy of voluntary metric conversion.*

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## Public Awareness and Education

Congress mandated that the Board "assist the public through information and education programs, to become familiar with the meaning and applicability of metric terms and measures in their daily life..." This task was enormous, given the limited resources available to the Board. An added complication was that the Board had to avoid being perceived by the public as an advocate of the metric system over the customary system of measurement. Despite the Board's best efforts, this has proven to be a difficult distinction for the general public to make, particularly when the Board is actively seeking to educate and inform them about metric.

After four years of experience, the Board has been pleased with the success of its programs to reach the public. Over 100,000 people have requested metric information. Best estimates indicate that a potential audience of 150 million people has been reached through the media alone. The programs have been designed to:

- Establish the identity and create public awareness of the U.S. Metric Board as a source of information and services to general and specific publics.
- Establish conversion to the metric system as an important national issue, one worthy of public debate, and one requiring informed decisionmaking before metrication can take place.

- Stress the voluntary nature of metric conversion and the non-partisan role of the Board.

## Public Forums

To create a dialogue about metric and acquaint the public with U.S. Metric Board activities, the Board decided to hold a series of public forums in conjunction with its bi-monthly business meetings. These forums took place in major cities throughout the United States. The first forum was held in Dallas, Texas, in February 1979. Since then, the Board has held forums in Boston, San Francisco, Detroit, Orlando, Phoenix, St. Louis, Seattle, Minneapolis, Columbus, New Orleans, Albuquerque, Charlotte, Baltimore, Denver and San Diego.

Representatives from all walks of American life were given the chance to speak for or against the metric system—and speak out they did. Here is what some of them said:

- A trucking company in Seattle—"The worldwide trend to metric in automotive manufacturing seems unmistakable. We seek to stay competitive in the international marketplace. We feel that the costs and difficulties of metric conversion have been totally exaggerated."
- A farmers' association in St. Louis—"Our members are adamantly opposed to lending any support to a metric conversion program, for they realize that although it is voluntary, farmers will be mandated to convert because the others, who voluntarily go metric, will make them do so."

- A university in Albuquerque—"No nation has ever converted without making it mandatory or setting a date for conversion. We are alone in a world of metric measurement. Eventually, the U.S. will be metric because a progressive world will demand it."
- A citizen in Boston—"The metric system is inconvenient and has been the cause of much confusion. America's greatness has been achieved with the standards and the customs of the inch-pound system."
- A representative of an organization encouraging export of U.S. goods, testifying in San Diego—"I am an individual who, to this day, has trouble figuring out pints, quarts and gallons, so I don't know if I will ever be able to adjust to a change. But it seems to me that the biggest problem we face in the international market today is the trade restrictions that can be imposed on the kind of packaging and the sizes that are acceptable abroad. It creates a tremendous hardship on U.S. exporters and on the entire labor force."
- A furniture manufacturer in Charlotte—"Conversion to the metric system would throw into total disarray our purchasing specifications and our manufacturing criteria. The furniture manufacturing industry will *not* be leading any conversion attempt. There are no economic incentives for our industry to do so—and many reasons not to."

# U.S. Metric Board Activities

More than 100 formal presentations have been made by representatives from organizations ranging from the Gray Panthers and the United Auto Workers to Anheuser-Busch and the Boeing Company. Hundreds of people have taken advantage of the "open mike" sessions at the forums to air their opinions on metric, pro and con. The Board members have gained a deep understanding of the complexities of converting to the metric system through their face-to-face contacts with the American public.

The impact of the public forum in each city has been much wider than the immediate audience. Statewide mailings to several thousands in the business community and special interest groups preceded the Board's arrival in a city and informed the recipients of the Board's activities and the upcoming forum. Many thousands of people in every city visited became acquainted with the metric system through local media appearances by Board members. At least 25 visits were made to major media outlets in each city.

The public forum has proven to be one of the most effective means for the Board to assess public sentiment for or against metric usage, as well as to reach great numbers of people through media and personal contacts.

## Education Programs

The Board recognized that an educated public would be better prepared to deal with metric in everyday life and to protect itself against unscrupulous attempts to use conversion as a device to take advantage of the unwary. Because it has not been possible for a small organization alone to educate an entire country, the Board has concentrated on working with other organizations in an effort to reach the general population.

The educational philosophy of the Board has been to develop materials and programs for the public at large and for discrete groups and organizations that would provide basic knowledge of metric terms and measurements. These materials include a history of the metric system, information about metric in the supermarket, metric and automobiles, liter dispensing of gasoline, metric in the kitchen, and such general areas as "all you need to know about metric."

## Kits for Students and Teachers

The Board has developed special student kits that include rulers, conversion cards, activities and games, and materials children can use with their parents. Nearly 200,000 of these kits were distributed to students. Special teacher and trainer kits were also developed. These are being used by elementary and secondary school teachers and by those teaching adult education and job training courses. The educator kits stress a "hands-on" approach to

education that encourages students to experiment with measuring and weighing in metric and to "think in metric and develop a metric eye."

## National Metric Week

The National Council of Teachers of Mathematics (NCTM) established National Metric Week in the mid-1970's to coordinate "grass roots" efforts to promote metric awareness. The event was held each year in May and was clearly the most widely recognized of several "metric weeks" sponsored by various organizations.

The U.S. Metric Board joined NCTM in 1980 as a co-sponsor and began a program designed to bring other "metric weeks" under a single umbrella to forge a comprehensive metric education effort with a measurable national impact. National Metric Week 1980 represented the combined efforts of the U.S. Metric Board, NCTM, the Department of Education, the American National Metric Council, the U.S. Metric Association, the National Education Association, and many smaller organizations.

As part of its National Metric Week activities, the Board contacted over 600 of the Nation's leading educators to urge their active support of metric education in the classroom, distributed 20,000 posters promoting metric awareness to schools and libraries nationwide, and supplied major news bureaus with a basic metric quiz for their distribution. At the request of the Board, 33 State governors and several mayors of major cities issued proclamations supporting metric education during National Metric Week.

# U.S. Metric Board Activities

In 1981, the Board expanded the focus of National Metric Week to include the home and workplace, as well as the classroom. Seven "learn-by-doing" metric quizzes were developed, and 10,000 camera-ready sets were distributed to daily and weekly newspapers, magazines, corporations, schools and libraries. Public service announcements were distributed to the top-50 television markets. More than 650 metric-related articles appeared in print during National Metric Week. Over 80 radio and TV interviews were conducted by the Board. Twenty thousand people and organizations were sent letters urging their support for metric education programs. Thirty-five thousand true-and-false posters were distributed to schools, libraries, museums, corporations, associations and mass transit companies.

## Metric Usage Seminars

The Board has provided a seminar service for Federal and private organizations. Since its first metric usage seminar for government public information officers in November 1979, the Board has conducted several dozen one-day training sessions for Federal and local agencies, hospitals, corporations, civic groups and educators.

The seminars have been a successful method of inspiring others to produce their own programs, thus multiplying the effects of the Board's education efforts. Metric training programs in the Veterans Administration, the Bureau of the Census, a Washington, D.C. hospital association, and at least two Federal correctional facilities in Tennessee and Texas, have either been established or expanded as a result of these seminars.

The lessons learned in developing and conducting this seminar program were basic to the preparation of the "Leader's Guide for Conducting a Metric Usage Seminar," published by the Board late in 1981. The booklet, distributed to educators, has been very well received.

## Electronic Media Presentations

The Board's electronic media program was initiated in early 1980 to help meet the agency's public education and awareness objectives through the electronic media. In less than two years, nearly 100 radio and television public service programs and announcements were developed, distributed and extensively broadcast by networks and individual stations nationwide. The subject matter centered on:

- Current metric issues and metric-related events, such as gas sales by the liter, National Metric Week, and the Olympic Games.
- Educational information of a more general nature, including explanation of metric terms and discussion of metric conversion activity and the Board's research findings.
- Information designed to inform citizens of the voluntary nature of the country's metric conversion policy.

In all public service materials, emphasis has been given to stimulating listener/viewer questions, opinions and requests for information. The response has been gratifying. Over 20,000 letters and cards have been received by the Board as a direct result of its radio and television public service advertising.

## Radio

The Board's radio activities started in January 1980, in conjunction with the Winter Olympics held at Lake Placid. Five public service announcements were released to the ABC radio network and its affiliated stations nationwide. The spots, entitled "Metric and the Winter Olympics," were aired extensively in prime time.

In March 1980, when large numbers of gas stations began converting their pumps to measure gas by the liter, four spots were released to inform the public about the change and where they could get further information. The spots were broadcast in prime time by the ABC network and were used frequently by 1,500 individual radio stations in over 50 markets where liter conversion was taking place.

In August 1980, the Board began regular distribution of "Metric Magazine," a public service program that consisted of 60 weekly installments, each lasting five minutes. Distributed to 500 requesting radio stations in all fifty States, "Metric Magazine" covered the gamut of metric subjects, such as metric in the supermarket, and conversion activities in the tire, distilled spirits and oil

# U.S. Metric Board Activities

industries. Other programs focused on metric activity as viewed by a number of special interest sectors—consumers, large and small businesses, retailers, educators. Special "mailbag" editions highlighted many of the questions and opinions expressed by listeners.

## Television

The Board's television public service announcement exposure began in December 1980, when it released four spots to stations in 25 major markets dealing with the sale of gasoline by the liter. Over 12,000 viewers responded to the announcements, and the letters continue to come as a result of more recent showings. National Metric Week, in May 1981, received extensive television promotion from a public service announcement sent to top-50 market stations. The spot depicted the use of metric in the kitchen. Another four public service announcements were released in November 1981, dealing with what parents, shoppers, sports fans and mechanics should know about metric. They were aired by at least 35 of the targeted top-50 markets. At the same time, spots designed to increase attendance at the public forums were circulated and seemed to result in a greater number of people who came out to participate.

## Publications

Over 50 different publications have been written and distributed by the U.S. Metric Board in response to more than 100,000 individual requests for information. The literature designed for the general public attempts to allay some fears of metric conversion by demonstrating that

people are already using metric more than they realize. Skis, film, cigarettes, distilled spirits, wine and soft drinks are measured in metric units. Imported automobiles are designed to metric specifications, the automobiles manufactured by General Motors are almost 100 percent metric, and Ford, Chrysler and AMC are not far behind. The products purchased in the grocery store often have metric, as well as customary measurements listed on the labels.

The publications deemphasize the importance of making mathematical calculations in converting from one system to the other, although conversion tables are provided. Rather, the approach is one of learning to understand what a metric size represents, that a gram weighs about the same as a dime, or that a meter is the width of an average doorway, so that members of the public can relate the metric system to their personal experiences.

## Research

### The Research Plan

The Board based its initial research plan on the Metric Conversion Act of 1975, in which Congress suggested a series of issues that should be addressed. By the end of fiscal year 1982, the Board's comprehensive, but inexpensive, research program will have dealt with most of those issues. The areas particularly targeted by the Congress and the Board were statutory barriers to metrication, and the effects of metrication on occupations, workers and small business.

## Providing A Metric Option

The Board produced a report entitled, "Providing a Metric Option: Can Laws and Regulations be Amended in a Timely Manner?", which was sent to the President and Congress in December 1979. While legal impediments and annoyances prevail throughout the various jurisdictions of the country, the Board has found that there are few legal barriers to metrication. There is no current need for any new structural mechanism for converting customary units to metric units in statutes, regulations and other laws. The findings indicate that:

- Existing laws and regulations at all levels of government do not constitute significant legal barriers to voluntary conversion efforts.
- Not all legal references to customary units require change.
- Most legal changes can be accommodated through administrative rulemaking rather than legislative action.
- The extent of voluntary conversion is not of sufficient magnitude to strain the effectiveness of existing mechanisms.

The Board also determined that business firms, particularly the largest manufacturing firms, do not see laws and regulations as real impediments to metrication. They must, however, take into account certain laws when planning conversions, particularly antitrust laws and local building codes, and to a lesser extent the Fair Packaging and Labeling Act and weights and measures laws.

# U.S. Metric Board Activities

## The Effects of Metrication on Occupations and Workers

### Measurement-Sensitive Occupations

A study on the effects of metric conversion on measurement-sensitive occupations reveals that almost half of the occupations could be affected by changes in measurement units. Specific examples of these occupations include the health, mathematics, physical science, mechanic and machinist fields. This finding was based on a review of the occupational job descriptions listed in the U.S. Department of Labor's Dictionary of Occupational Titles.

### Workers' Tools

The Board's survey of workers and their tools found that while tools are often bought by the employer, workers that service vehicles and tool and die makers generally buy all their own tools as a condition of employment. The price can range from \$100 to nearly \$1,000. Many workers do not take a tax deduction for these tools. For some, it is not beneficial to itemize deductions. Others are unaware that the deduction is possible. The Board recently alerted Congress and the President to this situation, as the Act directs, whenever unresolved problems may require Federal remedial action.

### Workers' Training

The Board's survey found that the cost of metric training is usually covered by the employer and varies from \$15 to \$350 per employee, including the cost for wages of workers being

trained on company time. The workers themselves sometimes experience anxiety when faced with conversion in the workplace; older workers are especially prone to anxiety. Once training takes place, however, the anxiety decreases or disappears. Workers later adapt well to using metric on the job.

There also appears to be considerable duplication of training models and information for similar types of workers, which implies added, unnecessary costs. There may be a need for a clearinghouse of metric training information, which could provide models, materials and procedures for use by the private sector.

### Safety in the Workplace

The Board initiated a study to identify and analyze potential safety hazards that can affect certain occupations and employees as a result of metric conversion in the workplace. Since no actual safety hazard experiences have been identified as being associated with conversion, the study provides hypothetical scenarios to demonstrate situations where there is a possibility that metric conversion could compromise safety.

The study identified the following job task situations where hazards can occur:

- When workers exercise judgment in using measurement. For example, when a worker takes a temperature reading from a dial registering in Celsius and believes the temperature to be "safe" but does not make the correct conversion to customary units—and the temperature reaches the danger point.

- When a measurement value must be communicated between two workers, such as when one worker shouts a number in meters to a co-worker, who hears the number but thinks it represents yards.
- When emergencies occur that require use of measurement, and the worker has to make a judgment without taking time to analyze whether he/she is using metric or customary measurement units. In other words, the worker reacts with a conditioned response. An example would be an airline pilot, who must decide quickly whether to abort a landing or takeoff and must be sure to use the appropriate measurement units.

Aviation has been identified as an industry where metric safety issues need attention. The industry is seeing an increasing use of metric measurement in the international arena. At present, all U.S.-certified air carriers use inch-pound instrumentation. This situation requires airborne conversion as U.S. aviators fly in a metric measurement environment outside the country and as foreign aviators fly in U.S. airspace measured in customary units. The potential safety problems have not been addressed, nor has a comprehensive aviation conversion plan been developed and endorsed by the industry.

The study found that industrial safety programs involving professional safety experts in metric planning, metric training and procedural analyses can reduce the potential exposure of the workforce to hazards when metric change takes place.

# U.S. Metric Board Activities

## The Effects of Metrication on Small Business

The effects of metrication on small business have been of particular concern to the Congress and the Board. Two studies have been completed to assess problems and the extent of small business conversion. The studies indicate that conversion problems encountered by small firms have been met and solved within the resources of their business. There is little economic or operational difficulty. Metric conversion is rarely a primary concern in manufacturing decisions and occurs in the context of many other business decisions on equipment, customer needs, worker relations, finances, and dealings with suppliers and other companies.

Other findings include:

- **Costs**—It is difficult to identify any small business that has endured significant costs as a result of conversion to metric. Investments in conversion are insubstantial and sometimes difficult to isolate from other business costs. The importance of metric costs to small business diminishes when compared with their concerns about inflation, energy and materials costs, interest rates and other general economic conditions. Firms with no conversion experience expect conversion costs to be high and problems to be many. Experience shows these fears to be unfounded.

- **Metric Capacity**—Small business has a widespread, but shallow capability to produce in metric dimensions. Without a major surge in demand, the metric capacity of the Nation's small businesses may not develop beyond its current state.
- **Impetus for Conversion**—Small businesses see their metric production as neither voluntary nor forced by the Federal Government or any one company. They rarely produce in metric to seek out new business markets. Rather, conversion takes place as a result of general industry trends and the demands of present customers.

## Other Research Efforts

In order to collect knowledge about metric conversion activities in large businesses, as well as consumer reactions to metric conversion, the Board conducted the following studies:

### Survey of Large U.S. Manufacturing and Mining Firms (The Fortune 1000)

In 1979, the Board surveyed the largest manufacturing and mining firms to find out how much they are using metric, and what their intentions are for the future.

Sixty-three percent of these firms are selling at least one metric product that is either designed and made in metric dimensions (accounting for 6 percent of their sales), or carries metric information on the labels (accounting for another 21 percent of their sales), or has a combination of

metric and customary units (5 percent of their sales). Significantly, the firms that sell metric products overseas report that these products account for 48 percent of their export sales, compared to 29 percent of their domestic sales. This may indicate the importance of metric in competing in the foreign marketplace and expanding the U.S. export base. The impact of metric on international trade is an area in need of further study.

While over half the companies have some degree of metric activity, the data show a relatively low level of intensive industry-wide planning. Large businesses seem to have a "wait and see" attitude. This could pose a problem. Over half the companies intend to add some metric capability by 1985. Beyond that date, 41 percent expect that all new equipment will have metric capability. If planning and coordination is as limited as it appears to be, the results may be increased costs, disruption and inefficiencies.

### Metric Use in the Machine Tool Industry

In a recently completed study the Board assessed the status of metrication in the U.S. machine tool industry. This industry provides capital equipment for other manufacturers, including the automotive, aerospace, construction and farm machine industries. It is a small but critical segment of the national economy.

The study found that machine tool companies need better information on the status of metrication within their own industry and in supplier and customer industries. They also need to know what that status means in terms of competitiveness in domestic

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# U.S. Metric Board Activities

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and world markets. There have been complaints about the lack of an explicit Federal policy on metrication. Procurement policies, particularly those of the Department of Defense, are a source of confusion and dissatisfaction to this industry.

American tool companies are slowly moving toward conversion to the metric system and will continue to do so. So far the demands of domestic and foreign markets for metric machine tools have been met by providing either machines with metric capability or numerically controlled or computer numerically controlled machines with dual selection switches. The sales of these machines are estimated to average about 10 percent of total sales.

The strongest factor pulling the industry toward metrication is the significant, growing demand for machines with metric capability in the domestic market, especially in the automotive, construction and farm machinery industries. Other factors include increased interest in the export market and decisions by multinational corporations to make domestically produced machines compatible with machine tools and components produced in their overseas subsidiaries.

On the other hand, the major inhibiting factor to metric conversion is also domestic market demand, since a large volume of domestic sales does not require metric products. Additionally, there is a backlog of domestic orders in customary units, which is now disappearing; machine tools generally have a long life before becoming obsolete; there are fears about costs of metrication; and occasionally supplies of metric materials and components are limited.

The industry is experiencing a declining share of the overseas market, which is four times the size of the domestic market. This decline has been partially masked by the rise in the dollar value of machine tool exports.

Metric conversion will not solve these problems. There is some indication, however, that some countries may strengthen their requirements for imports to be in metric units in the future. Some industry officials believe that metric capability makes American products more attractive in overseas markets.

The metrication issue is regarded by the industry as of secondary importance. Attitudes toward metric vary widely, from indifference to mild enthusiasm to hostility to disappointment that it has not come more rapidly. Most agree, however, that the industry will have total metric capability within a generation.

## **Consumer Attitudes on Metric Conversion of Distilled Spirits Containers**

Consumer involvement in metrication decisions of individual industries has been essentially nonexistent, a finding based on the Board's study of the metric conversion of distilled spirits containers. Consumers are generally aware that the sizes have changed, but they typically do not make price comparisons with the customary sizes. The study also found that there is a potential for firms to use metrication as a device to justify product price increases to consumers, even when the increases are not related to conversion and can

be attributable to other factors. If the Board's planning guidelines had been written and used at the time the distilled spirits industry began to make its conversion in late 1976, the findings show that they would have made a positive difference in smoothing the transition and might have improved consumer involvement and understanding.

## **Topics for Future Research**

Unfortunately, the Board cannot conclude that all necessary research on metrication has been completed. In its four years of existence, the Board has completed 18 research studies. Most have been performed under contract with minority and small business firms; some have been conducted by the Board's staff. Eight projects are still in the final analysis and report-writing stages and will bring the total number of completed research studies to 26 by the end of fiscal year 1982.

There are still a number of unknowns that the Board believes need attention. A particularly challenging research task would be to determine the effects of metrication on the U.S. economy and compare these effects under the existing voluntary national program and a hypothetical, mandated conversion program. The task would require a large-scale gathering of data and use of econometric models. The results could yield answers to a host of questions, including:

- What are the effects on export trade of the U.S. operating under a mixed system of measurement?



# U.S. Metric Board Activities

- Is the present voluntary system satisfactory or does it pose serious problems for the future by contributing to business uncertainty in making planning and investment decisions?
- Will the voluntary system eventually favor those who keep customary measurements and penalize those who convert to metric, or will the benefits be reversed?
- What are the costs and inconveniences of maintaining dual inventories—products measured in metric and in customary units?
- If the metric system is mandated, is there a "best" number of years for metrication to take place?
- Does setting a target date for metrication cause dislocations in the marketplace, such as price increases or product scarcities?
- Will metrication growth under the voluntary program stop, remain the same or increase?
- Do money supply and interest rates affect metrication?

Many industry leaders have expressed concern about what they perceive to be the increasingly uncertain direction of metric conversion in this country. For this reason, industry may hesitate to make major capital investment decisions that involve metric in the absence of a clear signal of intention from the Federal Government. Before putting money on the line, business leaders want and deserve a clear-cut position so they can order mills, systems and machine tools. A broad-based study of the economy and metrication could

provide the Federal Government with solid answers to use in future decisionmaking about the course of metric in the United States.

## Coordination

When the U.S. Metric Board began its activities late in 1978, it was faced with the challenge of establishing an effective way for all sectors of the economy to communicate and share information on metric conversion. While encouraging consultation, planning, and coordination of metric conversion plans, the Act specifically directed that the Board should avoid unnecessary duplication of existing activities. The Act also directed the Board to provide procedures to guide industry sectors in their planning and coordination efforts.

Some industry conversion planning was already taking place under the auspices of the American National Metric Council (ANMC), a private, nonprofit organization created for that purpose. Coordination among Federal agencies was already happening. At the State government level, a few metric councils were in the process of being formed. What was missing was a more efficient structure for cooperation and exchange of information among the private sector, the Federal agencies and the States.

The Board addressed the problem by creating the following four programs:

- **A Private Sector Program**—To encourage and monitor ANMC development of industry sector plans, to establish planning guidelines for industry sectors to follow, and to assist industry, when asked, in developing their plans.
- **A Federal Program**—To establish and oversee a policy level interagency metric committee, the Interagency Committee on Metric Policy (ICMP). The ICMP would assume responsibility for a network of Federal agency policy experts and coordinators, who would provide guidance and monitor agency development and execution of metric policy in the Federal establishment.
- **A State Program**—To organize a National Council on State Metrication, with representatives appointed by each State Governor. The Council would meet periodically to coordinate metric policy at the State level, with emphasis on education, laws and regulations, and metric planning. The Council would also encourage the development of metric councils in those States without them.
- **A Standards Program**—To consult with existing Federal, State and private sector standards organizations with the goal of encouraging timely development of metric standards to support voluntary metric conversion.

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# U.S. Metric Board Activities

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## The Private Sector Program

In initiating the Private Sector Program, the Board had to consider two separate issues—plans for future conversions and the actual conversions that were taking place without benefit of the planning process.

The Board chose a passive role in the development of private sector conversion plans. Endorsement of these plans, however, was recognized as a U.S. Metric Board responsibility when industry sectors request that the Board review their plans. To provide continuity in the industry planning process and set minimum standards for conversion plans, the Board developed and published a set of guidelines designed to bring order and consistency to industry-wide conversion activities.

The actual conversions that were continuing to take place without planning were affecting both the average consumer and purchasers of products for commercial use. In many cases, marketing strategy and secrecy were the predominant causes. In other cases, there was no obvious reason. The Board decided to offer assistance in these conversions when the situation warranted its attention.

## Private Sector Metric Conversion Planning Guidelines

After months of effort and extensive coordination with potentially affected industries, organizations and individuals, the Board established private sector metric conversion

planning guidelines. The guidelines outline the Board's suggestions for managing an industry-wide metric conversion plan. They set forth procedures for planning, and they stress the principle of openness in discussions, giving anyone with an interest ample opportunity to participate and be heard.

The guidelines refer planners to the publication "Antitrust: A Handbook for Metric Planning Conversion," which was developed by the Board with the cooperation of the Federal Trade Commission and the Department of Justice Antitrust Division. The publication has provided answers to many of the antitrust concerns expressed by industry planning groups.

To encourage the use of the guidelines, the Board offers various types of assistance to planners in the private sector. The assistance includes preplanning help, identification of Federal and State agencies for participation in the planning process, and publicizing the plans through press releases, insertions in the Federal Register, and other means. To qualify for assistance, the planners are required to follow the planning guidelines and would be expected to submit final plans for U.S. Metric Board endorsement. ANMC has adopted planning activities which are compatible with the Board's guidelines, and recent Board review of two ANMC plans has shown that the guidelines are practical and effective.

## Conversion of Gas Pumps

The Board soon had the opportunity to assist in an actual industry conversion even before the planning guidelines were established. When gasoline prices soared in 1979, gasoline retailers were confronted with a major problem. The internal computers of most of the Nation's gasoline pumps could not calculate sales at a price of over \$1.00 per gallon. In the short run, the pumps could be adjusted to register only half the price, and consumers would then have to pay double the price shown on the pump. This solution caused confusion and ill will among consumers and was only a temporary solution. As an alternative, some California stations were converting their pumps to measure gasoline by the liter, which would require a relatively small expenditure, and the California Metric Council hearings on the issue captured the Board's attention.

After a quick survey of other parts of the country, the Board realized that the situation was not confined to California and could cause disruption for retail dealers, their customers and the State weights and measures officials who regulate retail gasoline sales. Hearings were held by the Board in May 1979 to address the issue. Witnesses from the oil companies, consumer groups, State weights and measures organizations, equipment manufacturers, industry associations and the Department of Energy came to testify. After additional investigation, the Board issued a comprehensive report which outlined the problem and evaluated

# U.S. Metric Board Activities

alternative solutions, including a planned conversion to liter dispensing of gasoline. The Board then encouraged those interested in liter conversion to develop a planned and coordinated voluntary program. The Board offered to assist in the process and participated in public education activities.

Actual conversion of the gas pumps soon overcame the planning process, however, and even though ANMC sponsored a gas pump conversion plan, it was never submitted to the Board for review. In 1981, approximately 20 percent of the Nation's service stations were selling gasoline by the liter. To prepare the consumer for this change, the Board distributed a series of radio and television public service announcements that have been widely used in locations where conversion has been taking place. The Board also developed easily reproducible informational materials that compared liter pricing with gallon pricing, which were made available to retailers for distribution to their customers.

The future of selling gasoline by the liter is unclear. Some stations have already reconverted to measuring gasoline in gallons, while others are just starting the liter conversion process.

## Conversion Planning in the Construction Industry

Although the construction industry developed a metric conversion plan, it lacked consensus among the diverse elements of this complex industry. To encourage an industry-wide dialogue on metrication, the Board, ANMC and the National Institute of Building Sciences (NIBS) jointly sponsored a construction industry metric

symposium in December 1980, which brought together for the first time decisionmakers from all elements of the construction industry to determine if it was in their best interest to convert to the metric system. The in-depth analysis that took place at the symposium has been the most extensive to date. A consensus was reached to continue the deliberations, and the NIBS Board of Directors voted to take the lead role in developing an effective follow-up program.

## Metric Conversion Plan Reviews

The Chemical and Allied Products and the Instruments Sector Committees of the ANMC submitted industry-wide metric conversion plans for the Board's review. These plans were completed in accordance with the Board's metric conversion planning guidelines. In December 1981, the Board held public hearings in Washington, D.C., after first alerting the public and providing information on the plans. Following an extensive review to assure that the plans met the criteria in the guidelines, particularly those requiring widespread involvement and public awareness of the planning efforts, the Board endorsed both plans in January 1982. The Chemical and Allied Products Plan calls for the shipping and billing of industrial chemicals by 1984. The Instruments Industry Plan outlines recommended steps for voluntary metric conversion of selected products and manufacturing processes by individual firms in response to market forces.

## The Federal Program

Before the U.S. Metric Board was created, the Department of Commerce's National Bureau of Standards (NBS) was involved with the metric system as part of its responsibility for the Nation's physical measurement system. During that time Federal agencies were generally following industry's lead in becoming involved in metrication efforts. Several agencies, however, such as the Departments of Defense and Agriculture, were faced with circumstances that forced them to develop metrication plans on their own. The Department of Defense shares the responsibility with this country's NATO allies for development, production, operation and maintenance of certain military equipment and weapons systems to be used in the NATO environment. The NATO allies all use the metric system. The Department of Agriculture deals with food production on an international basis. International agricultural transactions and data are often in metric, whereas U.S. farmers measure land in acres and livestock, crops, fertilizer and supplies in other non-metric terms.

As individual agencies responded to their special metric requirements, it soon became apparent that better coordination was needed of Federal agency metric activities to avoid inconsistent or inappropriate responses. The initial effort was made by the Interagency Committee on Standards Policy (ICSP), chartered by the Department of Commerce. ICSP created a Metrication Subcommittee in June 1975 to conduct Federal coordination activities.

In 1978, the Office of Management and Budget and the Department of

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# U.S. Metric Board Activities

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Commerce decided that a high-level policy committee was needed and should be established under the auspices of the newly created U.S. Metric Board. This committee became the Interagency Committee on Metric Policy and assumed responsibility for the coordination initiated by the ICSP.

## **The Interagency Committee on Metric Policy (ICMP)**

The ICMP was chartered by the Board to serve as the focal point of the Board's Federal metrication policy and program coordination activities. In October 1978, the ICMP adopted a charter and established the Metrication Operating Committee (MOC), an operational support group consisting of metric coordinators within the 37 Federal agencies that were members of the ICMP. As one of its initial tasks, the MOC worked to develop a consensus among Federal agencies on metrication policy and guidelines.

As a result of its efforts, the MOC developed the Metric Conversion Policy for Federal Agencies and the supporting Federal Agency Guidelines for Implementation of Metric Conversion Policy, which were approved by the ICMP and the Board and distributed to the Federal agencies. The policy stresses that:

- Federal agencies shall coordinate their metrication activities and assure that they are consistent with metric conversion trends in the Nation.
- Federal agencies shall adapt to metrication initiatives of the private sector.

- Federal agencies' unilateral metric conversion actions shall be taken in the public interest, with consideration of the impact on the private sector and State and local governments.

Several other MOC initiatives have resulted in more consistent metric practices throughout the Federal Government. The MOC developed Federal Standard 376, which sets forth the preferred metric units for use by the Federal Government. It also circulated guidelines for the Government's public information offices to use in converting customary to metric units in press releases, as well as guidelines for Federal employees who participate in private sector metric conversion planning committees.

The table on p.37 shows the metrication activities of the Federal agencies represented in the ICMP.

## **The State Program**

It was quickly realized that the States have a great stake in coordinating metric conversion activities. Individual States have taken the responsibility for weights and measures regulations, and virtually all educational systems are administered at the State and local level. The Act requires that the Board coordinate activities with the National Conference on Weights and Measures (NCWM), a voluntary association of

State and local weights and measures officials. The Act also established two State-oriented members on the U.S. Metric Board—one to represent State governments and the other to bring expertise to the Board about the NCWM and standards-making organizations. Despite the need, there was no structure at the State level upon which the Board could build. The Board then initiated its State activities by creating the National Council on State Metrication.

## **The National Council on State Metrication**

The fifty States were responsive in joining together to address metric planning and coordination. Commercial measurement laws, educational curricula and consumer protection were involved. The National Council on State Metrication (NCSM), with representatives appointed by each State's Governor, was created by the Board to meet the need for efficient, effective communication among the States on metric matters and to provide the link between the States, private industry and Federal agencies involved in actual conversion and conversion planning.

The NCSM had its organizational meeting in Nashville, Tennessee, in 1980. At the second meeting in Des Moines, Iowa, in 1981, the Council approved a charter setting up the NCSM as an official advisory committee to the Federal Government and further developed and refined the activities of the Council.

The table on p. 41 depicts the status of each State's metrication activities.

# U.S. Metric Board Activities

## State Metric Clearinghouse

In 1980, the Board, in cooperation with the 50 members of the NCSM, developed a comprehensive status report on the progress of metrication in each State. It was soon evident that keeping this valuable data current and accessible to the U.S. Metric Board and the NCSM would be increasingly difficult and costly. The State Metric Clearinghouse therefore was developed to provide a simple, effective and inexpensive means to collect new data and organize available information for efficient retrieval and distribution. A State newsletter prepared by the Board was initiated early in 1982 and is used to transmit general metric information to the State Council members for redistribution within their States.

## Metric Legal Information Kit

A metric legal information kit was developed and distributed by the Board's Office of General Counsel to provide a means of helping keep States current on metric legal problems. The kit contains a variety of metric legal information, including Federal and State statutes, opinions, uniform laws and research materials. It has been distributed to all State attorneys general and legislatures and is updated periodically.

## The Standards Program

The Metric Conversion Act directs the Board to encourage standards organizations to develop metric engineering standards as rapidly as possible. After initial consultation with private and governmental standards officials, the Board proceeded with a two-phased approach to the task.

First, the Board surveyed over 400 private sector standards-preparing organizations to obtain basic information about their metric policies and activities. The findings indicated that only one-fifth of the respondents have formal policies on metric, but more than half use either metric only or dual units in their technical publications and standards. About one-third also predict that users of their standards will be converted to the metric system within 10 years.

The second phase of the Standards Program was to determine how the development of metric standards was proceeding. The Board conducted structured interviews with nine major standards-writing organizations that account for over 80 percent of all voluntary consensus standards used in the United States. The Board found that:

- Standards are developed in response to market demand from standards users and are generally not developed in anticipation of need. There is apparently no pressing demand for metric standards that exceeds the capacity of standards producers to develop them.

- If greater demand for metric standards does develop, the standards organizations are confident that standards users will provide volunteer technical experts required to produce the additional metric standards.
- Standards-writing organizations generally acknowledge the need to encourage consideration of metric in new product designs and new areas of technology to avoid the cost and inconvenience of later conversion to the metric system.
- There is some concern that foreign origin metric standards are replacing U.S. non-metric standards, but most of those interviewed do not view this as a major problem.

Based on the findings, the Board concluded that the desire to convert to metric is not prevented or significantly delayed by the lack of metric standards. The Board has nevertheless been examining the feasibility of developing a practical, low cost system for reporting the availability of domestic metric standards that would be of use to the Department of Defense and to industrial sectors or individual firms that are developing future metric conversion strategies.

# Metrication Status Within Federal Agencies Represented on The Interagency Committee on Metric Policy

Agencies	Comments
<b>Agriculture</b>	Has formal metric policy with an intra-agency metric committee and a metric information committee; has representatives on four ANMC sector committees; many specifications undergoing revision being changed to metric; increasing usage of dual units in summary economic data sheets; initiated use of dual units in departmental press releases.
<b>Central Intelligence Agency</b>	Has formal metric policy; uses metric citations in reports where appropriate; is accommodating to procurement of metric items.
<b>Civil Aeronautics Board</b>	Continues to provide metric conversion tables in its statistical reports.
<b>Commerce</b>	Has formal metric policy and a committee of agency metric coordinators; has representation on three ANMC advisory groups; published thirteen new all-metric nautical charts; DOC-NBS personnel served as U.S. representatives to international committees defining the International System of Units (SI); published new (1981) edition of English translation of official SI brochure (NBS SP-330); published new metric wall chart; published "Metric Laws and Practices in International Trade — A Handbook for U.S. Exporters."
<b>Commission on Fine Arts</b>	Dual citations in architectural publications and drawings.
<b>Commodity Futures Trading Commission</b>	No activity reported.
<b>Consumer Product Safety Commission</b>	Continues using metric notations and equivalents in its rules.
<b>Defense</b>	Has formal metric policy and an intra-agency metric committee; has representation on 35 ANMC sector committees; approval of memorandum plus implementing instructions requiring availability of metric standards and specifications; approval of Revised Policy Directive on Metrication; held two metric seminars for DOD personnel (uniformed and civilian).
<b>Education</b>	Metric Education Program was a categorical discretionary grant and contracts program and has now been included under State block grant programs. Future grants and contracts, if provided, will be under the direct aegis of State and local educational agencies, with the Department of Education providing technical assistance in response to the agencies' requests.

# Metrication Status Within Federal Agencies Represented on The Interagency Committee on Metric Policy

Agencies	Comments
Energy	Has formal metric policy and a metric committee of coordinators from each agency; representation on two ANMC sector committees.
Environmental Protection Agency	Has a formal metric policy; uses metric citations in regulations, reports, guidelines and other agency documents.
Export-Import Bank of the United States	Metric designations used in internal memoranda by engineering staff; metric designations used in Ex-Im Bank press releases.
Federal Communications Commission	Has formal metric policy and an intra-agency metric committee; has representation on an ANMC sector committee and the Electronic Industries Association Metric Study Panel; conversion to metric units is accomplished in conjunction with changes in the FCC Rules.
Federal Maritime Commission	Has an unwritten policy of cooperation and assistance.
Federal Reserve Board	Has an unwritten policy of supporting the Metric Conversion Act; maintains observer liaison with the ICMP.
Federal Trade Commission	No activity reported.
General Services Administration	Has formal metric policy and an intra-agency metric committee; has representation on three ANMC sector committees.
Government Printing Office	Has formal metric policy and a metric committee of six agency coordinators; has representation on American Paper Institute Technical Committee; government paper specifications have been soft converted to show dual weights and measures.
Health and Human Services	Is developing formal metric policy; is preparing formal instructions to require metrication planning activities (such as dual labeling of prescriptions and across-the-counter drugs) and to implement the ICMP Federal Metric Policy and Guidelines.

# Metrication Status Within Federal Agencies Represented on The Interagency Committee on Metric Policy

Agencies	Comments
<b>Housing and Urban Development</b>	Has representation on an ANMC sector committee; uses dual notations in press releases; has a metric conversion factors table in building design and construction standards; accepts metric architectural plans and specifications.
<b>Interior</b>	Has formal metric policy and an intra-agency metric committee; has continuation of metrication activities started earlier (such as publication of maps using metric contours).
<b>Interstate Commerce Commission</b>	Has formal metric policy and representation on two ANMC sector committees.
<b>International Trade Commission</b>	Has a metric coordinator in each commodity division.
<b>Labor</b>	Has formal metric policy; inserted dual citations during revision of the fire-protection standards contained in subpart of OSHA's General Industry Standards (CFR 1910); has included dual citations for roofing standards in Subpart M of OSHA's construction standards (following the policy).
<b>Library of Congress</b>	Has formal metric policy; purchase orders are changed to metric as suppliers start using metric.
<b>National Aeronautics and Space Administration</b>	Has formal metric policy and an intra-agency committee of metric coordinators from 11 field installations; has representation on ANMC sector committee; established metrication policy in October 1980.
<b>Office of Consumer Affairs, Executive Office of the President</b>	Has representation on ANMC Consumer Advisory Group.
<b>Office of Science and Technology, Executive Office of the President</b>	No activity reported.



# Metrication Status Within Federal Agencies Represented on The Interagency Committee on Metric Policy

Agencies	Comments
<b>Office of Technology Assessment, U.S. Congress</b>	Made further use of metric units in published technical assessment reports.
<b>Postal Service</b>	Has formal metric policy and an intra-agency committee of coordinators from headquarters offices and each of its five regions.
<b>Small Business Administration</b>	Has established an intra-agency committee of metric coordinators and is developing a formal metric policy.
<b>Smithsonian Institution</b>	Has formal metric policy with an intra-institutional metric committee and special metric task forces; continues increasing use of dual citations in signage, labeling, and publications; has initiated an internal and public awareness campaign.
<b>State</b>	Is developing a formal metric policy.
<b>Tennessee Valley Authority</b>	Is developing a formal metric policy and has an intra-agency metric committee; reorganizing metric committee to reflect agency reorganization.
<b>Transportation</b>	Has formal metric policy and a metric committee of coordinators from each agency; has representation on two ANMC sector committees; provided new metric safety standards for tires and auto parts; phasing in international air navigation standards under the International Civil Aviation Organization (ICAO); finalized Metric Planning Guidelines Memorandum; revised Department Order on transition to the metric system.
<b>Treasury</b>	Has unwritten policy of cooperation and assistance; has an intra-agency committee of metric coordinators from twelve bureaus; amended the Customs Regulations to allow for designations in merchandise which may receive personal exemption from customs duties and internal revenue taxes.
<b>Veterans Administration</b>	Has formal metric policy and an intra-agency metric committee of coordinators from each agency; has representation on two ANMC sector committees.

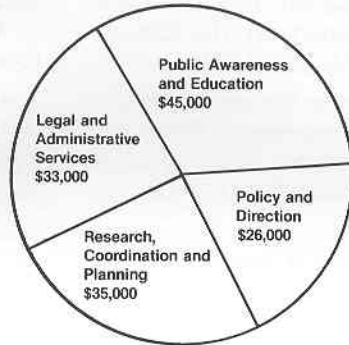
# State Metric Status:

State	State Metric Policy		State Government Metric Activity		State Mechanisms for Coordination			Conversion Activity within State Government			Conversion Activity with the Private Sector			Public Education				
	1	2	1	2	1	2	3	1	2	3	1	2	3	1	2	3	4	
Alabama		X		X	X			X				X		X	X	X	X	
Alaska					X			X										
Arizona		X		X	X			X		X				X	X	X	X	
Arkansas	X				X			X	X						X	X	X	
California	X			X	X	X		X	X	X	X	X	X	X	X	X	X	X
Colorado		X	X		X	X		X	X						X	X	X	
Connecticut	X		X		X	X		X		X				X		X	X	
Delaware		X		X	X			X				X		X	X	X	X	
Florida	X		X	X	X	X		X	X	X	X			X	X	X	X	
Georgia		X			X	X		X	X									
Hawaii	X		X	X	X	X		X			X			X	X	X	X	
Idaho					X			X										
Illinois					X			X										
Indiana		X			X			X										
Iowa	X				X			X							X	X	X	
Kansas		X			X			X	X	X		X		X	X	X	X	
Kentucky		X			X			X										
Louisiana	X		X		X			X				X		X	X	X	X	
Maine		X	X		X	X		X						X	X	X	X	
Maryland	X		X	X	X			X	X	X				X	X		X	
Massachusetts		X		X	X			X		X					X	X	X	
Michigan	X				X			X				X		X	X	X	X	
Minnesota	X			X	X			X						X	X	X	X	
Mississippi		X		X	X			X	X		X			X	X	X	X	
Missouri	X				X	X		X				X	X		X	X	X	

# State Metric Status:

State	State Metric Policy		State Government Metric Activity		State Mechanisms for Coordination			Conversion Activity within State Government			Conversion Activity with the Private Sector			Public Education			
	1. Has policy.	2. Has no policy.	1. Executive activity.	2. Legislative activity.	1. Departmental designee responsible.	2. Committees with State Government only representation.	3. Committees with Public, Private, and Government representation.	1. Gasoline pumps.	2. International trade.	3. Highways.	1. Surveys of private-sector metrification.	2. State aid and private-sector employee training.	3. Data sources for private sector.	1. State mandate for metric activity.	2. Grant monies.	3. Metric workshops/training.	4. Teaching of metric.
	1	2	1	2	1	2	3	1	2	3	1	2	3	1	2	3	4
Montana	X		X	X	X	X		X						X	X	X	X
Nebraska		X		X	X			X	X		X	X		X	X	X	X
Nevada	X		X	X	X		X	X								X	X
New Hampshire				X				X									
New Jersey					X			X								X	X
New Mexico		X	X	X	X			X						X		X	X
New York	X		X	X	X	X		X							X	X	X
North Carolina		X	X		X	X		X						X		X	X
North Dakota	X			X	X			X							X	X	X
Ohio		X		X	X			X		X				X	X	X	X
Oklahoma					X			X									
Oregon		X	X		X	X		X		X	X	X	X	X	X	X	X
Pennsylvania		X		X	X			X							X		
Rhode Island		X			X			X						X		X	X
South Carolina	X			X	X		X	X				X		X	X	X	
South Dakota		X		X	X			X		X					X	X	X
Tennessee		X	X		X		X	X							X	X	X
Texas	X			X	X		X	X		X		X		X	X	X	X
Utah					X			X									
Vermont	X				X		X	X		X				X	X	X	X
Virginia		X		X	X			X				X		X	X	X	X
Washington		X	X		X	X		X		X	X	X	X		X	X	X
West Virginia		X		X	X			X				X		X	X	X	X
Wisconsin					X			X									
Wyoming					X			X									

# U.S. Metric Board Expenditures



FY 1978-Partial Year—\$139,000  
Staff — 2



FY 1979—\$1,547,000  
Staff — 25



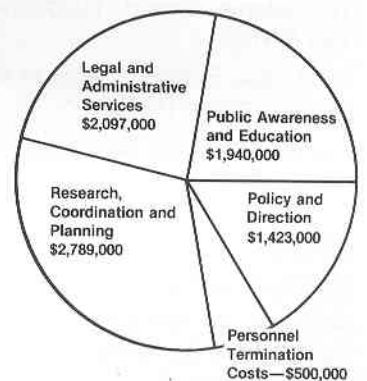
FY 1980—\$2,389,000  
Staff — 31



FY 1981—\$2,674,000  
Staff — 35



FY 1982—\$2,000,000 (Estimated)  
Staff — 35 prior to reduction-in-force



Total Expenditures—\$8,749,000

# A Selected List of U.S. Metric Board Publications

## Public Awareness and Education Publications

All About Metric (1981)  
All You Will Need To Know About Metric (revised 1980)  
America and the Metric System: A Capsule History (1978)  
Automotive Metrics Card (1981)  
Conversion Factors (revised 1980)  
Leader's Guide for Conducting a Metric Seminar (1981)  
Metric Conversion Card (revised 1981)  
Metric Speakers Directory (1980)  
Public Law 64-168 (revised 1981)  
Understanding Liter Measurement (1981)  
U.S. Metric Board — An Introduction (revised 1981)  
U.S. Metric Board Annual Report — 1979  
U.S. Metric Board Annual Report — 1980  
U.S. Metric Board Backgrounder (1978)  
U.S. Metric Board Biographical Data (1979)  
U.S. Metric Board Height/Weight Card (1979)  
U.S. Metric Board: Its Role in Voluntary Conversion (1979)  
U.S. Metric Board, Summary Report (July 1982)

## Research and Research-Related Publications

Antitrust: A Handbook for Metric Planning and Conversion (May 1980)  
A Study of Metric Conversion of Distilled Spirits Containers: A Policy and

Planning Evaluation. Task I — Comprehensive Report on The Conversion Process (August 1981)

A Study of Metric Conversion of Distilled Spirits Containers: A Policy and Planning Evaluation. Final Report on Findings and Lessons Learned (October 1981)

A Study of Metric Measurement and Legislation (September 1979)

Effects of Metrication on Safety in the Work Place for Selected Occupations (April 1982)

Effects of Metric Change on Workers' Tools and Training (July 1981)

Federal Procurement Metrication — Appropriateness and Methods (June 1982)

Five Years After the Metric Conversion Act: Where Do We Stand? Survey of Large U.S. Manufacturing and Mining Firms (The *Fortune* Magazine 1000) Executive Summary (December 1980)

Going Metric: Is It For You? — Planning Models for Small Business Manufacturers, Wholesale and Retail, and Service Firms (June 1982)

Metric Usage Study: A Look at Six Case Histories (1980)

Metric Use in the Machine Tool Industry (April 1982)

Providing A Metric Option. Can Laws and Regulations be Amended in a Timely Manner? (December 1979)

Research Overview and Analysis (April 1982)

Survey of Consumer Attitudes and Awareness of the Metric Conversion of Distilled Spirits Containers (A Special Report for a Study of Metric Conversion of Distilled Spirits Containers: A Policy and Planning Evaluation) (October 1981)

Survey of Small Businesses: Issues in Metric Planning and Conversion (December 1980)

The Consequences of Metric Production for Small Manufacturers (April 1982)

The Conversion of Retail Fuel Pump Computers to Sale by the Liter (June 1979)

The Impact of Laws on Metric Conversion. A Survey of Selected Large U.S. Corporations (April 1982)

The Search for Small Businesses with Investments in Metric Production (June 1981)

U.S. Metric Board 1979 Survey of Selected Large U.S. Firms and Industries (May 1980)

## Coordination Publications

Congressional Handbook About the U.S. Metric Board (1981)

Federal Metric Information Referral Directory (December 1981)

First National Council on State Metrication — Proceedings: September 23-25, 1980 (January 1981)

Second National Council on State Metrication — Proceedings: June 23-25, 1981 (December 1981)

State Metric Status (September 1980)  
Volume I — Introduction/Summary  
Volume II — Northeastern Region  
Volume III — Mid-Western Region  
Volume IV — Southern Region  
Volume V — Near-Western Region  
Volume VI — Far-Western Region  
Volume VII — Appendices/Index

Status of Metric Conversion: A Brief Survey of U.S. Standards-Writing Organizations (May 1982)

Status of Metric Conversion of Standards — The Views of Nine Selected Major Standards Development Bodies (May 1982)



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