

Report of the Laws and Regulations (L&R) Committee

Richard Lewis, Committee Chair
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200 INTRODUCTION

This is the report of the Laws and Regulations (L&R) Committee (hereinafter referred to as the “Committee”) for the 101st Annual Meeting of the National Conference on Weights and Measures (NCWM). This report is based on the Interim Report offered in the NCWM Publication 16, “Committee Reports,” testimony at public hearings, comments received from regional weights and measures associations and other parties, the addendum sheets issued at the Annual Meeting and actions taken by the membership at the voting session of the Annual Meeting. The voting items shown below were adopted as presented when this report was approved. This report contains those recommendations to amend National Institute of Standards and Technology (NIST Handbook 130, “Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality (2016),” and the NIST Handbook 133, “Checking the Net Contents of Packaged Goods (2016).”

Table A identifies the agenda and appendix items by reference key, title of item, page number, and the appendices by appendix designations. The acronyms for organizations and technical terms used throughout the agenda are identified in Table B. The first three digits of the Reference Key Numbers of the items are assigned from the Subject Series List. The status of each item contained in the report is designated as one of the following: **(D) Developing Item:** the Committee determined the item has merit; however, the item was returned to the submitter or other designated party for further development before any action can be taken at the national level; **(I) Informational Item:** the item is under consideration by the Committee but not proposed for Voting; **(V) Voting Item:** the Committee is making recommendations requiring a vote by the active members of NCWM; **(W) Withdrawn Item:** the item has been removed from consideration by the Committee.

Table C provides a summary of the results of the voting on the Committee’s items and the report in its entirety. Some Voting Items are considered individually; others may be grouped in a consent calendar. Consent calendar items are Voting Items that the Committee has assembled as a single Voting Item during their deliberation after the open hearings on the assumption that the items are without opposition and will not require discussion. The Voting Items that have been grouped into consent calendar items will be listed on the addendum sheets. Prior to adoption of the consent calendar, the Committee entertains any requests from the floor to remove specific items from the consent calendar to be discussed and voted upon individually.

Proposed revisions to the handbook(s) are shown as follows. 1) deleted language is indicated with a **bold face font using strikeouts** (e.g., ~~this report~~), and 2) proposed new language is indicated with an **underscore bold faced font** (e.g., new items). When used in this report the term “weight” means “mass”.

Note: The policy of NIST is to use metric units of measurement in all its publications; however, recommendations received by NCWM technical committees and regional weights and measures associations have been printed in this publication as submitted. Therefore, the report may contain references to U.S. customary units.

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Uniform Weighmaster Law	222 Series
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Table B
Glossary of Terms and Acronyms

Acronym	Term	Acronym	Term
AAP	Average Adjusted Purge	HB 44	NIST Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices"
AKI	Minimum Antiknock Index	IRS	Internal Revenue Service
ASTM	ASTM International	LNG	Liquefied Natural Gas
ATC	Automatic Temperature Compensation	MATG	Moisture Allowance Task Group
BTU	British Thermal Unit	MON	Motor Octane Number
CFR	Code of Federal Regulations	MAV	Maximum Allowable Variation
DGE	Diesel Gallon Equivalent	NIST	National Institute of Standards and Technology
DLE	Diesel Liter Equivalent	OWM	Office of Weights and Measures
DOE	Department of Energy	PALS	Packaging and Labeling Subcommittee
EPA	Environmental Protection Agency	PMAA	Petroleum Marketers Association of America
FALS	Fuels and Lubricants Subcommittee	RMFD	Retail Motor Fuel Dispenser
FDA	Food and Drug Administration	S&T	Specifications and Tolerances
FPLA	Fair Packaging and Labeling Act	SCF	Sample Correction Factor
FSIS	Food Safety and Inspection Service	SEL	Sample Error Limit
FTC	Federal Trade Commission	SIGMA	Society of Independent Gasoline Marketers of America
GGE	Gasoline Gallon Equivalent	SP	Special Publication
GLE	Gasoline Liter Equivalent	SWMA	Southern Weights and Measures
GM	General Motors	TG	Task Group
L&R	Laws and Regulations	UPLR	Uniform Packaging and Labeling Regulation
HB 133	NIST Handbook 133, "Checking the Net Contents of Packaged Goods"	USNWG	U.S. National Work Group
NACS	National Association of Convenience Stores	WG	Work Group
NATSO	National Association of Truck Stop Operators	WWMA	Western Weights and Measures Association

Table C
Voting Results

<i>Reference Key Number</i>	<i>House of State Representatives</i>		<i>House of Delegates</i>		<i>Results</i>
	<i>Yeas</i>	<i>Nays</i>	<i>Yeas</i>	<i>Nays</i>	
Consent Calendar					
231-1	37	0	48	0	Adopted
232-2					Adopted
232-4					Adopted
232-5					Adopted
260-2					Adopted
260-3					Adopted
260-5					Adopted
232-7					36
232-8*	30	7	30	11	Adopted
237-1	37	1	34	3	Adopted
237-2	39	0	48	0	Adopted
232-6	26	11	20	21	Returned to Committee
237-6	16	16	34	8	Returned to Committee
260-1 To hear amendment	Yea: 66 Nay: 1				Amendment was heard
260-1 To amend	No Vote				Committee moved to Informational Status
To Accept the Report	Voice Vote				Adopted

* Items 232-8 and 337-2 were voted upon as a block.

Details of All Items
(In order by Reference Key)

231 NIST HANDBOOK 130 – A. UNIFORM PACKAGING AND LABELING REGULATION

231-1 V 1. Background, Section 5. Declaration of Responsibility: Consumer and Non-Consumer Packages, 6.7.1. Symbols and Abbreviations, and Section 13. Retail Sale Price Representations

(This item was Adopted.)

Source:

NIST Office of Weights and Measures (2016)

Purpose:

Amend NIST Handbook 130, Uniform Packaging and Labeling Regulations to have the requirements conform to the language finalized by the Federal Trade Commission (FTC) in their revision to regulations promulgated under the Fair Packaging and Labeling Act (FPLA).

Item under Consideration:

1. Background

The Uniform Packaging and Labeling Regulation was first adopted during the 37th Annual Meeting of the National Conference on Weights and Measures (NCWM) in 1952. Reporting to the Conference, the Committee on Legislation stated:

The National Conference should adopt a model package regulation for the guidance of those states authorized to adopt such a regulation under provisions of their weights and measures laws. Since so much of the work of weights and measures officials in the package field concerns food products, the importance of uniformity between the Federal (FDA) regulations and any model regulations to be adopted by this Conference cannot be overemphasized.

Since its inception, the Uniform Packaging and Labeling Regulation has been continually revised to meet the complexities of an enormous expansion in the packaging industry – an expansion that, in late 1966, brought about the passage of the Fair Packaging and Labeling Act (FPLA). Recognizing the need for compatibility with the Federal Act, in 1968 the Committee on Laws and Regulations of the 53rd Annual Meeting of the National Conference amended the “Model Packaging and Labeling Regulation” (renamed in 1983) to parallel regulations adopted by federal agencies under FPLA. The process of amending and revising this Regulation is a continuing one in order to keep it current with practices in the packaging field and make it compatible with appropriate federal regulations. Amendments and additions since 1971 are noted at the end of each section.

The revision of 1978 provided for the use of the metric system (SI) on labels as well as allowing SI-only labels for those commodities not covered by federal laws or regulations. “SI” means the International System of Units as established in 1960 by the General Conference on Weights and Measures and interpreted or modified for the United States by the Secretary of Commerce. [See the “Interpretation of the International System of Units for the United States” in the “Federal Register” (Volume 73, No. 96, pages 28432 to 28433) for May 16, 2008, and 15 United States Code, Section 205a - 205l “Metric Conversion.” See also NIST Special Publication 330 “The International System of Units (SI)” 2008 edition and NIST Special Publication 811 “Guide for the Use of the International System of Units (SI)” 2008 edition that are available at www.nist.gov/pml/wmd/ or by contacting TheSI@nist.gov.] In 1988, Congress amended the Metric Conversion Law to declare that it is the policy of the United States to designate the International System of Units of measurement as the preferred system of weights and measures for U.S. trade and commerce. In 1992, Congress amended the federal FPLA to require the most

appropriate units of the SI and the U.S. customary systems of measurement on certain consumer commodities. The 1993 amendments to NIST Handbook 130 require SI and U.S. customary units on certain consumer commodities in accordance with federal laws or regulations. Requirements for labeling in both units of measure were effective February 14, 1994, under FPLA and as specified in Section 15. Effective Date; except as specified in Section 11.32. SI Units, Exemptions for Consumer Commodities.

In 2015, the Federal Trade Commission (FTC) conducted a periodic review of its regulations issued under the FPLA and recently published several revisions which go into effect on December 17, 2015. [See the “Rules, Regulations, Statements of General Policy or Interpretation and Exemptions Under the Fair Packaging and Labeling Act] Final Rule” in the “Federal Register” (Volume 80, No. 221, pages 71686 to 71689) dated Tuesday, November 17, 2015. In response to comments from the NCWM’s Packaging and Labeling Subcommittee, the FTC amended its regulations to clarify that exponents may be used in conjunction with U.S. customary units and recognized that with today’s online resources the location of a business can be readily obtained in lieu of using a printed telephone directory. The FTC amended its regulations on the Declaration of Responsibility to allow the street address to be omitted if it is accessible in a printed or online telephone directory, or any readily accessible, widely published and publicly available resource. In response to a concern that the existing regulation included a limited table of metric conversions, the FTC decided to incorporate the more comprehensive metric conversion tables to provide users with the wide range of factors in NIST Handbook 133 (2015) “Checking the Net Contents of Packaged Goods,” Appendix E, General Tables of Units of Measurements. The FTC also revoked regulations on certain retail price sale representations, since they are no longer used in the marketplace. The regulation was also amended to aid state and local compliance efforts by alerting users of the role of the states in regulating packages that fall outside the scope of the FTC’s purview under the FPLA.

(Added 2016)

Nothing contained in this regulation should be construed to supersede any labeling requirement specified in federal law or to require the use of SI units on non-consumer packages.

Section 5. Declaration of Responsibility: Consumer and Non-Consumer Packages

Any package kept, offered, or exposed for sale, or sold at any place other than on the premises where packed shall specify conspicuously on the label of the package the name and address of the manufacturer, packer, or distributor. The name shall be the actual corporate name, or, when not incorporated, the name under which the business is conducted. The address shall include street address, city, state (or country if outside the United States), and ZIP Code (or the mailing code, if any, used in countries other than the United States); however, the street address may be omitted ~~if this is shown in a current city directory or telephone directory~~ **if it is listed in any readily accessible, well-known, widely published, and publicly available resource, including but not limited to a printed directory, electronic database or Web site.**

(Amendment effective December 17, 2015)

If a person manufactures, packs, or distributes a commodity at a place other than his principal place of business, the label may state the principal place of business in lieu of the actual place where the commodity was manufactured or packed or is to be distributed, unless such statement would be misleading. Where the commodity is not manufactured by the person whose name appears on the label, the name shall be qualified by a phrase that reveals the connection such person has with such commodity, such as “Manufactured for and packed by _____,” “Distributed by _____,” or any other wording of similar import that expresses the facts.

(Amended 2016)

6.7.1. Symbols and Abbreviations. – Any of the following symbols and abbreviations, and none other, shall be employed in the quantity statement on a package of commodity:

avoirdupois	avdp	ounce	oz
piece	pc	count	ct
pint	pt	cubic	cu
pound	lb	each	ea
feet or foot	ft	quart	qt
fluid	fl	square	sq
gallon	gal	weight	wt
inch	in	yard	yd
liquid	liq	drained	dr
diameter	dia		

A period should not be used after the abbreviation. Abbreviations should be written in singular form; and “s” should not be added to express the plural. (For example, “oz” is the symbol for both “ounce” and “ounces.”) Both upper and lower case letters and exponents are acceptable.

(Amendment effective December 17, 2015)

(Added 1974) (Amended 1980, 1990, ~~and~~ 1993, and 2016)

Section 13. Retail Sale Price Representations

13.1. “Cents off” Representations.

~~(a) The term “cents off representation” means any printed matter consisting of the words “cents off” or words of similar import (bonus offer, 2 for 1 sale, 1¢ sale, etc.), placed upon any consumer package or placed upon any label affixed or adjacent to such package, stating or representing by implication that it is being offered for sale at a price lower than the ordinary and customary retail sale price.~~

~~(Amended 1982)~~

~~(b) Except as set forth in Section 13.2. Introductory Offers, the packager or labeler of a consumer commodity shall not have imprinted thereon a “cents off” representation unless:~~

~~(1) The commodity has been sold at an ordinary and customary price in the most recent and regular course of business where the “cents off” promotion is made.~~

~~(2) The commodity so labeled is sold at a reduction from the ordinary and customary price, which reduction is at least equal to the amount of the “cents off” representation imprinted on the commodity package or label.~~

~~(3) Each “cents off” representation imprinted on the package or label is limited to a phrase that reflects that the price marked by the retailer represents the savings in the amount of the “cents off” the retailer’s regular price; e.g., “Price Marked is _____ Cents Off the Regular Price,” “Price Marked is _____ off the Regular Price of this Package”, provided the package or label may in addition bear in the usual pricing spot a form reflecting a space for the regular price, the represented “cents off,” and a space for the price to be paid by the consumer.~~

~~(4) The commodity at retail presents the regular price, designated as the “regular price”, clearly and conspicuously on the package or label of the commodity or on a sign, placard, or shelf marker placed in a position contiguous to the retail display of the “cents off” marked commodity.~~

- ~~i. Not more than three “cents off” promotions of any single size commodity may be initiated in the same trade area within a 12-month period;~~
 - ~~ii. At least 30 days must lapse between “cents off” promotions of any particular size packaged or labeled commodity in a specific trade area; and~~
 - ~~iii. Any single size commodity so labeled may not be sold in a trade area for a duration in excess of six months within any 12-month period.~~
- ~~(5) Sales of any single size commodity so labeled in a trade area do not exceed in volume 50 % of the total volume of sales of such size commodity in the same trade area during any 12-month period. The 12-month period may be the calendar, fiscal, or market year provided the identical period is applied in this subparagraph and subparagraph (5) of this paragraph. Volume limits may be calculated on the basis of projections for the current year, but shall not exceed 50 % of the sales for the preceding year in the event actual sales are less than the projection for the current year.~~
- ~~(c) No “cents off” promotion shall be made available in any circumstances where it is known or there is reason to know that it will be used as an instrumentality for deception or for frustration of value comparison; for example, where the retailer charges a price that does not fully pass on to the consumers the represented price reduction or where the retailer fails to display the regular price in the display area of the “cents off” marked product.~~
- ~~(d) The sponsor of a “cents off” promotion shall prepare and maintain invoices or other records showing compliance with this section. The invoices or other records required by this section shall be open to inspection and shall be retained for a period of one year subsequent to the end of the year (calendar, fiscal, or market) in which the “cents off” promotion occurs.~~

~~(Added 1972)~~

~~13.2. Introductory Offers~~

- ~~(a) The term “introductory offer” means any printed matter consisting of the words “introductory offer” or words of similar import, placed upon a package containing any new commodity or upon any label affixed or adjacent to such new commodity, stating or representing by implication that such new commodity is offered for retail sale at a price lower than the anticipated ordinary and customary retail sale price.~~
- ~~(b) The packager or labeler of a consumer commodity may not have imprinted thereon an introductory offer unless:~~
 - ~~(1) The product contained in the package is new, has been changed in a functionally significant and substantial respect, or is being introduced into a trade area for the first time.~~
 - ~~(2) Each offer on a package or label is clearly and conspicuously qualified.~~
 - ~~(3) No commodity so labeled is sold in a trade area for duration in excess of six months.~~
 - ~~(4) At the time of making the introductory offer promotion, the offerer intends in good faith to offer the commodity, alone, at the anticipated ordinary and customary price for a reasonably substantial period of time following the duration of the introductory offer promotion.~~
- ~~(c) The packager or labeler of a consumer commodity shall not have imprinted thereon an introductory offer in the form of a “cents off” representation unless, in addition to the requirements in paragraph (b) of this section:~~

- ~~(1) The package or label clearly and conspicuously and in immediate conjunction with the phrase “Introductory Offer” bears the phrase “_____ cents off the after introductory offer price.”~~
- ~~(2) The commodity so labeled is sold at a reduction from the anticipated ordinary customary price, which reduction is at least equal to the amount of the reduction from the after introductory offer price representation on the commodity package or label.~~
- ~~(d) No introductory offer with a “cents off” representation shall be made available in any circumstance where it is known or there is reason to know that it will be used as an instrumentality for deception or for frustration of value comparison; e.g., where the retailer charges a price that does not fully pass on to consumers the represented price reduction.~~
- ~~(e) The sponsor of an introductory offer shall prepare and maintain invoices or other records showing compliance with this section. The invoices or other records required by this section shall be open to inspection and shall be retained for a period of one year subsequent to the period of the introductory offer.~~
~~(Added 1972)~~

13.3. — Economy Size.

- ~~(a) The term “economy size” means any printed matter consisting of the words “economy size,” “economy pack,” “budget pack,” “bargain size,” “value size,” or words of similar import placed upon any package containing any consumer commodity or placed upon any label affixed or adjacent to such commodity, stating or representing directly or by implication that a retail sale price advantage is accorded the purchaser thereof by reason of the size of that package or the quantity of its contents.~~
- ~~(b) The packager or labeler of a consumer commodity may not have imprinted thereon an “economy” size representation unless:
 - ~~(1) At the same time the same brand of the commodity is offered in at least one other packaged size or labeled form.~~
 - ~~(2) Only one packaged or labeled form of that brand of commodity labeled with an “economy size” representation is offered.~~
 - ~~(3) The commodity labeled with an “economy size” representation is sold at a price per unit of weight, volume, measure, or count that is substantially reduced (i.e., at least 5 %) from the actual price of all other packaged or labeled units of the same brand of that commodity offered simultaneously.~~~~
- ~~(c) No “economy size” package shall be made available in any circumstances where it is known that it will be used as an instrumentality for deception; e.g., where the retailer charges a price that does not pass on to the consumer the substantial reduction in cost per unit initially granted.~~
- ~~(d) The sponsor of an “economy size” package shall prepare and maintain invoices or other records showing compliance with paragraph (b) of this section. The invoices or other records required by this section shall be open to inspection and shall be retained for one year.~~
~~(Added 1972)~~

Editor’s Note: Section 14. “Effective Date” was renumbered to Section 13.

Background/Discussion:

The Federal Trade Commission (FTC) finalized revisions to regulations promulgated under the Federal Fair Packaging and Labeling Act (FPLA). This proposal is to amend NIST Handbook 130, Uniform Packaging and Labeling Regulations to have the requirements conform to the language finalized by FTC in their revision to regulations promulgated under the FPLA. These amendments will align the requirements of the UPLR with FTC regulations that are effective December 17, 2015, (www.gpo.gov/fdsys/pkg/FR-2015-11-17/pdf/2015-28918.pdf). This proposal modifies the following Sections in NIST Handbook 130, Uniform Packaging and Labeling Regulations; Background, Section 5. Declaration of Responsibility: Consumer and Non-Consumer Packages, 6.7.1. Symbols and Abbreviations, and removing Section 13. Retail Sale Price Representations in its entirety.

This item was accepted as a Priority Item by the Committee for inclusion into the L&R Committee’s agenda at the 2016 NCWM Interim Meeting. The Committee recommends this as a Voting item.

232 NIST HANDBOOK 130 – UNIFORM REGULATION FOR THE METHOD OF SALE OF COMMODITIES

232-1 D Section 1. Food Products and Section 2. Non-Food Products

Source:

Los Angeles County, California (2016)

Purpose:

Clarify and formalize the long-standing, fundamental, core tenet of legal metrology and weights and measures regulation that the sale of any commodity, in any form or by any method, be according to legally-recognized, traceable units of measure.

Item under Consideration:

Amend NIST Handbook 130, Uniform Regulation for the Method of Sale of Commodities as follows:

Section 1. Food Products

- (a) Any food product, whether sold from bulk or in packaged form, shall be sold only in a unit of measure or weight that meets all of the following criteria:**
 - (1) is recognized and defined by NIST as legal for use in commerce;**
 - (2) has been published in the “Federal Register”; and**
 - (3) has metrological traceability ^(NOTE #, page #) to a national standard.**

Note: Sale of a product or commodity according to count, where appropriate to be fully informative to facilitate value comparison, is permissible as a method of sale.

- (b) Only the following commodities may be exempted from the method of sale limitations set forth in Section 1.(a) and permitted to be sold according to “head” or “bunch,” as appropriate:**
 - (1) asparagus;**
 - (2) Brussels sprouts (on stalk);**
 - (3) rhubarb;**
 - (4) edible bulbs (onions [spring or green], garlic, leeks, etc.);**

(5) flower vegetables (broccoli, cauliflower, Brussel sprouts, etc.);

(6) leaf vegetables (lettuce, cabbage, celery, parsley, herbs, loose greens, etc.); and

(7) root vegetables (turnips, carrots, radishes, etc.).

(Added 20XX)

And

Section 2. Non-food Products [NOTE 1, page 109]

(a) Any non-food product, whether sold from bulk or in packaged form, shall be sold only in a unit of measure or weight that meets all of the following criteria:

(1) is recognized and defined by NIST as legal for use in commerce;

(2) has been published in the “Federal Register”; and

(3) has metrological traceability (NOTE #, page #) to a national standard.

Note: Sale of a product or commodity according to count, where appropriate to be fully informative to facilitate value comparison, is permissible as a method of sale.

(b) The only exemption from the method of sale limitations set forth in Section 2(a) shall be retail sales of compressed natural gas (CNG) sold as a vehicle fuel, which are permitted to be sold in terms of gasoline liter equivalent (GLE) or gasoline gallon equivalent (GGE) as defined in Section 2.27.1. Definitions.

Note: As defined in NIST Handbook 130, Uniform Weights and Measures Law, Metrological traceability means the property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty.

(Added 20XX)

Background/Discussion:

Much discussion and debate has been undertaken within the NCWM over the past two years regarding proposals for methods of sale of commodities (specifically, liquefied natural gas [LNG] and compressed natural gas [CNG] as vehicle fuels) based upon “equivalencies” to other methods of sale for different commodities (in these recent cases, based upon calculated average energy content comparisons to gasoline or diesel fuel). With the exception of a singular commodity, CNG, for which gasoline-liter-equivalent (GLE) and gasoline-gallon-equivalent (GGE) methods of sale were permitted some 20 years ago, the methods of sale for all other commodities have historically and consistently been established based upon legally-recognized units of weight or measure that are traceable to national standards maintained by NIST, the sole exceptions (found in interpretations and guidelines) being specific fresh vegetable commodities permitted to be sold by “head” or “bunch.” Discussions surrounding considerations of “equivalency” units have raised the potential for untold similar proposals to establish methods of sale for countless competing products in the marketplace claiming comparisons of performance, quality, energy or nutritional content, or other factors that can be subjective, widely varying due to inconsistent chemical or biological makeup, or a host of other influences that are, or may be, based on little to no scientific or metrologically sound and traceable determinations or calculations.

While a core tenet of weights and measures regulation and legal metrology – whether regarding design and function of weighing and measuring devices or sales of commodities – has always been widely recognized to require employment of units of measure that are recognized and published as legal for use and having metrological traceability, clear language in model laws and regulations developed by NCWM and published in NIST Handbooks is absent, likely never heretofore being deemed necessary due to the well-established, long-held tenet. This proposal serves to codify, memorialize, and specifically clarify that tenet as a formal adoption in the Uniform Regulation for

the Method of Sale of Commodities to ensure against potentially misleading, confusing, or unclear business practices in commerce, whether in sales from bulk or in labeling of packaged commodities, that may be based upon observations, calculations, assumptions, or other considerations that may be subjective and not metrologically traceable.

At the 2016 NCWM Interim Meeting, Mr. Kurt Floren (Los Angeles County, California) remarked that this proposal would codify a long-standing practice. This is not intended to interfere with the current debate on liquefied natural gas (LNG). Mr. Floren encouraged the item on LNG to have a vote prior to considering this item. If the LNG proposal is adopted, this item could be amended from the floor of the Conference. A former regulator remarked that Uniform Weights and Measures Law, Section (n) allows the term or unit of weight or measure be used if it is determined that it is an existing or firmly established practice. He further commented that this proposal conflicts with Weights and Measures Law Section 12(n) that states this is a state function, not NIST controlled. The term “traceability” is in NIST Handbook 130, Uniform Weights and Measures Law. NIST remarked that when changes are made to NIST SP 811, “The NIST Guide for use of International System of Units” or NIST SP 330, “The International System of Units (SI)” it is required that a “Federal Register” notice be announced. The Committee is unclear as to what issue this proposal resolves. The Committee would also like to know what impact this would have for all items covered under the current Method of Sale of Commodities Regulation. The Committee agreed to move this forward as a Developing item.

At the 2016 NCWM Annual Meeting, the submitter had no updates for the Committee, but stated this is a commonsense practice in determining the method of sale of commodities.

Regional Association Comments:

At the 2015 WWMA Annual Meeting, Mr. Kurt Floren, (Los Angeles County, California) advised that the proposal is intended to place into the model regulations a legally recognized, traceable unit of measure and such specific language does not appear in current NIST handbooks even though it has been a longstanding requirement. An industry representative said to use caution in moving forward with this item, as there may be some unintended consequences; specifically, related to non-food items, such as a toaster. Mr. Floren responded, pointing out that sales by count, where appropriate, are specifically permitted in the proposal. Three regulators supported the concept and idea. One regulator expressed concern because of the ongoing LNG debate. A regulator stated any product can petition for exemption. During the voting session, an industry member commented that in the report, the last paragraph under the “Background/Discussion” was confusing and suggested it should be deleted or revised. WWMA forwarded this item to NCWM, recommending that it be a Voting item.

At the 2015 CWMA Interim Meeting, an industry representative remarked that the WWMA modified the original version, omitting the last paragraph. He suggested the CWMA consider the same version as the WWMA. He also commented he had concerns of unintended consequences for products that do not currently have a net content requirement. A state regulator expressed a similar sentiment, and felt the proposal needs to be further developed and clarified, as to what is included and what is not included. Other state regulators agreed, there needed to be clear and distinct parameters, and one state commented that measure by count is already established. The Committee considered the timely nature of this issue and determined there were no major concerns, which would preclude it from being ready for voting status by July 2016. The CWMA forwarded the item to NCWM, recommending it be a Voting item.

At the 2015 NEWMA Interim Meeting, a state regulator questioned the meaning of the term “bunch.” A consultant and former regulator indicated this item serves no purpose and should be sent back to the originator for further development. He also indicated that the term “bunch” has been used for a long time, and if the consumer is comfortable with purchasing in this unit, it should be permitted. Another regulator was not sure what this agenda item clarifies and would like to have additional information. Another state regulator indicated he agreed with other state regulators that he saw no real purpose for this item. Since there is no clear direction for this item, the region felt the item needs further clarification and development by both the regulatory community, as well as industry. NEWMA forwarded the item to NCWM, recommending that it be a Developing item.

At the 2015 SWMA Annual Meeting, it was recommended that all sections within the proposed CNG/LNG items be reviewed to determine if additional exemptions are required to avoid language conflicts with this proposed language. SWMA forwarded the item to NCWM and recommended it be an Informational item.

At the 2016 NEWMA Annual Meeting, a retired weights and measures Director expressed several concerns with this proposal. He remarked that over 80 % of items in commerce do not have a method of sale because buyers and sellers have agreed upon the terms of sale. The only time commodities are included in the regulations are due to a dispute between the buyer and seller. NEWMA believes that this proposal could have a negative impact on commerce and recommends that it be Withdrawn.

232-2 V Section 1.5. Meat, Poultry, Fish, and Seafood.

(This item was Adopted.)

Source:

Massachusetts Division of Standards (2015)

Purpose:

To allow the retail sale of meat, poultry and fish by count with adequate consumer information.

Item under Consideration:

Amend NIST Handbook 130, Uniform Regulation for the Method of Sale of Commodities as follows:

1.5. Meat, Poultry, Fish, and Seafood. ^[NOTE 3, page 110] – Shall be sold by weight, except that whole shellfish in the shell may be sold by weight, measure, and/or count. Shellfish are aquatic animals having a shell, such as mollusks (for example, scallops) or crustaceans (for example, lobster or shrimp).

~~(Amended 1988)~~

- (a) When meat, poultry, fish, or seafood is kept, offered or exposed for sale from bulk (e.g., direct service counters), by the portion or piece according to a pre-determined fixed weight, the product identity and net weight shall be displayed, as well as the unit price at which it is offered for sale. This information shall appear on a label or sign immediately adjacent to the meat, poultry, fish or seafood and must be presented in an easy-to-read type style and color. The font size of the net weight and unit price declaration shall be equal to or greater than the font size used for the product identity.
- (b) The unit price required under Sections 1.5.(a) shall be in terms of the unit price-per-kilogram or unit price-per-pound, and not in common or decimal fractions of the permitted units. A supplemental declaration of a price per unit (i.e., price per ounce) is permitted.
- (c) Similar or competing commodities kept, offered, or exposed for sale from bulk in any single display or facility shall have unit prices posted or advertised in the same terms uniformly and consistently expressed (i.e., all in either prices-per-kilogram or prices-per pound, not in differing units) to readily facilitate value comparison.

(Amended 1988 and 2016)

NOTE 3: See Section 1.12. Ready-to-Eat Food for additional requirement.

1.5.1. In Combination with Other Foods. – When meat, poultry, fish, or seafood is combined with some other food element to form a distinctive food product, the quantity representation may be in terms of the total weight of the product or combination, and a quantity representation need not be made for each element provided a statement listing the ingredients in order of their predominance by weight must also appear on the label.

Note: See Interpretations and Guidelines Section 2.2.13. Declaration of Identity: Consumer Package and Labeling Regulation (UPLR).

(Amended 1989)

1.5.2. Clams, Mussels, Oysters, and Other Mollusks.

1.5.2.1. Whole Clams, Oysters, Mussels, or Other Mollusks in the Shell (fresh or frozen). – Shall be sold by weight (including the weight of the shell, but not including the liquid or ice packed with them), dry measure (e.g., bushel), and/or count. In addition, size designations may be provided.

1.5.2.2. Whole Clams, Oysters, Mussels, or Other Mollusks on the Half Shell (fresh, cooked, smoked, or frozen, with or without sauces or spices added). – Shall be sold by weight (excluding the weight of the shell) or by count. Size designations may also be provided.

(Added 1989)

1.5.2.3. Fresh Oysters Removed from the Shell. – Shall be sold by weight, drained weight, or by fluid volume. For oysters sold by weight or by volume, a maximum of 15 % free liquid by weight is permitted.

(Amended 1991)

1.5.2.4. Processed Clams, Mussels, Oysters, or Other Mollusks on the Half Shell (fresh or frozen). – Shall be sold by net weight excluding the weight of the shell. The term “processed” means removing the meat from the shell and chopping it or cutting it or commingling it with other solid foods.

(Amended 1989)

1.9. Advertising and Price Computing of Bulk Food Commodities

1.9.1. Total Price Computing. – The price of food commodities sold from bulk by weight shall be computed in terms of whole units of weight (i.e., price per grams, kilograms, pounds, grams, ounces, etc.) and not in common or decimal fractions.

(Amended 1989 and 2016)

1.9.2. Unit Price Advertising. – The unit price of food commodities sold from bulk shall be advertised or displayed in terms of the price per whole units of weight in of kilograms or pounds only, not in common or decimal fractions of a kilogram or pound or in ounces. A supplemental declaration of a price per unit (i.e., price per ounce) is permitted in font size print no larger than the whole unit price. This supplemental declaration may be expressed in common or decimal fractions or in ounces.

(Added 1976) (Amended 1985, 1987, ~~and~~ 1991, and 2016)

1.9.3. Individual Piece Advertising. – The unit price and net weight of any food commodity offered or exposed for sale from bulk by the portion or piece, according to a pre-determined fixed weight, shall be advertised or displayed to include a declaration of the individual item price, a unit price in terms of kilogram or pound and net weight in terms of kilograms or pounds or decimal fractions, thereof. The font size of the net weight and unit price declaration shall be equal to or greater than the font size used for the product identity.

NOTE: For specific requirements on Meat, Poultry, Fish and Seafood refer to Section 1.5. Meat, Poultry, Fish, and Seafood.

(Added 2016)

Background/Discussion:

Several jurisdictions have reported that meat and meat products are routinely being sold by count both with and without a net weight declaration or unit price, many times alongside meat products that are being sold by weight. This approach does not give the consumer enough information to make value comparisons and may be misleading; however, it is believed this amendment will remedy this. Retailers will benefit from this amendment by having more options for the method of sale of these products; consumers will benefit from this amendment because they will be able to make informed value comparisons; and weights and measures officials will be able to ensure accuracy of net weight declarations and unit price calculations.

At the 2015 NCWM Interim Meeting, a regulator remarked that the regulations are clearly defined in the handbook and any changes would cause confusion. Several states opposed this item as written. The NIST Technical Advisor remarked that this item was posted on the NIST State Director List Server and several states expressed concern on labeling issues in the marketplace. The State of Florida commented that they had an issue in their marketplace but worked directly with the grocers to clarify. The NIST Technical Advisor presented the following to the Committee for review:

1.5. Meat, Poultry, Fish, and Seafood. ^[NOTE 3, page 110] – Shall be sold by weight, except that whole shellfish in the shell may be sold by weight, measure, and/or count. Shellfish are aquatic animals having a shell, such as mollusks (for example, scallops) or crustaceans (for example, lobster or shrimp). **The net weight declaration for meat, poultry, fish and seafood shall be by the kilogram, gram or pound and not by portion or piece except as permitted below:**

- (a) **If meat, poultry, fish, and seafood is kept, offered or exposed for sale or sold at the retail store level in standard weight packages (refer to the Uniform Packaging and Labeling Regulation (UPLR), Section 6.16., Random Packages) the net weight, total price and unit price must appear on the principal display panel of each package and must conform to all of the applicable requirements of the UPLR. This section does not apply to packages of meat or poultry that bear a USDA Inspection Seal and plant identity and a label that conform to the net weight labeling requirements of the USDA Food Safety and Inspection Service (FSIS).**
- (b) **If meat, poultry, fish, and seafood is kept, offered or exposed for sale from bulk (e.g. direct service counters) by the portion or piece the product identity and net weight shall be displayed along with the unit price at which it is offered for sale. This information shall appear on a label or sign adjacent to the meat, poultry, fish or seafood and must be presented in an easy-to-read type style and color and must appear on a single-color contrasting background.**
- (c) **The unit prices required under Sections 1.5.(a) and 1.5.(b) shall be in terms of the unit price-per-kilogram; or unit price-per-100 grams; or unit price-per-pound, and not in any other unit or denomination or in common or decimal fractions of the permitted units.**

(Amended 1998 and 20XX)

The traditional method of sale for meat and poultry at retail has been to sell by the pound in decimal units (i.e., 1.5 lb). NIST Handbook 44, Section S.1.8.4., Customer Indications in the Scale Code requires the display of the whole units of weight but permits unit pricing for metric units to appear as price per kilogram or price per 100 g. Any proposal in the method of sale should be consistent with the scale code or retailers will not have the equipment they need to do the job.

NIST, OWM understands that retailers are attempting to shift from the traditional method of sale of decimal pounds over to the sale of meat by the piece, but still by weight (but in ounces). This is currently acceptable; however, as this practice is emerging in many states, it appears to hinder or frustrate the consumer's ability to make value comparisons between packaged meat and sales from bulk.

At least one state has obtained a court ruling that prohibits the sale of the same product by different methods of sale within the same retail location, specifically because it hinders value comparison.

In the example given below, the consumer must divide the price by ounces to obtain a price per ounce and multiply that value by 16 to obtain a price per pound, to compare the unit price offered in the bulk sales counter to the unit price of the same identical type of meat offered for sale in a random weight prepackage by the decimal pound.

Example, for a 5-ounce piece of meat: $\$5.99 \div 5 = \1.198 per ounce $\times 16 = \$19.16$ per pound

It appears that to maintain the traditional method of sale and pricing (i.e., offered for sale by decimal pounds and unit pricing by the pound) the Method of Sale Regulation (and, because not all states adopt the method of sale regulation, perhaps the UPLR) should be revised to only permit sales by the decimal pound or kilogram, and unit prices be revised

to only appear in terms of price per pound or kilogram (or price per 100 grams [per NIST Handbook 44]). For sales of food from bulk, unit price advertising by the ounce should be prohibited in Section 1.9.2. Unit Price Advertising and Section 1.9.1. Total Price Computing.

Another suggestion provided by NIST, OWM is to change the title of Section 1.9., Advertising and Price Computing of Bulk Food Commodities to read:

1.9. Advertising and Price Computing of Bulk Food and Prepackaged Food Commodities.

1.9.1. Total Price Computing. – The total price of food commodities sold from bulk and in packages shall be by weight and the total price shall be computed in terms of whole units of weight (i.e., price per 100 grams, or price per kilogram, or price per pound, ounces, etc.) and not in common or decimal fractions.

1.9.2. Unit Price Advertising. – The unit price of food commodities sold from bulk and in packages shall be advertised or displayed in terms of whole units of weight of kilograms, (or price per 100 grams) or pounds only, not in common or decimal fractions. ~~or in ounces~~. A supplemental declaration is permitted in print no larger than the whole unit price. This supplemental declaration may be expressed in common or decimal fractions. ~~or in ounces~~.

1.9.3. Individual Piece Advertising. – The unit price and net weight of food commodities offered or exposed for sale by the each from bulk shall include a declaration of the individual item price, a unit price in terms of decimal kilograms or pounds or price per 100 grams and net weight in terms of decimal kilograms or pounds. The net weight and unit price declaration shall be presented adjacent to the item price in type size no less than one-half the height of the item price and shall be displayed as clear and conspicuous as the item price.

Example:
Tuna Steaks
\$5.99 Each

NET WT 0.31 LB
\$19.16 PER LB

Various pricing schemes found in the marketplace by the states:



Figure 1. Being Sold by Each.



Figure 2. Label Identifier. The Identifier on the label states “5 oz bnl's pork chops.” The random pack label has a net weight that differs from package to package.

At the NCWM 2015 Interim Meeting, the Committee heard comments to Withdraw this item. The Committee would like to receive additional feedback from all the Regions. For these reasons, the Committee is recommending this remain an Informational item.

At the NCWM 2015 Annual Meeting, the NIST Technical Advisor remarked that states have different interpretations for Section 1.5. Meat Poultry, Fish and Seafood. Some states believe this is a non-issue and does not need to be addressed through the Conference. Some states were able to work directly with retailers in resolving any issues. A primary concern is the need for uniformity in the marketplace. There are two separate issues; one being the method of sale on prepackaged products; and the second being the method of sale when sold by bulk. NIST Handbook 130 does not provide guidance for some of the marketing practices that are being seen in today’s marketplace. NIST also has been in contact with a state that is having issues with markdowns labels. If the NCWM approves the Committee’s request that a task group (TG) be formed, NIST would facilitate the TG that will consist of regulatory officials and retailers working together to review this item and provide a recommendation at the 2016 Interim Meeting.

At the 2016 NCWM Interim Meeting, the Committee was provided with language from the Meat, Poultry, Fish and Seafood TG (MPFS TG). Mr. Hal Prince (Florida) remarked that the language submitted by the TG applies to bulk packages but falls short of addressing packaged items. Mr. Prince would like to see the TG continue to work on the task assigned by the Committee. The Committee agreed to move forward the TG language for consideration as a Voting item.

At the 2016 NCWM Annual Meeting, Mr. Alan Walker (Florida) remarked that the language is not clear whether the advertising is for the placard or the label. The Committee reviewed the language and modified Section 1.9.3. Individual Piece Advertising to add “be advertised or displayed to include”. The Committee made minor revisions to the language under consideration to address Mr. Walker’s comment.

Regional Association Comments:

At the 2015 WWMA Annual Meeting, a NIST Technical Advisor remarked that a MPFS TG was formed and will be chaired by NIST. This TG is comprised of regulatory officials, industry, and trade associations. The goal of the TG is to have a recommendation to the NCWM L&R Committee by the 2016 NCWM Interim Meeting. Several regulators support the work of the TG. A regulator expressed concern with the whole concept, due to potential effects on both products packed and sold on the same premise and wholesale-distribution products and recommended the item be Informational. WWMA recommends that it be an Informational item.

At the 2015 CWMA Interim Meeting, an industry representative remarked that a task group has been formed to address this issue, and representatives from each region will meet to discuss prior to the 2016 NCWM Interim Meeting. CWMA is recommending this be an Informational item.

At the 2015 NEWMA Interim Meeting, a state regulator remarked that with the language “if sold by count,” there may be unintended consequences for some of the items included under the new language. Another regulator wanted clarification as to whether the concerns expressed during the 2015 NCWM Annual Meeting were addressed by the MPFS TG. The original submitter of the proposal, Mr. Charles Carroll (Massachusetts), commented that the proposal was originally intended to provide a price-per-pound comparison between a single price-per-piece item with the same item being offered per pound. A retired regulator asked why frozen products such as salmon are priced per piece. He is wondering why fresh cut items should be treated differently than frozen items. He said this issue has come up many times, and the focus in the past has been only for every item to have a weight declaration. Mr. Carroll clarified that in his state, every item must include a price per pound, regardless if it is pre-packaged, frozen or fresh. A state regulator commented he had a concern with the shellfish portion of the proposal, and wants ensure shellfish are excluded. The item is not yet fully developed, and there are still many unanswered questions from the region. NEWMA looks forward to seeing the results of the MPFS TG and recommends that it be an Informational item.

At the 2015 SWMA Annual Meeting, members indicated they would like to see this developed by the MPFS TG. The SWMA recommends this be an Informational item.

At the 2016 NEWMA and CWMA Annual Meeting, both regions believe this item is fully developed and supports it as a Voting item.

Additional letters, presentations, and data may have been part of the Committee’s consideration. To review the supporting documentation, please refer to the “Report of the 100th National Conference on Weights and Measures” (SP 1210, 2015)

232-3 I Section 1.12. Ready-to-Eat Food.

Source:
MPFS TG (2016)

Purpose:
Provide clarification in the definition and method of sale for these products.

Item under Consideration:
Amend the NIST Handbook 130, Method of Sale Regulation as follows:

1.12. Ready-to-Eat Food.

1.12.1. Definition - Ready-to-Eat Food. –Restaurant ~~style type~~ food offered or exposed for sale, whether in restaurants, supermarkets, or similar food service establishments, that is ready for immediate human consumption, though not necessarily on the premises where sold, and which does not require any cooking or heating preparation by the customer. Ready-to-Eat Food does not include sliced luncheon products, such as meat, poultry, or cheese when sold separately.

Some examples of Ready-to-Eat food items (The list is not intended to be all inclusive.):

- servings of pastas, potato, or coleslaw;
- servings of salads, vegetables, or grains such as rice;
- pizzas, whole or sliced;
- meat/vegetable pockets/pies;

- tacos, fajitas, enchiladas, tostadas;
- cooked, whole chickens or turkeys
- buckets, tubs, or individual pieces of cooked chicken or fish;
- cooked ribs by the slab or piece;
- stuffed clams, oysters, shrimp, and fish;
- cooked shrimp or crab cakes;
- slices of cake, pie, and quiche;
- donuts, bagels, and rolls for individual sale;
- cookies and brownies for individual sale;
- sandwiches, egg, and spring roll;
- servings of prepared chili or soup;
- stuffed peppers, tomatoes, and cabbage;
- knishes; and
- pickles.

NOTE: The sale of an individual piece of fresh fruit (like an apple, banana, or orange) is allowed by count.
(Added 2004) (Amended 20XX)

1.12.2. Methods of Sale. – Ready-to-Eat Food sold from retail cases displaying product in bulk or in single servings packed or prepared on the premises may be sold by weight, measure, or count (i.e., by piece, portion, or serving) (count includes servings). If pre-packaged, the product shall have the appropriate statement of quantity set forth in the current edition of NIST Handbook 130, Uniform Packaging and Labeling Regulation [UPLR].

(Amended 1993 and 20XX)

Background/Discussion:

The current definition and method of sale is broad and subject to individual (both inspector and establishment) interpretation as to what is considered ready-to-eat. The state of Michigan submitted a proposal at their 2015 CWMA Interim Meeting.

1.12. Ready-to-Eat Food.

1.12.1. Definition - Ready-to-Eat Food. – Restaurant style food offered or exposed for sale, whether in restaurants, supermarkets, or similar food service establishments, that is ready for consumption, **and will not require additional cooking preparation by the customer. Consumption may not necessarily be on the premises where sold. though not necessarily on the premises where sold.** Ready-to-Eat Food does not include **bulk deli food or** sliced luncheon products, such as meat, poultry, or cheese when sold separately.

NOTE: The sale of an individual piece of fresh fruit (like an apple, banana, or orange) is allowed by count.
(Added 2004) (Amended 20XX)

1.12.2. Methods of Sale. – Ready-to-Eat Food ~~sold from bulk or in single servings packed on the premises may be sold by weight, measure, or count (count includes servings).~~ shall be sold from bulk or in single serving packages. Bulk ready-to-eat foods may be sold by random weight or count which includes serving size. Pre-packaged single serving or multi-serving packages shall display a net weight statement representative of the contents, a unit price and a total cost.

(Amended 1993 and 20XX)

At the 2016 NCWM Interim Meeting, the NIST Technical Advisor remarked that the MPFS TG is tasked with reviewing the Method of Sale, Ready to Eat Food requirements. The state of Michigan agreed this proposal should come from the MPFS TG. A MPFS TG member asked that since this has been addressed by the Conference in the past, that past background information be placed into the report.

The following excerpts are from the 1991 and 1992 NCWM Conference reports.

The Committee is aware that consumer buying habits and food marketing practices are constantly changing. Retail food stores compete with restaurants and fast food outlets in the prepared, ready-to-eat market. The traditional methods of sale required in retail grocery stores for ready-to-eat food items put grocers at a substantial competitive disadvantage compared to restaurants and fast food outlets that sell the same or similar items. An industry representative testified that consumers want to purchase these foods in supermarkets, but find it difficult to relate the cost per pound of a ready-to-eat item in the supermarket to the common method of sale used in a restaurant or fast food establishment (for example, "by each".) The industry indicated that allowing supermarkets to offer ready-to-eat food for sale by the piece would enhance value comparison by consumers. When purchasing ready-to-eat items in the supermarket, most consumers do not compare the price per pound, for instance, to the unprepared product, but rather take the total cost of the meal into consideration. Consumers then compare that price not only to other products in the grocery store, but to the same prepared items they might buy were they dining at a restaurant or purchasing a meal at a fast food establishment. The following list is presented to illustrate a few of the menu item foods that would be included under the definition of ready-to-eat foods. The list is not intended to be all inclusive. Some examples of Ready-to-Eat food items:

- Servings of pastas
- Cooked, whole chickens or turkeys
- Bar-b-que ribs by the slab or piece
- Stuffed clams, oysters, shrimp, and fish
- Slices of cake, pie, and quiche
- Sandwiches, egg, and spring roll
- Buckets or tubs of chicken or fish
- Servings of chili or soup
- Servings of salads, vegetables, or grains such as rice
- Meat/vegetable pockets/ pies
- Tacos, fajitas, enchiladas, tostadas
- Stuffed peppers, tomatoes, and cabbage
- Knishes
- Pickles
- Pizzas, whole or sliced
- Cookies and brownies

The Committee heard comments during the Interim Meeting that restaurants sell such items by the piece or in small, medium, or large size portions, whereas supermarkets are required to sell them by weight or measure. Representatives from the food industry indicated that supermarkets are not

inclined to sell by the piece any ready-to-eat food items that have traditionally been carried in their delis and sold by weight (such as sliced cold cuts or cheese, and prepared salads). Consumers are familiar and comfortable with the pricing and method of sale of these items, and grocers are reluctant to change the system. According to the Food Marketing Institute (FMI), which represents grocery retailers nationally, the supermarket business is highly competitive. Grocers depend on return business, and therefore most grocers would not risk "shorting" consumers by selling them inconsistent portions when offering ready-to-eat items by the piece. Rather, they would work to employ strict practices and controls to ensure uniform servings. FMI contacted their members from throughout the United States, grocery retailers large and small, regarding the sale of ready-to-eat food. Each agreed that the concerns raised initially by supermarkets in the northeastern part of the country are valid across the country. Retailers told FMI that their consumers would prefer to see ready-to-eat food items priced by the piece so they can easily determine the product's value.

In its deliberations to develop a definition for ready-to-eat foods, the Committee agreed that attempting to limit the definition to only items "prepared on the premises" was unreasonable because it would be impossible to enforce, especially if the term "prepared" is not defined. The Committee took the position that how the products are advertised and sold is the issue to be addressed, not where products are "prepared" or what constitutes "preparation." The Committee recognized that many items sold in restaurants, fast food outlets, and supermarkets are prepared in central kitchens and then distributed to the various retail outlets, and that this is the trend for the future. The Committee also decided that attempting to develop an all-inclusive list of products that could be sold as ready-to-eat food would be difficult because of the wide scope of products; in addition, it would be difficult to keep such a list current.

The NCWM first addressed the issue of ready-to-eat food at the 43rd NCWM in 1958. At that time, the terms "carry out meal" and "menu items" were used to provide illustrations of what the Committee intended to exempt from any specific method of sale. These broad terms allowed the individual jurisdiction to establish, according to its marketplace needs, policies or individual regulations to address which products had to be sold by weight, measure, or count. The key to applying the proposed requirement is to focus on how a product is advertised. For example, if a product is advertised in the same way as a food item is on a restaurant or fast food outlet menu, it could be sold by weight, measure, or count.

The Committee considered the importance of this issue, which is of national significance, and believes that action by the NCWM is needed to provide the States and industry with uniform guidance. The Committee proposed to amend Section 1.12. Ready-to-Eat Food to permit the sale of any ready-to-food by weight, measure, or count (count includes serving sizes such as small, medium, or large) if the food is sold from bulk and is ready for consumption. The proposed definition for "Ready-To-Eat Food" is comparable to the definition for restaurant foods used by the Federal Food and Drug Administration regulations that implement the Nutrition Labeling and Education Act of 1990. At the Annual Meeting, the Committee heard comments that the proposal was not supported by the Central and Northeastern Weights and Measures Associations and several members of industry. Therefore, the item was carried forward as an informational item to allow for additional review and development of alternative proposals.

During the 2016 NCWM Interim Meeting, Mr. Kurt Floren (Los Angeles County, California) recommended that consideration be given to removing the term "serving size" from the language in Section 1.12. Ready to Eat Foods and require items be sold by weight or count. The Committee would like to have the MPFS TG continue to develop this item and recommends this be an Informational item.

At the 2016 NCWM Annual Meeting, the Committee stated that the MPFS TG submitted language for consideration to the Committee on March 23, 2016. The L&R Committee accepted this language and looks forward to receiving feedback from the fall regional meetings.

Regional Association Comments:

At the 2015 CWMA Interim Meeting, a state regulator said this proposal merits further consideration, but does not include such items as rotisserie chicken, pizza, meat, and cheese trays. She would like to see this proposal include these items. There is confusion on what defines the term “single serving.” CWMA recommends that it be a Developing item for further vetting by the states and regions.

At the 2015 NEWMA Interim Meeting, a state regulator commented that the language is confusing. Another regulator remarked it is unnecessary and redundant with other sections of NIST Handbook 130. NEWMA did not forward this item to NCWM.

At the 2016 NEWMA Annual Meeting, the Chair commented that recommended language for this proposal was received from the MPFS TG. The NIST Technical Advisor remarked that this group consisted of many weights and measures officials, inspectors, and grocery store chains. The concerns regarding “what is a serving size?” was also defined with assistance from FDA (<http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/LabelingNutrition/ucm217762.htm>). The FDA is tasked by Congress to develop nutritional guidelines on food in the marketplace. Included with the nutritional guidelines is serving size. NEWMA believes this new language is fully developed and recommends it move forward as a Voting item.

At the 2016 CWMA Annual Meeting, the NIST Technical Advisor commented that the MPFS Task Group submitted new language to the National L&R Committee. All were encouraged to review the revised language and provide feedback at the Annual NCWM in July. The CWMA is recommending this be an Informational item.

Additional letters, presentations, and data may have been part of the Committee’s consideration. To review the supporting documentation, please refer to the “Report of the 100th National Conference on Weights and Measures” (SP 1210, 2015).

232-4 V Section 2.4. Fireplace and Stove Wood (See Related Items 260-3 and 260-4)

(This item was Adopted.)

Source:

NIST Office of Weights and Measures (2016)

Purpose:

Recognize traditional industry labeling practice and eliminate language that appears to conflict with the requirements of the packaging and labeling regulation regarding quantity statements.

Item under Consideration:

Amend the NIST Handbook 130, Method of Sale Regulation as follows:

2.4.3. Quantity. – Fireplace and stove wood shall be advertised, offered for sale, and sold only by measure, using the term “cord” and fractional parts of a cord or the cubic meter, except that:

(a) **Packaged natural wood.** – Natural wood offered for sale in packaged form in quantities less than 0.45 m³ (1/8 cord or 16 ft³) shall display the quantity in terms of:

(1) liters, to include fractions of liters; **and may also include a declaration of quantity in terms of:**
~~or~~

~~(2) cubic inches, if less than one cubic foot; or~~

~~(2) cubic foot or feet, if one cubic foot or greater,~~ to include fractions of a cubic foot.

(Amended 2010 **and 20XX**)

Note: Implementation for the requirement for use of the liter in (1): packages may continue to show the dm³ instead of the liter (L) for 3 years after the effective date of this regulation to allow for the use of current packaging inventories.

(Added 2016)

- (b) **Artificial compressed or processed logs** – A single fireplace log shall be sold by weight, and packages of such individual logs shall be sold by weight plus count.
- (c) **Stove wood pellets or chips** – Pellets or chips not greater than 15 cm (6 in) in any dimension shall be sold by weight. This requirement does not apply to flavoring chips.
(Amended 1976 and 1991)
- (d) **Flavoring chips.** –Flavoring chips offered for sale in packaged form in quantities less than 0.45 m³ (1/8 cord or 16 ft³) shall display the quantity in terms of:
 - (1) liters, to include fractions of liters; **and may also include a declaration of quantity in terms of:**
~~or~~
 - ~~(2) cubic inches, if less than one cubic foot; or~~
 - (2 3) cubic foot or** feet, ~~if one cubic foot or greater,~~ to include fractions of a cubic foot.
(Added 1998) (Amended 2010 **and 2016**)

Note: In determining the appropriate Method of Sale, a clear distinction must be made as to whether the wood is being sold primarily as fuel (some wood is sold as fuel but flavoring is a byproduct) or strictly as a wood flavoring.

(Added 2010)

(Amended 1976, 1991, **and 2010, and 2016**)

Background/Discussion:

The submitter stated the adoption of the proposed amendments to the method of sale is needed to recognize the widespread use of a method of sale by many packers, which conflicts with existing requirements. If the current method of sale requirement is rigidly enforced, tens of thousands of packages of firewood in many states that adopt NIST Handbook 130, Uniform Method of Sale of Commodity Regulation would likely be found in violation of that regulation.

There is a sector of the firewood industry that sells chunks and split firewood from many types of trees for use in restaurants and homes for smoking and flavoring foods. Currently, Section 2.4.3.(c). Quantity requires “stove wood pellets or chips” no larger than 15 cm (6 in) to be sold by net weight but the wording specifically excludes flavoring chips.

The types of “chunk” wood may include apple, cherry, mesquite, pecan, oak, chunks of “BBQ wood” and used whisky barrels. Some online sellers offer packages of these varied products for sale by net weight and “approximate” net weight but others sell by volume. Some sites also offer split logs by volume and “wood chunks” by net weight. The variations in the sizes and shapes of the wood being sold for flavoring and cooking are significant (in some advertisements the chunk sizes range from 2.0 inches to 4.5 inches), which may be why some sellers have switched to net weight, perhaps believing they fall under Section 2.4.3.(c) Stove wood pellets or chips. It must be determined if under Section 2.4. Fireplace and Stove Wood, “cooking wood” and “chunks” are included under the terms “flavoring chips” and if the method of sale for those products that according to Section 2.4.3.(d) Flavoring chips must be sold by volume is appropriate, or if they fall under Section 2.4.3.(c) Stove wood pellets or chips which permits sales by net weight. If the latter is preferred, then the subsection should be amended to allow flavoring “chunks” to be sold by net weight.

Based on information from several industry sources and weights and measures officials, the current labeling on packaged firewood has the quantity declared in fractions of a cubic foot (e.g., 0.6, 0.7 and 0.75 cubic feet) and by cubic decimeters (dm³). The use of these units on these package sizes does not comply with the method of sale requirements in Section 2.4.3. Quantity.

Section 2.4.3. Quantity requires that packages of firewood and flavoring chips less than 1 cu ft to be sold by cubic inches and liters. Sale of packaged natural wood by the cubic foot instead of the required cubic inches appears to be a nationwide traditional sales practice. The labeling by the cubic foot appears to provide consumers with quantity information in a unit of measure they understand and can use in making value comparisons against firewood offered for sale by the cord or fractions of a cord. The OWM recommends that the method of sale be revised to require natural wood to be sold by the cubic foot or fractions thereof, to recognize traditional industry sales practice. No change to the method of sale for flavoring chips and kindling is proposed at this time except to request the interpretation regarding cooking wood and flavoring chunks discussed above.

In 1994 the requirement that packages subject to the UPLR include metric units in their quantity declarations was adopted. At that time, the consensus of the NCWM WG that developed the metric revisions to the UPLR was due to consumers being familiar with the term liter (symbols: l or L) rather than the terms cubic decimeter and its symbol (dm³) even though the quantities are the same. At that time, the methods of sale for peat moss, pine bark mulch, and other products were revised to require the use of the liter instead of cubic decimeter (dm³) to facilitate consumer understanding of metric units and quantities by requiring a more familiar metric unit to appear on a wide range of packages and quantities. Today, some 21 years after mandatory use of the liter was first implemented, consumer acceptance and understanding of what a liter is and the amount of product it represents is greater than it was in 1994, so the requirement that metric volumes must appear on labels in terms of the liter should not be changed.

Packages subject solely to the UPLR (i.e., they are not subject to the Federal Fair Packaging and Labeling Act) may be offered for sale only in metric units (customary units may also appear on the principal display panel at the option of the packer.) As currently written in the Method of Sale, Section 2.4.3., subsections (a)(1) and (d)(1) require packages be labeled in “liters, to include fractions of liters or,” which may confuse readers by making it appear that liters are only one option for how quantities must be shown. That wording is inconsistent with the declaration of quantity requirement in the UPLR, Section 6.1. General that requires all packages to bear a declaration of quantity in both metric and customary units (an exemption in Section 11.33. of the UPLR makes customary units optional). An editorial change must be made to Section 2.4.3. Quantity for both natural wood and flavoring chips to clarify that a packer must provide a declaration of quantity in metric units in terms of the liter and that U.S. customary units may appear on the package but that they are optional.

If adopted, the amendment to allow sales of packaged natural firewood by the cubic foot will go into effect on January 1 of the year following NCWM adoption. However, since it will take time for packers to learn of the changes and to add metric units to their packaging or change cubic decimeter to liters, a period of three years from the effective date of the revised regulation should be allowed for the changeover.

At the 2016 NCWM Annual Meeting, Mr. Richard Whiting (American Woods Fibers) was in support of this item but noted that flavoring pellets should be added. Ms. Cheryl Ayers (New Hampshire) questioned whether bio bricks in the marketplace would fall under this category. The Committee believes that bio bricks would fall under Section 2.4.3.(b) Artificial compressed or processed logs and recommends this as a Voting item.

At the 2016 NCWM Annual Meeting, Ms. Ayers submitted modified language to the Committee to include bio bricks. The Committee firmly believes that bio bricks would fall under the Section 2.4.3.(b) Artificial compressed or processed logs, since a bio brick is formed from fine scraps of wood and sawdust. The Committee made editorial changes to Section 2.4.3.(a)(2) and 2.4.3(d)(2) to read “cubic foot or feet, ~~if one cubic foot or greater~~, to include fractions of a cubic foot.”

Regional Association Comments:

At the 2015 WWMA Annual Meeting, an industry representative spoke in support of the proposal. The NIST Technical Advisor submitted changes (that appear below) to the proposed language. The changes reflect labeling practices in the marketplace and will correct language that appears to conflict with the requirements of the UPLR, in regards to quantity statements. The WWMA believes this item has merit, and suggests additional industry input is

needed on the method of sale and conversion methods. In addition to the NIST revision the WWMA recommends the Committee also review the following suggested editorial changes: 2.4.3 (a) 1 and 2 be merged into one statement; 2.4.3 (d) 1 and 2 also be merged into one statement. The WWMA is recommended that in the “note” dm^3 should read cubic decimeter (dm^3). The WWMA forwarded the item to NCWM, recommending that it be a Voting item.

2.4.3. Quantity. – Fireplace and stove wood shall be advertised, offered for sale, and sold only by measure, using the term “cord” and fractional parts of a cord or the cubic meter, except that:

- (a) **Packaged natural wood.** – Natural wood offered for sale in packaged form in quantities less than 0.45 m^3 ($1/8$ cord or 16 ft^3) shall display the quantity in terms of:

(1) liters, to include fractions of liters **or may also include a declaration of quantity in terms of:**

~~(2) cubic inches, if less than one cubic foot; or~~

~~(2 3) cubic foot, feet, if one cubic foot or greater, to include fractions of a cubic foot; or cubic feet~~ to include fractions of a cubic foot.

Note: Implementation for the requirement for use of the liter in (1): packages may continue to show the dm^3 instead of the liter (L) for three years after the effective date of this regulation to allow for the use of current packaging inventories.

- (b) **Artificial compressed or processed logs** – A single fireplace log shall be sold by weight, and packages of such individual logs shall be sold by weight plus count.

- (c) **Stove wood pellets or chips** – Pellets or chips not greater than 15 cm (6 in) in any dimension shall be sold by weight. This requirement does not apply to flavoring chips.

(Amended 1976 and 1991)

- (d) **Flavoring chips.** – Flavoring chips offered for sale in packaged form in quantities less than 0.45 m^3 ($1/8$ cord or 16 ft^3) shall display the quantity in terms of:

(1) liters, to include fractions of liters; **and or may also include a declaration of quantity in terms of:**

~~(2) cubic inches, if less than one cubic foot; or~~

~~(2 3) cubic foot, feet, if one cubic foot or greater, to include fractions of a cubic foot; or cubic feet~~ to include fractions of a cubic foot.

(Added 1998) (Amended 2010, **and 20XX**)

At the 2015 CWMA Interim Meeting, a state regulator commented that he was supportive of the proposal with the exception pertaining to “chips, chunks, and logs.” He believes there is a need to develop uniformity in package labeling, and the proposal should continue as a Developing item. State regulators were curious about the method of testing, how it will be conducted, and where it will be conducted, hygroscopic nature of the materials, etc. The CWMA forwarded the item to NCWM recommending it be a Developing item.

At the 2015 NEWMA Interim Meeting, the Committee received additional information and modifying language from NIST. A retired regulator was unclear about the terminology that would require every package purchased to be declared in liters. He does not understand why only the measurement of liter is required; it should be in terms of liters or cubic feet. Other regulators agreed with this comment. NEWMA forwarded the item to NCWM with these amendments and the revised language from NIST (refer to the 2015 WWMA Annual report) be a Voting item.

At the 2015 SWMA Annual Meeting, the NIST Technical Advisor requested input regarding the method of sale of “chunk wood.” The Committee recommended that a note be added to Sections 2.4.3.(c) and (d) for “chunk wood shorter than 12 inches being sold in volumes of 1 cubic foot or less or be sold by weight.” SWMA forwarded their recommendation to add the note regarding chunk wood and recommended this as a Voting item.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 100th National Conference on Weights and Measures" (SP 1210, 2015).

232-5 V Section 2.10. Softwood Lumber

(This item was Adopted.)

Source:

American Lumber Standard Committee (2016)

Purpose:

Correct the treatment of nominal dimensions of softwood lumber and make the language consistent with NIST Voluntary Product Standard PS 20.

Item under Consideration:

Amend NIST Handbook 130, Uniform Method of Sale of Commodities as follows:

2.10. Softwood Lumber. – Applies to softwood boards, timbers, and dimension lumber that have been surfaced, ~~but shall not apply to rough lumber, to lumber that has been matched, patterned, or shiplapped; to other products set forth in the latest version of the Department of Commerce, Voluntary Product Standard PS 20-15, "American Softwood Lumber Standard," Tables 1-4; but shall not apply~~ or to rough lumber or lumber (other than products in the Tables) remanufactured or joined so as to have changed the form or identity, such as individually assembled or packaged millwork items. "Nominal sizes" ~~are for U.S.~~ customary dimensions ~~are size designations used for convenience in describing to describe~~ approximate, rather than actual, sizes of lumber. "Nominal sizes" were originally derived from the dimensions of rough lumber before surfacing and are always greater than the actual or minimum dressed dimensions; thus, a dry "2 × 4" is surfaced to actual dimensions of 1½ in × 3½ in (38 mm × 89 mm). The requirements in ~~this section~~ Section 2.10.1. Definitions refer to actual sizes of lumber; ~~for Examples of~~ nominal sizes and minimum dressed sizes for board and dimension lumber are shown in (see Table 1. Softwood Lumber Sizes). A more complete listing of nominal size categories are found in the latest version of PS 20-15. The nominal sizes used in this section follow Department of Commerce Voluntary Product Standard PS 20-10, "American Softwood Lumber Standard" in Tables 1, 2, 3, and 4. or latest edition. SI equivalents are included for actual measurements only.

(Amended 2016)

2.10.1. Definitions.

2.10.1.1. Surfaced (dressed) Lumber. – Lumber that has been surfaced by a machine (to attain smoothness of surface and uniformity of size) on one side (S1S), on two sides (S2S), one edge (S1E), two edges (S2E), or a combination of sides and edges (S1S1E, S1S2E, S2S1E, S4S).

(Amended 2016)

2.10.1.2. Boards. – Lumber 38 mm (1½ in) or less in actual thickness and 38 mm (1½ in) or more in actual width. Lumber less than ~~139~~140 mm (5½ in) in actual width may be classified as strips.

(Amended 2016)

2.10.1.3. Timbers. – Lumber 114 mm (4½ in) or more in smallest dimension. Timbers may be designated as beams, stringers, postscaps, sills, girders, or purlins.

2.10.1.4. Dimension Lumber. – Lumber from 38 mm (1½ in) to, but not including, 114 mm (4½ in) in actual thickness, and 38 mm (1½ in) or more in actual width. Dimension lumber may be designated as framing, joists, planks, rafters or studs.

2.10.1.5. Rough Lumber – Lumber that has not been **dressed surfaced**, but that has been sawed, edged, and trimmed at least to the extent of showing saw marks, or other primary manufacturing marks in the wood, on the four longitudinal surfaces of each piece for its overall length.

(Amended 2016)

2.10.1.6. Matched Lumber. – Lumber that has been worked with a tongue on one edge of each piece and a groove on the opposite edge to provide a close tongue and groove joint by fitting two pieces together; when end-matched, the tongue and groove are worked in the ends also.

2.10.1.7. Patterned Lumber. – Lumber that is shaped to a pattern or a molded form, in addition to being dressed, matched, or shiplapped, or any combination of these workings.

2.10.1.8. Shiplapped Lumber. – Lumber that has been worked or rabbeted on both edges of each piece to provide a closelapped joint by fitting two pieces together.

2.10.1.9. Grade – The commercial designation assigned to lumber meeting specifications established by a nationally recognized grade rule writing organization.

2.10.1.10. Species. – The commercial name assigned to a species of trees.

2.10.1.11. Species Group. – The commercial name assigned to two or more individual species having similar characteristics.

2.10.1.12. Representation – A “representation” shall be construed to mean any advertisement, offering, invoice, or the like that pertains to the sale of lumber.

2.10.1.13. Minimum Dressed Sizes (width and thickness). – The standardized width and thickness at which lumber is dressed when manufactured in accordance with the U.S. Department of Commerce Voluntary Product Standard PS 20-~~1510~~, “American Softwood Lumber Standard,” or latest edition, and regional grading rules conforming to **the latest version of PS 20-1510 or latest edition.** (See Table 1. Softwood Lumber Sizes **containing examples of some minimum dressed sizes.**)

(Amended 2016)

2.10.2. Identity. – Representations shall include a declaration of identity that specifies the grade or grades, species or species group, and whether the lumber is unseasoned (green) or dry.

2.10.3. Quantity. – Representations shall be in terms of:

(a) the number of pieces;

(b) the minimum ~~dressed surfaced~~ width and thickness; **and or actual width and thickness, except that the use of nominal dimensions shall be allowed as long as:**

(1) The term “nominal” or “nom” is also used; and

(2) The actual or minimum dressed sizes are prominently displayed to the customer either by means of a table or label.

(c) either the length of individual pieces or the lineal footage; ~~except that the use of nominal dimensions shall be allowed as long as a table of minimum surfaced sizes is displayed prominently or the actual dimensions are prominently displayed to the customer and the term “nominal” or “nom” is also used in conjunction with any representation of dimensions.~~

Table 1. Softwood Lumber Sizes

Examples of minimum dressed standard surfaced sizes at the time of manufacture for both unseasoned green) and dry lumber as published by the in the latest version of the U.S. Department of Commerce in Voluntary Product Standard PS 20-~~15~~ 10 or latest edition.

Product Classification (Nominal Size)	Minimum Dressed Sizes**			
	Unseasoned		Dry	
	Inches	Millimeters	Inches	Millimeters
Surfaced Lumber*				
2 × 2	1 ⁹ / ₁₆ × 1 ⁹ / ₁₆	40 × 40	1½ × 1½	38 × 38
2 × 2½	1 ⁹ / ₁₆ × 2 ¹ / ₁₆	40 × 52	1½ × 2	38 × 51
2 × 3	1 ⁹ / ₁₆ × 2 ⁹ / ₁₆	40 × 65	1½ × 2½	38 × 64
2 × 4	1 ⁹ / ₁₆ × 3 ⁹ / ₁₆	40 × 90	1½ × 3½	38 × 89
2 × 6	1 ⁹ / ₁₆ × 5 ⁵ / ₈	40 × 143	1½ × 5½	38 × 140
2 × 8	1 ⁹ / ₁₆ × 7½	40 × 190	1½ × 7¼	38 × 184
2 × 10	1 ⁹ / ₁₆ × 9½	40 × 241	1½ × 9¼	38 × 235
2 × 12	1 ⁹ / ₁₆ × 11½	40 × 292	1½ × 11¼	38 × 286
Board Lumber				
1 × 2	25/32 × 19/16	20 × 40	¾ × 1½	19 × 38
1 × 3	25/32 × 29/16	20 × 65	¾ × 2½	19 × 64
1 × 4	25/32 × 39/16	20 × 90	¾ × 3½	19 × 89
1 × 6	25/32 × 55/8	20 × 143	¾ × 5½	19 × 140
1 × 8	25/32 × 7½	20 × 190	¾ × 7¼	19 × 184
1 × 10	25/32 × 9½	20 × 241	¾ × 9¼	19 × 235
1 × 12	25/32 × 11½	20 × 292	¾ × 11¼	19 × 286
*The dry thicknesses of nominal 3 in and 4 in lumber are 2½ in (64 mm) and 3½ in (89 mm); unseasoned thicknesses are 2 ⁹ / ₁₆ in (65 mm) and 3 ⁹ / ₁₆ (90 mm). Widths for these thicknesses are the same as shown above.				
**PS 20- 15 <u>10</u> defines dry lumber as being 19 % or less in moisture content and unseasoned lumber as being over 19 % moisture content. The size of lumber changes approximately 1 % for each 4 % change in moisture content. Lumber stabilizes at approximately 15 % moisture content under normal use conditions. (Added 1971) (Amended 2016)				

Background/Discussion:

The American Lumber Standard Committee, the Standing Committee for maintenance of the American Softwood Lumber Standard, Voluntary Product Standard 20 (“PS-20”) [gsi.nist.gov/global/docs/vps/approved%20PS20-15%20SSD%20final%202-25-15_dfa%20April%201st_wCover.pdf], recommends that certain clarifications be made to the Uniform Regulation for the Method of Sale of Commodities, Section 2.10. Softwood Lumber and the Table on page 117 in NIST Handbook 130 (2016).

The NIST, Voluntary Product Standards (VPS) Program acts as an unbiased coordinator, provides editorial assistance, and assures technical soundness. NIST also determines compliance with the criteria of the Department's procedures, provides secretarial functions for VPS Committees appointed under DOC procedures, and publishes the standards as public documents. The use of DOC Voluntary Product Standards is voluntary. NIST has no regulatory power in the enforcement of their provisions; however, since the standards represent a consensus of all interested groups, their provisions are likely to become established as trade customs. In addition, when a Voluntary Product Standard is made a part of a legal document, such as a sales contract or code, compliance with the standard is enforceable.

For some time, there has been confusion in the regulated community as to the specific requirements for the display and advertising of quantity measure for the widths and thicknesses of softwood lumber, particularly when nominal measure is used. This has led to inconsistent labeling in the market and, in some cases, enforcement actions by various state and local weights and measures authorities. These suggested changes would provide greater clarity and make the language internally consistent and consistent with industry terminology. No changes are suggested in the underlying concepts, substantive requirements or practical applications (as we understand them).

Explanation of Specific Changes

1. PS-20 contains four tables with nominal dimensions of different products. It is our understanding that nominal dimensions for these products are accepted by weights and measures officials. NIST Handbook 130 does not include these products in the description of product scope (and indeed even excludes some) and contains information from only one of the PS-20 Tables. The change would make clear that the products in all the PS-20 Tables are all covered.
2. The current Section 2.10. Softwood Lumber indicates that SI equivalents are only used for actual dimensions. In fact, the Table 1 includes metric dimensions for nominal sizes. Other legal authorities require metric. We suggest the sentence be deleted.
3. There is a statement in Section 2.10. Softwood Lumber that the “...requirements of this section refer to actual sizes of lumber.” We suggest clarifying that this reference is only to the definitions in Section 2.10.1. Definitions. The section as a whole does include nominal dimensions where indicated.
4. Repositioning the nominal dimension provisions. The nominal dimension provisions are currently in subsection 2.10.3(c) on length. These dimensions relate to width and thickness. We recommend placing them in subsection 2.10.3(b). Quantity.
5. Reformatting of the width and thickness provision — Subsection 2.10.3(b) Quantity (as changed) is altered to make clear that the requirement of displaying the term “nom” or “nominal” when nominal measure is used is applicable with either the disclosure of actual or minimum dressed sizes. The current language with its multiple conjunctions could be read in two different ways.
6. Adding the option for labeling. The current language provides for the use of a “table of minimum surfaced sizes is displayed prominently.” In the marketplace, many producers label each piece of lumber. Alternatively, sellers might choose to prominently display a label, rather than a table, to more effectively convey the information to consumers.
7. Consistent use of the term “dressed sizes” rather than “surfaced sizes.” Subsection 2.10.1.13. Minimum Dressed Sizes appropriately contains a definition of “Minimum dressed sizes (width and thickness)” and refers to PS-20 as a source for this information. PS-20 similarly uses that term.¹ However, there is inconsistency in other parts of Section 2.10. Softwood Lumber. For example, Subsection 2.10.1.1. defines the term “Surfaced (dressed) lumber.” Subsection 2.10.3(b) refers to “minimum surfaced width and

thickness.” Subsection 2.10.3(c) uses “minimum surfaced sizes.” Table 1 on page 121 of the NIST Handbook 130 (2016) introduces yet another variation with reference to “minimum standard surfaced sizes.” We urge that one term “dressed” be consistently used throughout.

8. Table 1 of the section sets forth some, but not all, of the nominal and minimum dressed sizes from PS-20. It is recommended that both Section 2.10. and the Table be revised to indicate that the Table contains examples. Alternatively, all four tables from PS-20(15) could be included.

Section 2.10.1.2. Boards. The dimension for width of dry 1 × 6 board lumber is changed from 139 mm to 140 mm to be consistent with PS-20. (The actual conversion is 139.7 mm.)

¹ See, PS-20, Sections 3.3.1, 3.3.1.1, 3.3.1.2, 3.3.2, 3.3.3, 3.4.4, and Tables 1 - 4. Although Section 3.3.2 is titled Dressed (surfaced) lumber, “dressed” is used alone in all of the other sections.

At the 2016 NCWM Interim Meeting, it was noted that this item was submitted by the American Lumber Standards Committee and not the NIST, OWM as noted in NCWM Publication 15 (2016). The Committee recognizes the need to align the language between the standard and NIST Handbook 130, and recommends this as a Voting item.

Regional Association Comments:

At the 2015 WWMA Annual Meeting, Mr. Brock Landry, (General Counsel for the American Lumber Standard Committee [ALSC]), provided an overview of the proposed changes and reasons for the changes, which is for clarification purposes. A regulator supported the changes as they would harmonize the language and not change the way weights and measures officials enforce the lumber standard. WWMA believes the item would improve store labeling practices and forwarded the item to NCWM, recommending it be a Voting item.

At the 2015 CWMA Interim Meeting, a state regulator indicated the need to hear more details about this item. It is unclear whether it is fully developed. Consequently, the Committee recommended it be a Developing item.

At the 2015 NEWMA Interim Meeting, there were no comments heard. NEWMA believes it is fully developed and forwarded it to NCWM with the recommendation it be a Voting item.

At the 2015 SWMA Annual Meeting, Mr. Landry provided a presentation that gave an overview of the proposal and how it clarifies the current language, but does not change the content, and also aligns with the NIST Voluntary Product Standard (PS 20-15). The SWMA believes this item is fully developed and forwarded it to NCWM, recommending that it be a Voting item.

At the 2016 NEWMA Annual Meeting, a state weights and measures official remarked that the term “surface” is crossed out and “dressed” is added, but not throughout the proposal. He asked the difference between the two terms. A NIST Technical Advisor added that this language is intended to harmonize the PS 20-15 Voluntary Product Standard with NIST Handbook 130. The NIST Technical Advisor will check with the American Lumber Standards Committee regarding the term “dressed.” The NIST Technical Advisor reported that the American Lumber Standards Committee remarked that the terms “dressed” and “surface” mean the same thing. At its 2016 Annual Meeting, NEWMA believed that this item is fully developed and should remain a Voting item.

At the 2016 CWMA Annual Meeting, no comments were heard on this item and the Committee feels it is fully developed and ready for a Vote.

232-6 V Section 2.17. Precious Metals

(This item was returned to the Committee.)

Source:

Florida (2016)

Purpose:

Provide critical information consumers should have when deciding to sell items containing precious metals.

Item under Consideration:

Amend the NIST Handbook 130, Method of Sale Regulation as follows:

2.17. Precious Metals.**2.17.1. Definition.**

2.17.1.1. Precious Metals. –Gold, silver, platinum, or any item composed partly or completely of these metals or their alloys and in which the market value of the metal in the item is principally the gold, silver, or platinum component.

2.17.2. Quantity. – The unit of measure and the method of sale of precious metals, if the price is based in part or wholly on a weight determination, shall be either troy weight or SI units. ~~When the measurement or method is expressed in SI units of mass, a conversion chart to troy units shall be prominently displays so as to facilitate price comparison.~~ To facilitate price comparison and provide information allowing consumers to make an informed decision a chart must be prominently displayed and present in proximity to the purchasing scale being used for the transaction. This chart requirement is not intended to apply to pure precious metals traded on commodity markets such as stock exchanges and the like rather it is only intended to apply to precious metals purchased by second hand markets. The chart must be clearly visible to the seller and contain at a minimum the following information.

- (a) A table of troy weights indicating grains, pennyweights, and troy ounces.
- (b) The percentages as noted in Table 3 of precious metals contained in common mixtures found in the marketplace.

<u>Gold</u>	<u>10 karat</u>	<u>41.7 %</u>
	<u>14 karat</u>	<u>58.3 %</u>
	<u>18 karat</u>	<u>75.0 %</u>
	<u>24 karat</u>	<u>100.0 %</u>
<u>Silver</u>	<u>Sterling</u>	<u>92.5 %</u>
<u>Platinum</u>	<u>900 platinum</u>	<u>90.0 %</u>
	<u>950 platinum</u>	<u>95.0 %</u>

- (c) If buying precious metals based on weight the chart shall also state the minimum percentage of the current melt value being used to calculate the buying price and the minimum melt value on which the buying price is based.
- (d) If buying precious metals based on weight the following formula:
- "(Item weight × Percentage in decimal form of precious metal contained in the item) × (Melt value being used × Percentage in decimal form being paid of melt value being used) = Potential Monetary Offer."
- (e) When the measurement or method of sale is expressed in SI units of mass, a conversion chart to troy units must also be present on the chart.

(Added 1982) (Amended 20XX)

Background/Discussion:

The accurate and fair purchase of precious metals by retailers from the general public is dependent on two primary factors. The first factor being the accuracy of the scale, which is well covered in Section 2.20. of NIST Handbook 44.

The second factor has not been addressed, but it involves the calculation or method used by buyers to make an offer to the seller (the general public). Because the average consumer is unaware of how to calculate market value for their precious metal containing items (e.g., gold and silver jewelry, etc.), the potential for an inequitable or uninformed transaction exists despite an accurate scale. The weights and measures community routinely refers to the quintessential (and justified) need for “equitable transactions” and if the general public elects to sell precious metals in a time of need or for whatever reason they should have sufficient information to ensure value comparison and be able to engage in an equitable transaction. We believe this additional information will further ensure equitable transactions occur in the precious metal buying market (from the general public).

Florida officials are aware of scenarios where consumers were paid as low as 10 % of the melt value. Their suspicion is that they were unaware they were being paid such a low percentage of the melt value for their property. The officials believe it is difficult for consumers to discern whether they are being offered a fair price for their items, and the proposed information will help make it less difficult. Secondhand dealers and pawn shops may not be in favor of the additional declarations, but there is no additional cost or requirement to these businesses. Pursuant to existing language (since 1982) charts are already required.

At the 2016 NCWM Interim Meeting, Dr. Matt Curran (Florida) provided background information as to why this proposal was submitted. He believes providing consumers with this information will help them when making a precious metals transaction. The Committee encourages the submitter to reach out to notify stakeholders of this change. The Committee believes this item has importance for marketplace transactions and recommends this move forward as a Voting item.

At the 2016 NCWM Annual Meeting, Dr. Curran remarked that the intent of this proposal is to address secondhand and pawn shops. This requirement is not intended for precious metals traded on the commodity market. There was discussion from the regions regarding the marketplace and how precious metals are sold in their region. It was remarked that terminology needs to be defined for the terms “meltdown, salvage, and secondhand market).” Ms. Julie Quinn (Minnesota) commented that language needs to include the salvage pricing offering and the chart should include grams. At the voting session, Dr. Curran modified the language:

NOTE: This requirement is not intended to apply to pure precious metals traded on commodity markets, such as stock exchanges and the like

2.17.2. Quantity. – The unit of measure and the method of sale of precious metals, if the price is based in part or wholly on a weight determination, shall be either troy weight or SI units. **To facilitate price comparison and provide information allowing consumers to make an informed decision a chart must be prominently displayed and present in proximity to the purchasing scale being used for the transaction. ~~The~~ This chart requirement is not intended to apply to pure precious metals traded on commodity markets such as exchanges and the like, rather, it is intended to apply to pure precious metals purchased by secondhand markets. The chart must be clearly visible to the seller and contain at a minimum the following information: When the measurement or method of sale is expressed in SI units of mass, a conversion chart to troy units shall be prominently displayed so as to facilitate price comparison. The conversion chart shall also display a table of troy weights indicating grains, pennyweights, and troy ounces.**

The Committee concurs with the modified language with removal of the Note. The modified language was not adopted and returned to the Committee.

Regional Association Comments:

At the 2015 SWMA Annual Meeting, Dr. Curran stated that this language will give the consumer information that is needed to make a value comparison. A state official was concerned about the size of the chart; however, it was explained that the information could be included on the weight conversion chart that is already required. Another state official expressed concern that enforcement of this requirement might not be within the purview of weights and measures officials. The SWMA believes this item has merit and would like to get feedback from the other regions. SWMA forwarded the item to NCWM recommending that it be an Informational item.

At the 2016 NEWMA Annual Meeting, a Maine weights and measures official commented that they support this item and believe there is a significant need for this new language. A retired weights and measures official commented he

had concerns with vagueness in Table 3 – conversion factors need to be stated and clarified. A state official commented that this chart is already adopted in NIST Handbook 44. Another state official asked for clarity regarding the term “melt value.” Another state official asked if this new language would impact the precious metals commodity market. A retired individual commented that Section 2.17.2. Quantity clarifies that this provision is dealing with recycled scrap gold. He suggested that a paragraph be added that clarifies metals in pure form would be exempt from this provision. NEWMA supports this as a Voting item with the recommendation the submitter of the proposal add language clarifying a precious metals exemption in a non-retail environment.

At the 2016 CWMA Annual Meeting, a NIST Technical Advisor commented that the submitter was asked by the National L&R Committee to seek additional stakeholder input. CWMA members were also encouraged to review the proposal with stakeholders and provide additional input. However, the Committee feels the item is fully developed and ready for Voting status unless subsequent concerns arise.

232-7 V Section 2.23. Animal Bedding

(This item was Adopted.)

Source:

NIST Office of Weights and Measures (2015)

Purpose:

Provide a uniform method of sale for animal bedding that will enhance the ability of consumers to make value comparisons and will ensure fair competition.

Item under Consideration:

Amend the NIST Handbook 130, Method of Sale Regulation as follows:

2.23. Animal Bedding. —~~Packaged animal bedding of all kinds, except for baled straw, shall be sold by volume, that is, by the cubic meter, liter, or milliliter and by the cubic yard, cubic foot, or cubic inch. If the commodity is packaged in a compressed state, the quantity declaration shall include both the quantity in the compressed state and the usable quantity that can be recovered. Compressed animal bedding packages shall not include pre-compression volume statements.~~

Example:

~~250 mL expands to 500 mL (500 in³ expands to 1000 in³).~~

2.23.1. Definition.

- (a) Compressed Animal Bedding – means that the volume of the bedding was reduced under pressure during the packaging process.**
- (b) Useable Volume – the volume of the product that can be recovered from a package by the consumer after it is unwrapped and, if necessary, uncompressed.**

2.23.2. Method of Sale.

- (a) Packaged animal bedding of all kinds, except for baled straw, shall be advertised, labeled, offered for sale and sold by volume in either a compressed or a uncompressed package. A packaged of compressed animal bedding shall be advertised, labeled, offered and exposed for sale and sold on the basis of the “Useable Volume.” If unit pricing is provided for use by retail customers to make a value comparison it shall be in terms of the price per liter.**
- (b) A quantity declaration shall be in terms of the largest whole unit of the milliliter, liter, or cubic meter. A declaration may also include the quantity in terms of largest whole unit of**

the cubic inch, cubic foot, or cubic yard only. The terms “Useable Volume” must appear in the quantity declaration on a package of compressed animal bedding.

Examples for Uncompressed Animal Bedding:

Volume 41 Liters (1.4 Cubic Feet)

Volume 125 Liters

Examples for Compressed Animal Bedding:

Useable Volume 1.4 Cubic Feet (41 Liters)

Useable Volume 27.9 Liters (1700 Cubic Inches)

Useable Volume 113 L (4 Cubic Feet)

Useable Volume 226 L

- (c) **The display of a net or gross weight, pre-compression volume, compressed volume, or supplementary dry measure quantities (e.g., dry pint, dry quart, or bushel) anywhere on the package is prohibited.**

(Added 2016)

2.23.1.3. Exemption - Non-Consumer Packages of Animal Bedding Sold to Laboratory Animal Research Industry. – Packaged Animal Bedding consisting of granular corncobs and other dry (8 % or less moisture), pelleted, and/or non-compressible bedding materials that are sold to commercial (non-retail) end users in the laboratory animal research industry (government, medical, university, preclinical, pharmaceutical, research, biotech, and research institutions) may be sold on the basis of weight.

(Added 2010)

Note: This method of sale for animal bedding shall be enforceable after January 1, 2018.

(Added 2016)

Background/Discussion:

This proposal provides amendments to NIST Handbook 130, Uniform Method of Sale, Section 2.23. Animal Bedding. These changes were determined necessary when a proposal was drafted to revise the test procedures within NIST Handbook 133, Chapter 3. Section 3.9. **Dimensional Test Procedure for Verifying the Compressed Quantity Declaration on Packages of Peat Moss and Animal Bedding** and a new proposal was created to add **Section 3.15. Test Procedure for Verifying the Expanded Volume Declaration on Packages of Animal Bedding** (refer to Item 260-5 in NCWM Publication 15 (2016)).

At the 2015 NCWM Interim Meeting, support was heard in favor for this proposal. It was agreed that the compressed statement is meaningless to the end users. The NIST Technical Advisor noted, if this item moved forward to remove the term compressed, it would impact the language in Item 260-2 (NCWM Publication 15 [2015]), NIST Handbook 133, Section 3.9. **Dimensional Test Procedure for Verifying the Compressed Quantity Declaration on Packages of Peat Moss and Animal Bedding.** The NIST Technical Advisor remarked that the background information is being formatted by NIST, OWM, and advised that no technical changes were being made and would be resubmitted with NCWM Publication 16 (2015). Refer to 2015 NCWM Interim Meeting, Report, Appendix C. for the Executive Summary, additional background and supporting information for “Testing Packages of Animal Bedding and Peat Moss with Compressed and Expanded Volume Declarations.” The Committee agreed to move this forward as a Voting item.

At the 2015 NCWM Annual Meeting, the NIST Technical Advisor submitted the following changes to the Item under Consideration:

- 2.23.1.(a) added the language: **including pet or stall bedding, cat or pet litter, or simply bedding.**
- Change the term “expanded volume” to read “usable volume.”
- Moved the examples in 2.23.2.(c) to 2.23.2.(b).

- Section 2.23.2.(c) add the term **or weight**.
- Add the following: **Note: This method of sale for animal bedding shall be enforceable after January 1, 2018.**

During open hearings, it was discussed that adding the term “cat litter” to the definition of animal bedding may not be appropriate. It was suggested that only wood shavings and paper products be used for animal bedding under the method of sale and test procedure. Along with the method of sale for kitty litter, there were questions regarding the MAV and the test procedure for cat litter. The Committee modified two areas of the Item Under Consideration:

- **2.23.1. Definitions.**

Animal Bedding – Packaged animal bedding of all kinds, except for baled straw. any material, except for baled straw kept, offered or exposed for sale or sold for primary use as a medium for any companion or livestock animal to nest or eliminate waste, including pet or stall bedding, cat or pet litter, or simply bedding.

- Section 2.23.2.(c) strike the term **or weight**.

The Committee changed the status of this item to Informational and is recommending further development of the following:

- Section 2.23.1.(b) review the definition of “Usable” volume for ALL types of animal bedding, including uncompressed. Substrate type products may not be the correct term for this section.
- Need to define the term “compressed form.”
- Section 2.23.2.(c) add the term “or weight” to supplemental units.
- Determine if the enforceable date works for manufacturers.
- Review of the test procedure (Item 260-3)

At the 2016 NCWM Interim Meeting, it was noted that NIST sent a document to all the fall regional meetings addressing any concerns that were previously brought up on this proposal. The Committee reviewed the regional reports on this item and will be moving forward the modified language provided by NIST.

At the 2016 NCWM Annual Meeting, it was recommended that the term “Compressed Bedding” read “Compressed Animal Bedding” for better clarity. The Committee moved forward an enforceable date of January 1, 2018, which will allow manufacturers two years to comply.

Regional Association Comments:

At the 2015 WWMA Annual Meeting, the NIST Technical Advisor addressed the concerns that were raised at the 2015 NCWM Annual Meeting. NIST submitted revised language (refer to 2015 SWMA Annual Report archive <https://www.ncwm.net>), which excludes cat litter and has additional editorial changes. An industry representative fully supported this item. A regulator also commented that his jurisdiction fully supports this item, and this is a good example of industry and regulators working together. WWMA recommends using the revisions that NIST proposed along with some minor amendments to that language. The item is fully developed and all the language that was previously objectionable has been corrected. The WWMA recommends this proposal be made a Voting item at the NCWM Interim Meeting.

2.23.1. Definition.

- (a) Compressed Bedding – ~~means that~~ the volume of the bedding **that** was reduced under pressure during the packaging process.

At the 2015 CWMA Interim Meeting a state regulator indicated he wanted to ensure pet litter was not included in the proposal. Another state regulator commented that she would support moving this item to Voting status, if it does not include pet litter. A state regulator questioned how cubic feet would be applicable for a pelletized product. A state regulator questioned whether the product should be sold by liter only. The group discussed the need for clarity with

regards to customary units of measure versus “liter only” versus unit pricing. Given the uncertainty related to the inclusion of pet litter and the need for clarity related to the method sale, the CWMA recommended that this item be a Developing item.

At the 2015 NEWMA Interim Meeting, it was reported there were some minor questions regarding the language, but the key issue was clear and recommended that this be a Voting item.

At the 2015 SWMA Annual Meeting, a NIST Technical Advisor provided the following language to be considered. The SWMA recommends that this item be a Voting item with these proposed changes incorporated.

~~2.23. Animal Bedding. —Packaged animal bedding of all kinds, except for baled straw, shall be sold by volume, that is, by the cubic meter, liter, or milliliter and by the cubic yard, cubic foot, or cubic inch. If the commodity is packaged in a compressed state, the quantity declaration shall include both the quantity in the compressed state and the usable quantity that can be recovered. Compressed animal bedding packages shall not include pre-compression volume statements.~~

Example:

250 mL expands to 500 mL (500 in³ expands to 1000 in³).

2.23.1. Definition.

- (a) Compressed Bedding – means that the volume of the bedding was reduced under pressure during the packaging process.**
- (b) Useable Volume – the volume of the product that can be recovered from a package by the consumer after it is unwrapped and, if necessary, uncompressed.**

2.23.2. Method of Sale.

- (a) Packaged animal bedding of all kinds, except for baled straw, shall be advertised, labeled, offered for sale and sold by volume in either a compressed or a uncompressed package. A packaged of compressed animal bedding shall be advertised, labeled, offered and exposed for sale and sold on the basis of the “Useable Volume.” If unit pricing is provided for use by retail customers to make value comparisons, it shall be in terms of the price per liter.**
- (b) A quantity declaration shall be in terms of the largest whole unit of the milliliter, liter, or cubic meter. A declaration may also include the quantity in terms of largest whole unit of the cubic inch, cubic foot, or cubic yard only. The terms “Useable Volume” must appear in the quantity declaration on a package of compressed animal bedding.**

Example for Uncompressed Animal Bedding:

Volume 41 Liters (1.4 Cubic Feet)

Volume 125 Liters

Examples for Compressed Animal Bedding:

Useable Volume 1.4 Cubic Feet (41 Liters)

Useable Volume 27.9 Liters (1700 Cubic Inches)

Useable Volume 113 L (4 Cubic Feet)

Useable Volume 226 L

- (c) The display of a net or gross weight, pre-compression volume, compressed volume, or supplementary dry measure quantities (e.g., dry pint, dry quart, or bushel) anywhere on the package is prohibited.**

2.23.4.3. Exemption - Non-Consumer Packages of Animal Bedding Sold to Laboratory Animal Research Industry. – Packaged Animal Bedding consisting of granular corncobs and other dry (8 % or

less moisture), pelleted, and/or non-compressible bedding materials that are sold to commercial (non-retail) end users in the laboratory animal research industry (government, medical, university, preclinical, pharmaceutical, research, biotech, and research institutions) may be sold on the basis of weight.

At the 2016 NEWMA Annual Meeting, Mr. Mike Sikula (New York) supported both the method of sale and test procedure for animal bedding and prefers a change in the test procedure (Item 260-5) to take nine measurements across the surface to measure the depth of the product. NEWMA considers this item to be fully developed.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 100th National Conference on Weights and Measures" (SP S1210, 2015).

232-8 V Section 2.27. Retail Sales of Natural Gas Sold as a Vehicle Fuel

(This item was Adopted.)

Source:

Clean Vehicle Education Foundation (2014)

Purpose:

Since natural gas is sold in the retail market place as compressed natural gas (CNG) to be an alternative fuel to gasoline and diesel fuel and as liquefied natural gas (LNG) to be an alternative fuel to diesel, the proposed additions and edits to NIST Handbook 130 will provide definitions for natural gas equivalents for diesel liters and diesel gallons so end users can readily compare cost and fuel economy. At present, only CNG equivalents for gasoline are included in the handbooks.

Item under Consideration:

Amend the NIST Handbook 130, Method of Sale Regulation as follows:

2.27. Retail Sales of Natural Gas Sold as a Vehicle Fuel.

2.27.1. Definitions.

2.27.1.1. Compressed Natural Gas (CNG). – A gaseous fuel composed primarily of methane that is suitable for compression and dispensing into a fuel storage container(s) for use as an engine fuel.

(Amended 2016)

~~**2.27.1.2. Gasoline Liter Equivalent (GLE).**~~ – ~~Gasoline liter equivalent (GLE) means 0.678 kg of natural gas.~~

~~**2.27.1.2.3. Gasoline Gallon Equivalent (GGE).**~~ – Gasoline gallon equivalent (GGE) means 2.567 kg (5.660 lb) of compressed natural gas.

(Amended 2016)

2.27.1.3. Diesel Gallon Equivalent (DGE). - **Diesel gallon equivalent means 6.384 lb of compressed natural gas or 6.059 lb of liquefied natural gas.**

(Added 2016)

2.27.1.4. Liquefied Natural Gas (LNG). – Natural gas which is predominantly methane that has been liquefied at – 162 °C (– 260 °F) at 14.696 psia and stored in insulated cryogenic fuel storage tanks for use as an engine fuel.

(Added 2016)

2.27.2. Method of Retail Sale and Dispenser Labeling.

2.27.2.1. Method of Retail Sale. – All **compressed** natural gas kept, offered, or exposed for sale and sold at retail as a vehicle fuel shall be **measured** in terms of **mass, and indicated in the gasoline liter equivalent (GLE), or gasoline gallon equivalent (GGE), diesel gallon equivalent (DGE) units or mass.**

(Amended 2016)

2.27.2.2. Dispenser Labeling Compressed Natural Gas. – All retail **compressed** natural gas dispensers shall be labeled with the **equivalent** conversion factor in terms of **kilograms or pounds (lb).** The label shall be permanently and conspicuously displayed on the face of the dispenser and shall have ~~either~~ the statement “1 Gasoline Gallon Equivalent (GGE) ~~is equal to means~~ 5.660 lb of **Compressed** Natural Gas” **or “1 Diesel Gallon Equivalent (DGE) means 6.384 lb of Compressed Natural Gas”** consistent with the method of sale used.

(Amended 2016)

2.27.2.3. Method of Retail Sale. – All liquefied natural gas kept, offered, or exposed for sale and sold at retail as a vehicle fuel shall be measured in mass, and indicated in diesel 1 gallon equivalent (DGE) units, or mass.

(Added 2016)

2.27.2.4. Dispenser Labeling of Retail Liquefied Natural Gas. – All retail liquefied natural gas dispensers shall be labeled with the equivalent conversion factor in terms of pounds (lb). The label shall be permanently and conspicuously displayed on the face of the dispenser and shall have the statement “1 Diesel Gallon Equivalent (DGE) means 6.059 lb of Liquefied Natural Gas.”

(Added 2016)

Background/Discussion:

The gasoline gallon equivalent (GGE) unit was defined by NCWM in 1994 to allow users of compressed natural gas (CNG) vehicles to readily compare costs and fuel economy of light-duty natural gas vehicles with equivalent gasoline powered vehicles. For the medium and heavy duty natural gas vehicles in widespread use today, there is a need to officially define a unit for both Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) (already in widespread use) allowing a comparison of cost and fuel economy with diesel powered vehicles. Natural gas is sold as a vehicle fuel as either Compressed Natural Gas (CNG) or Liquefied Natural Gas (LNG), and both products are measured in mass. The submitter stated that the official definition of a DLE and a DGE will likely provide justification for California, Wisconsin, and many other states to permit retail sales of LNG for heavy-duty vehicles in these convenient units. (Refer to the “Report of the 99th National Conference on Weights and Measures” [SP 1193, 2014] for the mathematics justifying the specific quantity (mass) of natural gas in a DLE and DGE.)

At the NCWM 2014 Interim Meeting, Mr. Mahesh Albuquerque (Chair, National Gas Steering Committee [NGSC]) notified the Committee that this item is being developed by the NGSC. The Committee noted that the factor in 2.27.1.6. Liquefied Natural Gas should not read – 126.1 °C but rather – 162 °C.

The L&R Committee, in responding to the NGSC’s June 10, 2014, request to change the NGSC’s March 2014 recommendation for DGE units to the following: The L&R Committee agreed that the CNG and LNG conversion factors proposed for use in converting these gases to DGE units should be revised in the 2014 Interim Report so that their numerical values are expressed to three decimal places rather than two decimal places. These changes are reflected in the following proposed modifications within Section 2.27. Retail Sales of Natural Gas Sold as Vehicle

Fuel to read: 1 Diesel Gallon Equivalent (DGE) is ~~6.380~~ 6.384 lb of Compressed Natural Gas and 1 Diesel Gallon Equivalent of Liquefied Natural Gas is ~~6.060~~ 6.059 lb.

At the NCWM 2014 Annual Meeting, a joint session was held with L&R and S&T Committees to hear comments on this item. It was noted that if the L&R did not move Item 232-3 forward then there would be no reason to proceed with Item 237-2 and S&T Item 337-2 as it appeared in the "Report of the 98th National Conference on Weights and Measures." There was discussion regarding the term "approximately equal" in Sections 2.27.2.2. and 2.27.2.4. It was noted this term was not a measurement equivalency but equal to an energy content. It was recommended that the Committee give consideration to amend the definition and clarify the meaning. Some spoke in opposition saying this item would cause consumer confusion in the marketplace if adopted. Several members questioned where the IRS obtained the numbers that are used in the IRS tax form referenced in the conversion value justification. NIST provided an alternative proposal to the item and several members believed this proposal should be taken into consideration. Since the proposal from the NGSC was not released until June 10, 2014, members felt they did not have enough time to vet the modification or the NIST proposal. The Committee reviewed numerous letters in support of the three items being considered here.

Mr. Ethan Bogren, NGSC Chair, provided the following write up from their NGSC's meeting on January 14, 2015.

Natural Gas Steering Committee Update Report – January 14, 2015

The NGSC has been working diligently at achieving a compromise proposal regarding the sale of CNG/LNG as an alternative motor fuel. While the group has found success in establishing a consensus opinion in many aspects of the regulations, the group remains divided as to what unit of measure should be used for primary method of sale.

As you all know, there has been a proposal submitted urging NCWM to adopt gallon equivalent units (GGE/DGE) as the primary method of sale for natural gas products to be used as an alternative motor fuel. There has been a feeling by many members of the NCWM that this would be considered a diversion from the customary units in which commodities are sold in the United States causing concern.

Since a consensus regarding the units used for the primary method of sale for natural gas products was unable to be achieved, the NGSC is prepared to submit two proposals to the L&R and S&T Committees for comment and review. It was agreed by NGSC members that this was the only fair way to represent the group as a whole.

While both proposals have many similarities, I would like to summarize the major differences regarding the method of sale as it pertains to each document.

Volume Equivalent Compromise Version: CNG/LNG shall be measured in mass and indicated in gallon equivalent units unless the weights and measures official having jurisdiction mandates otherwise through local regulation. This would make GGE/DGE units the only unit of quantity required to be displayed on the dispenser during a retail transaction.

Mass Compromise Version: CNG/LNG shall be measured in mass and indicated in mass. The display of supplemental information would also be permitted on the dispenser. This would allow GGE/DGE units to be indicated on the dispenser display face as long as it is stated the GGE/DGE units are for value comparison purposes only.

There is a willingness to accept equivalent units for advertising purposes such as street signs.

The NGSC is confident that a compromise will be found with the guidance of the S&T and L&R Committees. Along with input coming from the floor during Open Hearings during the NCWM Interim Meeting a sense of which proposal best represents the body of the National Conference of Weights & Measures may be determined.

NCWM 2015 Interim Meeting: A joint session was held with the L&R and S&T Committees to hear this item along with Item 237-1 of the L&R report and S&T Item 337-1. (Documentation for the S&T Item 337-1 can be found within the S&T report.) Two proposals were addressed. Proposal One, titled "the Volume Equivalent Compromise" requires natural gas to be measured in mass and indicated in equivalent gallon units or mass. Proposal Two, titled "The Mass Compromise" would require natural gas to be measured and indicated in mass with supplemental equivalent information to be displayed on the dispenser for value comparison.

Proposal One, Volume Equivalent Compromise Version was supported by industry representatives and several weights and measures officials. Some reasons for supporting Proposal One is it will cause less consumer confusion. Having one method of sale that consumers are currently familiar with allows them to make value comparisons at the pump and quickly compare street signage with various stations. It would be costly to manufacture dispensers that can indicate in both mass and equivalent gallons.

Proposal Two, Mass Compromise Version was supported by numerous weights and measures officials who favor a “traceable unit.” Equivalent values are not NIST traceable units of measurement. The equipment currently is able to indicate in mass units. There are several products that allow for supplemental information to be posted (e.g., paint and fertilizer.) Natural gas composition fluctuates and the equivalent values have not been validated. With new fuels being developed, the correct decision needs to be made on this matter, because it may affect future proposals brought before the Conference. The NIST S&T Technical Advisor requested that FALS review the references and data that was used to determine the values on the equivalent units. The FALS has agreed to put together a WG and provide additional feedback on this area.

The L&R Committee agreed to move Proposal One, “Volume Equivalent Compromise” version with revisions as addressed during the NGSC work session and open hearings. The Committee modified the language in Section 2.27.2.1. and 2.27.2.3. to add the language “or mass” to the last sentence in each section and moved this forward as a Voting item.

2.27.2.1. Method of Retail Sale. – All compressed natural gas kept, offered, or exposed for sale and sold at retail as a vehicle fuel shall be measured in terms of mass, and indicated in the gasoline liter equivalent (GLE), ~~or~~ gasoline gallon equivalent (GGE), diesel liter equivalent (DLE), ~~or~~ diesel gallon equivalent (DGE) units, or mass.

2.27.2.3. Method of Retail Sale. – All liquefied natural gas kept, offered, or exposed for sale and sold at retail as a vehicle fuel shall be measured in mass, and indicated in diesel liter equivalent (DLE), ~~or~~ diesel gallon equivalent (DGE) units, or mass.

2015 NCWM Annual Meeting: A joint session was held with the L&R and S&T Committees to hear this item along with Item 237-1 of the L&R report and S&T Item 337-1. (Documentation for the S&T Item 337-1 can be found within the S&T Committee report.) Mr. Matthew Curran (FALS Chair) provided the following modifications to the language as it appeared in NCWM Publication 16 (2015):

Under 2.27.1. Definitions (note renumbering of sections will be done editorially by NIST)

- Delete in its entirety Section 2.27.1.2. Gasoline Liter Equivalent (GLE).
- Under 2.27.1.3. remove metric equivalent 2.567 kg.
- Delete in its entirety Section 2.27.1.4. Diesel Liter Equivalent (DLE).

Under 2.27.2. Method of Retail Sale and Dispenser Labeling

- Under this section strike the term “is equal to” and replace with “means.”
- Under 2.27.2.1. strike the terms equivalent (GLE) or gasoline. Strike diesel liter equivalent (DLE).
- Under 2.27.2.2. strike the term “kilogram.” Strike “1 Gasoline Liter Equivalent (GLE) is equal to means 0.678 kg of Natural Gas.”
- Under 2.27.2.3. strike the term “liter equivalent (DLE), diesel.”
- Under 2.27.2.4. strike the term “kilogram (kg) or”. Strike “1 Diesel Liter Equivalent (DLE) ~~is equal to means 0.726 kg of Liquefied Natural Gas~~” **or**. In the last sentence strike “consistent with the method of sale used.” Change the term “and” to “or” Compressed Natural Gas **and or** “1 Diesel Gallon Equivalent (DGE).”

The Committee acknowledged receiving letters in support of this proposal and that the majority of comments made during the open hearings were also in support of the proposal. It was noted that measurement principles, value comparisons, traceability (**Note:** equivalents are not traceable) need to be analyzed. It is difficult to work with equivalent values that fluctuate in value. There is a task group under the FALS that is currently looking at the equivalent numbers. It was also questioned whether both proposals were reviewed and considered in detail. A corrected document was received for Appendix A, Background and Justification for NIST Handbook 130, Definition of “Diesel Gallon Equivalent (DGE)” of Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) as a Vehicular Fuel.

A majority of the Committee believes that the changes submitted during open hearings are fully developed and will align with language proposed in S&T Item 337-1. The language changes support clarifying that two types of natural gas exist as a motor vehicle fuel [compressed and liquefied]. Additionally, the proposal makes it clear that the method of sale for compressed natural gas may be either GGE, DGE, or mass, and for liquefied natural gas the method of sale may be DGE or mass; however, all natural gas sold as a vehicle fuel shall be measured in mass. This item along with Item 237-1 and S&T Item 337-1 received a split vote, therefore it was returned to the Committee.

At the 2016 NCWM Interim Meeting, a joint session was held with the S&T Committee to discuss combined Natural Gas items. It was agreed that a device requirement reflected in NIST Handbook 44 would require all printed receipts to include a statement of total quantity delivered in terms of mass when gallon equivalent units are used as the primary method of sale. Dr. Curran (Florida) remarked that the SWMA has provided compromised language in their fall regional report and urges the Committee to make this a Voting item. Mr. Randy Moses (Wayne) stated they will not be manufacturing dual level displays and this would affect all point of sale devices. Mr. Ross Anderson (retired New York Director) stated that the buyer and seller decides how a product is sold, over time this becomes tradition, and this determination is not a weights and measures role. Several state directors and stakeholders recommended that the Committee move the language in the current publication forward as a Voting item. A NIST Technical Advisor again reiterated the NIST Technical Analysis of S&T Item 337-1 is on the NCWM website. Ms. Angela Godwin (Ventura County, California) prefers the NIST language proposal but believes the SWMA has language that is fair and consistent. Mr. Ron Hayes (Missouri) remarked that the entire world sells natural gas by mass. We may mislead the public if we allow equivalent units. The Committee reviewed all comments and recommended that the language in NCWM Publication 15 moved forward as a Voting item.

At the 2016 NCWM Annual Meeting, a joint open hearing session was held with S&T Committee to hear testimony on the NCG/LNG agenda items. Mr. Jeff Clarke remarked that the Conference should adopt a uniform standard that is used by all states. Mr. Randy Moses suggest changing the language to have the conversion at the end of the receipt in mass. NIST/OWM submitted a technical analysis to the Committee that expresses that a method of sale should provide uniformity, transparency, and accuracy. Ms. Butcher also discussed weights and measures principles, limited supporting data, supplemental information, among many other factors to be reviewed when considering this item. Dr. Curran (FALS Chair) remarked that there is a CNG/LNG Equivalent Values informal focus group but they do not have an official position. Some states expressed support for this item and remarked this is what their customers are supporting. Several states remarked that they currently have in law that permit these fuels to be sold by equivalent units. Some commented that this needs to align with the current tax regulation. Again, the topic of the dual display was discussed as well as whether this would cause consumer confusion.

Regional Association Comments:

At the 2015 WWMA Annual Meeting, there was support from seven regulators for this to be a Voting item. One regulator objected to the fact that it violates weights and measures principles and referred the audience to the NIST, OWM Technical Analysis document against the use of equivalent units for natural gas. Another regulator would like a grandfather period of ten years and then a conversion to mass units on dispensers and advertising. WWMA believes this item is fully developed with the recommended amendments to Section 2.27.2.2. Dispenser Labeling and 2.27.2.4. Dispenser Labeling of Retail Liquefied Natural Gas), which emphasizes that the dispenser labeling is only needed when the equivalent units are used (not necessary when indications are in mass). WWMA recommended that this item be a Voting item as amended below:

2.27.2. Method of Retail Sale and Dispenser Labeling.

2.27.2.1. Method of Retail Sale. – All **compressed** natural gas kept, offered, or exposed for sale and sold at retail as a vehicle fuel shall be **measured** in terms of **mass, and indicated in** the gasoline ~~liter equivalent (GLE)~~, ~~or gasoline~~ gallon equivalent (GGE), **diesel gallon equivalent (DGE) units or mass.**

2.27.2.2. Dispenser Labeling Compressed Natural Gas. – All retail **compressed** natural gas dispensers **indicating in equivalent units** shall be labeled with the **equivalent** conversion factor in terms of **kilograms or pounds (lb)**. The label shall be permanently and conspicuously displayed on the face of the dispenser and shall have ~~either~~ the statement “1 Gasoline Gallon Equivalent (GGE) ~~is equal to means~~ 5.660 lb of **Compressed Natural Gas**” **or “1 Diesel Gallon Equivalent (DGE) means 6.384 lb of Compressed Natural Gas”** consistent with the method of sale used.

2.27.2.3. Method of Retail Sale. – **All liquefied natural gas kept, offered, or exposed for sale and sold at retail as a vehicle fuel shall be measured in mass, and indicated in diesel 1 gallon equivalent (DGE) units, or mass.**

2.27.2.4. Dispenser Labeling of Retail Liquefied Natural Gas. – **All retail liquefied natural gas dispensers indicating in equivalent units shall be labeled with the equivalent conversion factor in terms of pounds (lb). The label shall be permanently and conspicuously displayed on the face of the dispenser and shall have the statement “1 Diesel Gallon Equivalent (DGE) means 6.059 lb of Liquefied Natural Gas.”**

(Amended 20XX)

At the 2015 CWMA Interim Meeting, an industry representative from National Association of Convenience Stores (NACS), National Association of Truck Stop Operators (NATSO), Petroleum Marketers Association of America (PMAA) and Society of Independent Gasoline Marketers of America (SIGMA) supported this proposal as a Voting item and further stated that it strikes the appropriate compromise for regulators and consumers. He urged the group to maintain relevance by moving this issue forward. A state regulator commented that there should be a reference at the point of sale that indicates a mass reading such as pounds since the volume of gallons is not based on energy but only on weight. Instead of comparing energy content to energy content, this equivalency factor would only equate weight with weight. The industry representative indicated that whatever is on the price sign must be exactly what is on the pump. The industry representative also indicated that the industry would not have issue with having an equivalency statement on the pump. A state regulator commented that this proposal should move forward as a Voting item. A state regulator commented that tax officials in his state had a difficult time understanding the equivalency concepts and how to apply tax to those equivalencies. He believes the disparity between a diesel gallon equivalent and a gasoline gallon equivalent will be very problematic and confusing. The industry representative commented that while the diesel and gasoline gallon equivalents are different conversion factors today, he anticipates the conversion factor becoming a single equivalency rate in the near future. A state regulator commented that until a study is done to determine the economic impact of this proposal regarding assessing tax of the product per pound, the proposal should be Withdrawn. The state industry representative reminded the group that this body is contributing to consumer confusion and runs the risk of irrelevancy if the Conference does not move this proposal forward. A state regulator commented that politics has gotten interjected into a scientific discussion, but this is one of the rare occasions where elected politicians have come to the Conference and told regulators what they want and what they need, even though it may not be the best measurement method. Another state regulator commented that he disagreed with this statement, and suggested it is the role of the regulatory community to be the stopgap to advise policy makers of the best metrological provable and traceable units. Since there is no new information or data forthcoming, CWMA recommended that this item be a Voting item.

At the 2015 NEWMA Interim Meeting, no comments were heard on the item. NEWMA believes the item is fully developed and recommended that it be a Voting item.

At the 2015 SWMA Annual Meeting, these items were heard along with S&T Item 337-1. Dr. Matthew Curran (Florida) expressed concerns about the community not being able to get this issue addressed, for the industry and marketplace, and cited four general possible options for this item; adopt mass method of sale; adopt volume equivalent method of sale; adopt a dual/alternating display system; or withdraw it. Dr. Curran noted that the issue failed to pass

the last two years as members appear to be firmly entrenched in their mass or volume equivalent positions, so the first two options are not possible. He felt the item would find the same fate if we didn't think "outside of the box" and find a solution. He added that the fourth option (to withdraw the items) wasn't a preferred option since it would lead to individual state adoption or boutique markets. Dr. Curran felt the third option was worth exploring and provided suggested language for a dual/alternating display to use as a jumping off point, but challenged the community to get creative and come up with other ideas to move this item forward, if they felt this proposal wasn't acceptable. The language would not be effective until 2020, or another date decided by the membership, and it would be non-retroactive to prevent industry from having to replace existing devices. An industry member stated they were concerned over potential consumer confusion with a dual/alternating display option. Mr. Gordon Johnson (Gilbarco) replied that it would cost between \$400,000 to \$600,000 to redesign the face of the dispensers. Mr. Johnson was reminded that the toggle switch option had been suggested when this idea was first brought to the table two years ago. Mr. Johnson also added that all their resources were occupied with the credit card reader changes. He further stated that some of his customers require NTEP approval, but they can't get NTEP approved dispensers until this issue is resolved. Mr. Johnson did state he would take this idea back to discuss with his company. A representative from Wayne Fueling Systems agreed with Mr. Johnson's comments. Ms. Carol Hockert (NIST) added that they have witnessed testing occurring in the field based on the volume equivalent and not mass (as is read by the instrument). The SWMA submitted revisions to the following Sections 2.27.2. Method of Retail Sale, 2.27.2.2. Dispenser Labeling, and 2.27.2.3. Method of Retail Sale. The SWMA believes that it is fully developed and recommended that it be a Voting item.

2.27. Retail Sales of Natural Gas Sold as a Vehicle Fuel.

2.27.1. Definitions.

2.27.1.1. Compressed Natural Gas (CNG). – A gaseous fuel composed primarily of methane that is suitable for compression and dispensing into a fuel storage container(s) for use as an engine fuel.

~~2.27.1.2. Gasoline Liter Equivalent (GLE).~~ – ~~Gasoline liter equivalent (GLE) means 0.678 kg of natural gas.~~

~~2.27.1.2.3. Gasoline Gallon Equivalent (GGE).~~ – Gasoline gallon equivalent (GGE) means 2.567 kg (5.660 lb) of compressed natural gas.

2.27.1.3. Diesel Gallon Equivalent (DGE). – Diesel gallon equivalent means 6.384 lb of compressed natural gas or 6.059 lb of liquefied natural gas.

2.27.1.4. Liquefied Natural Gas (LNG). – Natural gas which is predominantly methane that has been – 162 °C (– 260 °F) at 14.696 psia and stored in insulated cryogenic fuel storage tanks for use as an engine fuel.

2.27.2. Method of Retail Sale and Dispenser Labeling.

2.27.2.1. Method of Retail Sale. – All compressed natural gas kept, offered, or exposed for sale and sold at retail as a vehicle fuel shall be measured in terms of mass, and indicated in the gasoline ~~liter equivalent (GLE), or gasoline~~ gallon equivalent (GGE), diesel gallon equivalent (DGE) units and or mass. Equivalent and mass units need not be displayed simultaneously, but may be displayed individually through customer activated controls.

(Non-retroactive as of January 1, 2020)

2.27.2.2. Dispenser Labeling Compressed Natural Gas. – All retail compressed natural gas dispensers shall be labeled with the equivalent conversion factor in terms of ~~kilograms or~~ pounds (**lb**). The label shall be permanently and conspicuously displayed on the face of the dispenser and shall have ~~either~~ the statement "1 Gasoline Gallon Equivalent (GGE) ~~is equal to means~~ 5.660 lb of Compressed Natural Gas" or "1 Diesel Gallon Equivalent (DGE) means 6.384 lb of Compressed Natural Gas" ~~consistent with the method of sale used.~~

2.27.2.3. Method of Retail Sale. – All liquefied natural gas kept, offered, or exposed for sale and sold at retail as a vehicle fuel shall be measured in mass, and indicated in diesel 1 gallon equivalent (DGE) units, and ~~or~~ mass. Equivalent and mass units need not be displayed simultaneously, but may be displayed individually through customer activated controls.

(Non-retroactive as of January 1, 2020)

2.27.2.4. Dispenser Labeling of Retail Liquefied Natural Gas. – All retail liquefied natural gas dispensers shall be labeled with the equivalent conversion factor in terms of pounds (lb). The label shall be permanently and conspicuously displayed on the face of the dispenser and shall have the statement “1 Diesel Gallon Equivalent (DGE) means 6.059 lb of Liquefied Natural Gas”.

(Amended 20XX)

At the 2016 NEWMA Annual Meeting, Mr. Ethan Bogren (Chair of the WG) commented that new language is being proposed under S&T Item 337-2. There is one change to the current language in this item, found under printer requirements NIST Handbook 44, Section S.6.(b) that states anytime an equivalency value is used for method of sale, the corresponding quantity in mass must be listed on the receipt. An industry representative with fuel marketing and retail groups directed a question to the representative from Gilbarco – is what gets printed on the receipt a point of sale issue or a method of sale issue? The Gilbarco representative commented it was a point of sale issue. The fuel marketer representative asked if this was practically achievable in the equipment world. Mr. Bogren indicated that discussion during WG meetings seemed to indicate it was practical – only one line would be added to the receipt. The Gilbarco representative indicated that his company cannot currently convert an equivalency value into mass onto a receipt. This issue was discussed with other manufacturers, and it is feasible but does not currently exist. Another fuel marketer industry representative commented that the information from the dispenser to the point of sale is programmed to convey the sales transaction information. He further commented that under this new option, the conversion calculation would become the responsibility of the point of sale manufacturers to accurately capture that conversion. A retired regulator commented that there is no requirement for dual pump displays, so why this information? He added that a single conversion statement could be added as a line of text, but not the calculation itself. Mr. Bogren commented that without this change, the WG would be submitting the same item that has failed for the past three years. The representative from Wayne Fueling commented he thinks this provision is possible, but is not recommending it. A retired state weights and measures official commented that the sellers and the buyers don't care about this, and regulators should not be interfering. Mr. Bogren explained that altering the point of sale (POS) software is a relatively easy way to introduce something new for the Conference to consider. An industry representative from the fuel marketers commented that he is concerned that the POS companies should be consulted on this proposal. Mr. Bogren commented that there were POS industry attendees at the joint session who had an opportunity to comment on this proposal, and they did not object. The fuel marketer industry representative indicated that his members were trying to gather information from their vendors. The NIST Technical Advisor commented items that are designated as Voting are considered fully developed. If they are not technically fully developed, their status may need to be deescalated. NEWMA considers this item to be fully developed and ready as a Voting item.

At the 2016 CWMA Annual Meeting, there was considerable discussion; the Committee was split evenly as to whether the item should move forward with Voting status or be Withdrawn. During the voting session, a state regulator from Kansas indicated he wondered why we are essentially proposing selling one item as two items (GGE and DGE). A state regulator from Minnesota commented that the item was fully developed and should move forward as a Voting item. A state regulator from Missouri stated that the Central Region should differentiate between actual support of the item and recommending it move forward as a Voting item strictly because it is fully developed. A state regulator commented that the region's views be stated in the regional report, including the comment that the region was divided in its support of the item. An API representative commented that if the body does not pass this provision, each state will enact its own version of this law. A state regulator from Missouri indicated there may be some additional language that modifies the proposal during the Annual Meeting in July. Following a hand vote, the region determined the item should move forward as a Voting item with the proposed change: 2.27.1.4. Liquefied Natural Gas 14.696 psi should read 14.696 psia.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 100th National Conference on Weights and Measures" (SP 1210, 2015).

232-9 I Section 2.XX. Automatic Transmission Fluid. (See Related Item 237-4)

Source:

American Petroleum Institute (2016)

Purpose:

Define how transmission fluids shall be identified in the marketplace on delivery documents, invoices, and receipts from service.

Item under Consideration:

Amend NIST Handbook 130, Uniform Regulation for the Method of Sale of Commodities as follows:

2.XX. Automatic Transmission Fluid.

2.XX.1. Labeling of Automatic Transmission Fluid. – Automatic transmission fluid shall be labeled.

2.XX.1. Labeling. – The label on a container of automatic transmission fluid, as well as the invoice or receipt from bulk distribution and service on an automatic transmission that includes the installation of automatic transmission fluid dispensed from a receptacle, dispenser, or storage tank shall not contain any information that is false or misleading.

(a) In addition, each packaged container shall be labeled with the following:

- (1) the brand name;**
- (2) the name and place of business of the manufacturer, packer, seller, or distributor;**
- (3) the words “Automatic Transmission Fluid”;**
- (4) the performance claim or claims for the fluid; and**
- (5) an accurate statement of the quantity of the contents in terms of liquid measure.**

(b) Each receptacle and/or storage tank of automatic transmission fluid shall be labeled with the following:

- (1) the brand name;**
- (2) the name and place of business of the manufacturer, packer, seller, or distributor;**
- (3) the performance claim or claims for the fluid; and**
- (4) the words “Automatic Transmission Fluid.”**

2.XX.2. Documentation of Claims Made Upon Product Label. – Any manufacturer, packer, or distributor of any product subject to this article and sold in this state shall provide, upon request of duly authorized representatives of the Director, documentation of any claim made upon their product label.

(Added 20XX)

Background/Discussion:

Many original equipment manufacturers (OEMs) set their own transmission fluid standards and recommend that consumers use these fluids in their designated applications. However, the current version of NIST Handbook 130 does not adequately define how transmission fluids shall be identified in the marketplace on delivery documents and

invoices and receipts from service. Requiring more specific information on invoices and receipts will provide some assurance to consumers that recommended automatic transmission fluids are being installed in their cars and trucks.

The changes proposed are consistent with those approved for gasoline and diesel engine (motor) oils sold in packages or dispensed from bulk containers.

At the 2016 NCWM Interim Meeting, Dr. Curran (FALS Chair) recommended that this (and related Item 237-4) be an Information item, so -the language can be worked on. Several members supported additional work on this proposal. The Committee recommends this as an Informational item.

At the 2016 NCWM Annual Meeting, Mr. Ferrick (API) submitted modified language to FALS and the Committee for consideration. The Committee moved forward this language and looks forward to receiving feedback from the Fall Regional Meetings.

Regional Association Comments:

At the 2015 WWMA Annual Meeting, Mr. Ferrick remarked that there is a need to revise the way automatic transmission fluids (ATF) are identified in the marketplace on delivery documents, invoices, and receipts from service. He stated that many original equipment manufacturers (OEMs) set their own transmission fluid standards and recommend that consumers use these fluids in their designated applications. In many cases, these standards are unique to the OEM's transmissions, and must be used to ensure proper operation. However, the current version of NIST Handbook 130 does not adequately define how transmission fluids are identified in the marketplace on delivery documents, invoices and receipts. Requiring more specific information on invoices and receipts will provide some assurance to consumers that recommended automatic transmission fluids are being installed in their cars and trucks. Proper identification will also assist state weights and measures officials in determining performance claims for transmission fluids sold in bulk in their states. Additionally, the changes proposed are consistent with those approved for gasoline and diesel engine (motor) oils sold in packages or dispensed from bulk. A regulator expressed concerns for the term and definition of "performance claim for fluid" since it would be challenging to enforce. He requested additional clarification at the NCWM with a possible amendment to add "performance claims" refers to additives, not ATF. WWMA forwarded the item to NCWM, recommending it as a Voting item with the following recommended editorial changes to renumber sections:

- 2.XX.1. to 2.XX.1.1. Labeling
- 2.XX.2. to 2.XX.1.2. Documentation of Claims Made Upon Product Label
- Remove the word "packaged" from the proposed language: ("In addition, each ~~packaged~~ container shall be labeled with the following") striking the word "packaged" is appropriate because a container is a package. Other sections in this regulation refer to a "container, receptacle, dispenser, storage tank." In no other place is a container described as a "packaged container."

At the 2015 CWMA Interim Meeting, an American Petroleum Institute (API) representative remarked that NIST Handbook 130 does not allow for proper identification of transmission fluids sold in states, and API supports adding new language for both the Method of Sale and Engine Fuels and Automotive Lubricants Regulations. He indicated the term "receptacle" might need to be changed in the proposal as well as performance claim language to performance specification instead. He explained that most OEMs engine manufacturers have their own transmission fluid standards, unlike motor oil. An industry representative from the Automotive Oil Change Association commented that one possibility could be a part number for transmission fluid labeling. Most OEMs will provide a preferred brand as well as at least one alternate option. Industry representatives recommended this proposal continue as a Developing item. A state regulator commented this is an important proposal and should move forward, but should have time to be fully vetted. CWMA believes that industry will continue to work on collaboration and education regarding this item and believes the item is sufficiently developed. CWMA forwarded the item to NCWM, recommending that it be a Voting item.

At the 2015 NEWMA Interim Meeting, a representative from the American Petroleum Institute (API) remarked that this item is intended to add some definition to transmission fluid so the consumer knows what they are getting, and it is properly labeled. A state regulator asked how the product is displayed or where it is stored at a retail oil change facility. He also asked if you have a service station with a permanent tank for transmission fluid, do they pour one type over another. The API representative said that different types of transmission fluids should not be commingled,

but common ATF's from different manufacturers can be commingled. Another state regulator asked for clarification on why item 3.14.(d), "duty type" was changed to "the performance claim or claims for the fluid?" Some who attended the CWMA Meeting commented that API made comments during that meeting in regards to the change, and API would provide further clarification at the 2016 NCWM Interim Meeting. NEWMA considered this item to be fully developed and forwarded it to NCWM, recommending it as a Voting item.

At the 2015 SWMA Annual Meeting, Mr. Ferrick stated that the proposed language has been shared with the WWMA, the CWMA, NEWMA, API's Lubricants Group, AOCA, and others. The WWMA raised some concerns about the term "performance claim" vs "duty cycle," and agreed there should be more suitable wording. API's plan is to provide an amended version in time for the NCWM 2016 Interim Meeting. It was noted that NIST provided some formatting edits and API recommends this version be submitted for inclusion into NCWM Publication 15. Dr. Curran (FALS Chair) stated that the FALS Committee would review the item and have comments for the 2016 NCWM Interim Meeting. The SWMA supported the item with the formatting changes recommended by NIST (also refer to Item 237-4) and more suitable language for the term "performance claim," which is expected to be addressed at the 2016 NCWM Interim Meeting. SWMA is recommending that this be a Voting item.

At the 2016 NEWMA Meeting, Mr. Ferrick stated this item should be an Informational item with new language coming in subsequent meetings. NEWMA awaits the new language and recommended that this item remain an Informational item.

At the 2016 CWMA Meeting, Mr. Ferrick commented the item should remain informational until additional details are compiled and presented to FALS

232-10 D Electric Watthour

Source:

NIST, OWM (2016)

Purpose:

1. Make the weights and measures community aware of work being done within the U.S. National Work Group on Electric Vehicle Fueling and Submetering to develop proposed requirements for electric watthour meters used in submeter applications in residences and businesses.
2. Encourage participation in this work by interested regulatory officials, manufacturers, and users of electric submeters.
3. Allow an opportunity for the USNWG to provide regular updates to the S&T Committee and the weights and measures community on the progress of this work.
4. Allow the USWNG to vet specific proposals as input is needed.

Item Under Consideration:

Create a "Developing Item" for inclusion on the NCWM S&T Committee Agenda (and a corresponding item is proposed for inclusion on the L&R Committee Agenda) where progress of the USNWG can be reported as it develops legal metrology requirements for electric watthour meters and continues work to develop test procedures and test equipment standards. The following narrative is proposed for this item:

In 2012, NIST, OWM formed the U.S. National Working Group on Electric Vehicle Fueling and Submetering to develop proposed requirements for commercial electricity-measuring devices (including those used in submetering electricity at residential and business locations and those used to measure and sell electricity dispensed as a vehicle fuel) and to ensure that the prescribed methodologies and standards facilitate measurements that are traceable to the International System of Units (SI).

In 2013, the NCWM adopted changes recommended by the USNWG to the NIST Handbook 130 requirements for the Method of Sale of Commodities to specify the method of sale for electric vehicle

refueling. At the 2015 NCWM Annual Meeting, the NCWM adopted NIST Handbook 44 Section 3.40. Electric Vehicle Refueling Systems developed by the USNWG.

This Developing item is included on the Committee's agenda (and a corresponding item is proposed for inclusion on the L&R Committee Agenda) to keep the weights and measures community apprised of USNWG current projects, including the following:

- The USNWG continues to develop recommended test procedures for inclusion in a new EPO 30 for Electric Vehicle Refueling Equipment along with proposed requirements for field test standards.
- The USNWG is continuing work to develop a proposed code for electricity-measuring devices used in sub-metering electricity at residential and business locations. This does not include metering systems under the jurisdiction of public utilities. The USNWG hopes to have a draft code for consideration by the community in the 2016-2107 NCWM cycle.

The USNWG will provide regular updates on the progress of this work and welcomes input from the community.

For additional information, contact USNWG Chair Ms. Tina Butcher at tbutcher@nist.gov or (301) 975-2196 or Technical Advisor, Ms. Juana Williams at Juana.williams@nist.gov or (301) 975-3989

237 NIST HANDBOOK 130 – UNIFORM ENGINE FUELS AND AUTOMOTIVE LUBRICANTS REGULATION

237-1 V Sections 1.36. Liquefied Natural Gas (LNG) and 3.11. Compressed Natural Gas (CNG)

(This item was Adopted.)

Source:

Clean Vehicle Education Foundation (2013)

Purpose:

Enable consumers to make cost and fuel economy comparisons between diesel fuel and natural gas.

Item under Consideration: Amend NIST Handbook 130, Uniform Engine Fuels and Automotive Lubricants Regulation as follows:

Section 1. Definitions

1.36. Liquefied Natural Gas (LNG). – Natural gas that has been liquefied at – 162 °C (– ~~259~~260 °F) and stored in insulated cryogenic tanks for use as an engine fuel.

(Amended 2016)

Section 3. Classification and Method of Sale of Petroleum Products

3.11. Compressed Natural Gas (CNG).

3.11.1. How Compressed Natural Gas is to be Identified. – For the purposes of this regulation, compressed natural gas shall be identified by the term “Compressed Natural Gas” or “CNG.”

3.11.2. Retail Sales of Compressed Natural Gas Sold as a Vehicle Fuel.

~~**3.11.2.1. Method of Retail Sale.**— All CNG kept, offered, or exposed for sale or sold at retail as a vehicle fuel shall be in terms of the gasoline liter equivalent (GLE) gasoline gallon equivalent (GGE).~~

3.11.2.2~~1~~. Retail Dispenser Labeling.

~~**3.11.2.2~~1~~.1. Identification of Product.** – Each retail dispenser of CNG shall be labeled as “Compressed Natural Gas.”~~

~~**3.11.2.2.2. Conversion Factor.**— All retail CNG dispensers shall be labeled with the conversion factor in terms of kilograms or pounds. The label shall be permanently and conspicuously displayed on the face of the dispenser and shall have either the statements “1 Gasoline Liter Equivalent (GLE) is equal to 0.678 kg of Natural Gas” “1 Gasoline Gallon Equivalent (GGE) is equal to 5.660 lb of Natural Gas consistent with the method of sale used.~~

~~**3.11.2.2~~1~~.3. Pressure.** – CNG is dispensed into vehicle fuel containers with working pressures of ~~16 574 kPa~~, 20 684 kPa (**3000 psi**), or 24 821 kPa (**3600 psi**). The dispenser shall be labeled ~~16 574 kPa~~, 20 684 kPa (**3000 psi**), or 24 821 kPa (**3600 psi**) corresponding to the pressure of the CNG dispensed by each fueling hose.~~

(Amended 2016)

~~**3.11.2.2~~1~~.4.3. NFPA Labeling.** – NFPA Labeling requirements also apply. (Refer to NFPA 52.)~~

3.11.3. Nozzle Requirements for CNG. – CNG fueling nozzles shall comply with ANSI/AGA/CGA NGV 1.

Background/Discussion:

The gasoline gallon equivalent (GGE) unit was defined by NCWM in 1994 to allow users of natural gas vehicles to readily compare costs and fuel economy of light-duty compressed natural gas vehicles with equivalent gasoline powered vehicles. For the medium and heavy duty natural gas vehicles in widespread use today, there is a need to officially define a unit (already in widespread use) allowing a comparison of cost and fuel economy with diesel powered vehicles. The submitter stated that the official definition of a diesel liter equivalent (DLE) and a diesel gallon equivalent (DGE) will likely provide justification for California, Wisconsin, and many other states to permit retail sales of CNG for heavy-duty vehicles in these convenient units. The mathematics justifying the specific quantity (mass) of compressed natural gas in a DLE and DGE (please refer to the “Report of the 99th National Conference on Weights and Measures” (SP1193, 2014).

At the 2014 NCWM Interim Meeting, Mr. Albuquerque (Chair, National Gas Steering Committee) notified the Committee that this item was actively being developed by the National Gas Steering Committee.

The L&R Committee is responded to the NGSC’s June 10, 2014, request to change the NGSC’s March 2014 recommendation for DGE units. The L&R Committee agreed that the CNG and LNG conversion factors proposed for use in converting these gases to DGE units should be revised in the 2014 Interim Report so that their numerical values are expressed to three decimal places rather than two decimal places. These changes are reflected in the following proposed modifications to Section 1. Definitions 1.XX., and to the proposed new definition for “diesel gallon equivalent” to read: 1 Diesel Gallon Equivalent (DGE) is ~~6.380~~ 6.384 pounds of Compressed Natural Gas and 1 Diesel Gallon Equivalent of Liquefied Natural Gas is ~~6.060~~ 6.059 pounds.

At the 2014 NCWM Annual Meeting, a joint session was held with L&R and S&T Committees to hear this item. It was noted that if the L&R Committee did not move Item 232-3 forward, there would be no reason to proceed with Item 237-2 and S&T Item 337-2 as it appeared in the “Report of the 98th National Conference on Weights and Measures.” There was discussion regarding the term “approximately equal” in Sections 2.27.2.2. and 2.27.2.4. It was noted this term was not a measurement equivalency but equal to in energy content. It was recommended the Committee give consideration to amend the definition and clarify the meaning. Some spoke in opposition that this item would cause consumer confusion in the marketplace, if adopted. Several members questioned where IRS

obtained the numbers used on the IRS tax form. NIST provided an alternative proposal and several members believed this proposal should be taken into consideration. Since the proposal from the NGSC was not released until June 10, 2014, members felt they did not have enough time to vet the modification or the NIST proposal. The Committee reviewed numerous letters in support of all the items that reflect this issue.

March 2014 Natural Gas Steering Committee Report to the L&R and S&T Committees:

The Natural Gas Steering Committee (NGSC) was formed in July 2013 to help understand and educate the NCWM membership regarding the technical issues surrounding the proposed changes to NIST Handbooks 44 and 130 submitted by the Clean Vehicle Education Foundation (CVEF), the anticipated impact of the proposed changes, and issues related to implementation requirements when compressed natural gas (CNG) and liquefied natural gas (LNG) are dispensed and sold as a retail engine fuel in gallon equivalent units.

At the NCWM Interim Meeting, in January 2014, Mahesh Albuquerque, Chair of the NGSC provided the S&T and L&R Committees with an update from the NGSC, including proposed revisions to the proposals submitted by the CVEF. The NGSC heard comments from the floor related to the proposed revisions and requested additional time to further develop its recommendations. The S&T and L&R Committees agreed to allow the NGSC additional time to meet and develop alternative proposals to those on the S&T and L&R Committees January 2014 agendas, with the expectation that the NGSC recommendations would be ready for inclusion in NCWM Publication 16, and moved forward as a Voting item at the July 2014 NCWM Annual Meeting.

Summary of NGSC Meeting Discussions:

The NGSC met weekly following the January 2014 Interim Meeting and focused on modifying the Clean Vehicle Education Foundation (CVEF) 2013 proposals for the recognition of diesel gallon equivalent (DGE) units for CNG/LNG dispenser indications and the method of sale for these two natural gas alternative engine fuels. The NGSC reviewed multiple modifications to those proposals including:

- limiting sales to a single unit of mass measurement enforceable by 2016;
- requiring indications in mass and gasoline and diesel gallon equivalents, while phasing in mass only units;
- require sale by mass as the primary means, but allow for the simultaneous display of volume equivalent units, so long as the purchaser always had access to the mass (traceable) measurement; and
- a proposal from NIST, OWM which would allow the posting of supplemental information to assist consumers in making value comparisons and for use by taxation/other agencies, but requiring the phase in of indications in mass

The NGSC received:

- input from Department of Energy (DOE) on the latest edition of the DOE TRANSPORTATION ENERGY DATA BOOK: EDITION 32 July 2013 available on the Oak Ridge National Laboratory website at: <http://cta.ornl.gov/data/index.shtml>;
- updates from CNG (3) and LNG (1) dispenser manufacturers indicating their dispensing systems comply with the requirements in the handbooks and have the capability to indicate a sale in a single unit of measurement, and any further input on adding displays to the cabinet for additional units would require further cost analysis; while one original equipment manufacturer indicated use of their LNG RMFD in a fleet operation where indications are only in the DGE; and
- feedback from committee members related to the pros and cons of requiring the indication of sale in mass or gallon equivalent units, including traceability, equipment capabilities, marketplace considerations, and units used by state and federal agencies.

Also noted in the NGSC discussions were:

- how a gallon equivalent unit is derived using energy content, and that the gallon equivalent is defined and measured in terms of mass, not volume;

- for the last 20 years, NIST Handbook 44 and NIST Handbook 130 have required all dispensing equipment to indicate deliveries of natural gas in GGE units to consumers, and in mass units for inspection and testing purposes. CNG RMFD equipment in the most states comply with the requirements in the handbooks;
- international practices for indicating CNG and LNG engine fuel deliveries are predominantly mass; Canada requires LNG indications in the kilogram and the corresponding OIML R 139 “Compressed gaseous fuel measuring systems for vehicles” standard requires indication of the measured gas in mass;
- the variations in engine efficiency relative to a single conversion factor based on an averaged energy content for LNG and the primary focus of the driving public and fleets on mileage rather than petroleum products no longer used to fuel their vehicles;
- the work ahead over the next year by ASTM Committees to develop current CNG and LNG fuel quality standards which will need to be referenced in NIST Handbook 130;
- differences in the measurement of the gallon and kilogram – since the gallon is a volume measurement and not an energy measurement, and the NIST Handbook 44 Mass Flow Meters Code includes a requirement for volume-measuring devices with ATC used in natural gas applications to be equipped with an automatic means to make corrections, if the device is affected by changes in the properties of the product; it was also noted that U.S. gasoline and diesel dispensers are not required to have ATC; whereas ATC does occur in sales at the wholesale level;
- how traceability applies to the measurement results at each level of the custody chain (to include the determination of the uncertainty of all calibrations and use of an appropriate unit of measurement); and
- the capabilities of equipment in the marketplace.

A DOE representative supported the use of gallon equivalents, and pointed out that they are used in the DOE Transportation Energy Data Book. The DOE representative also pointed out other federal agencies including the IRS were requiring use of gallon equivalent units for reporting.

Industry representatives on the NGSC indicated they are actively campaigning to their state and federal offices, encouraging each government branch to recognize sales of CNG and LNG in gasoline and diesel volume equivalent units. Industry sectors represented on the NGSC indicated that their customers are satisfied with the averaged fuel energy values that correspond to the conversion factors for CNG and LNG, with only one exception. The exception was a truck stop chain indicating their customers would be amenable to a single conversion factor for both fuels. The CVEF also provided a comparison of GTI’s 1992 study results and preliminary data from a 2013 study. The CVEF reported the constituents in natural gas as basically unchanged over 21 years since the NCWM first recognized the GGE. Industry unanimously opposed a recommendation for phasing in mass as the only unit of measurement, noting also that U.S. drivers would be confused by SI units while acknowledging the United States is in the minority of countries whereby delivery and sales are by equivalent units. At the conclusion of the NGSC deliberations, NGVAmerica provided the following statement:

One of the major advantages of the proposal as currently drafted with inclusion of the DGE and GGE units for natural gas is that this is a proposal that the natural gas industry can support. It further recognizes what is already the preferred practice for how natural gas is measured and dispensed. The latest proposal with DGE and GGE units provides a pathway forward toward a national consensus approach. If the proposal were to instead require use of kilograms or even pounds as the primary method of sale, industry would not support that proposal and likely would strongly oppose it this summer if NCWM were to consider it as a voting issue. Also, if NCWM finalizes on a standard that does not include DGE or GGE, industry is committed to pursuing adoption of an alternative standard on a state by state basis, which could lead to different treatment across the country. Several states have already introduced legislation to recognize the DGE standard (CA, IL, MO, and VA) and I expect more will do so later this year. And you know Colorado and Arkansas already have put in place standards that recognize the DGE units.

NGSC Recommendations:

After consideration of all of the above, the NGSC recommends alternate proposals to the L&R and S&T Committee’s agenda items that further modify and consolidate the Clean Vehicle Education Foundation 2013 proposals to include:

1. requirements for measurement in mass and indication in gallon equivalent units (NIST Handbook 44, Paragraphs S.1.3.1.1. and S.1.3.1.2.; and NIST Handbook 130, Paragraphs 3.11.2.1. and 3.12.2.1.);
2. posting of a label that has both the GGE and DGE or the GLE and DLE for CNG applications NIST (Handbook 44, Paragraphs S.5.2., S.5.3., UR.3.1.1., and UR.3.1.2; and NIST Handbook 130, Paragraphs 3.11.2.2.2. and 3.12.2.2.2.);
3. expression of all equivalent conversion factors expressed in mass units to 3 significant places beyond the decimal point for consistency (NIST Handbook 44, Paragraphs S.5.2., S.5.3., UR.3.1.1., and UR.3.1.2. and Appendix D and NIST Handbook 130, Section 1, Paragraphs 3.11.2.2.2. and 3.12.2.2.2.);
4. correction of the temperatures in the LNG definition (NIST Handbook 130, Section 1);
5. addition of 16 CFR Part 309 for CNG automotive fuel rating (NIST Handbook 130, Paragraph 3.11.2.2.5.); and
6. reference to NFPA 52 (NIST Handbook 130, Paragraph 3.12.2.2.4.)

With regards to NIST Handbook 44 the NGSC recommends withdrawing S&T agenda Items 337-1 and 337-4 and the consolidation of agenda Items 337-2, 337-3, and 337-5 into a newly revised single Voting item designated as Item 337-2 as it appeared in the “Report of the 98th National Conference on Weights and Measures.” The NGSC also recommends further modifications to corresponding NIST Handbook 130 proposals to align the definitions of related terms and method of sale with definitions, indicated delivery and dispenser labeling requirements being proposed for NIST Handbook 44.

With regards to NIST Handbook 44, the NGSC also recommends consideration of new a Developing item addressing proposed changes to paragraph S.3.6 Automatic Density Correction designated as Item 360-4. This new proposal is consistent with the NGSC decision to encourage further work beyond the current scope of their work on the CVEF’s proposals to fully address all LNG applications.

Representatives of the NGSC and the S&T and L&R Committees met in March 2014, all agreed on the course of action outlined above.

Additional Contacts: Clean Energy, Seal Beach, California, NGVAmerica, Washington, D.C., Clean Vehicle Education Foundation, Acworth, Georgia. Regional Association Comments: (Fall 2013 Input on the Committee’s 2014 Interim Agenda Items 337-1 through 337-5)

With regards to NIST Handbook 130, the NGSC recommends withdrawing L&R Agenda Items 237-1 and the consolidation of agenda Items 237-2, 237-3, and 237-5 into newly revised single Voting item designated as 237-1 in the “Report of the 98th National Conference on Weights and Measures.”

At the 2015 NCWM Interim Meeting, a joint session was held with the L&R and S&T Committees to discuss this Item 232-4 of the L&R report. Documentation for the S&T Item 337-1 can be found within the S&T report. Two proposals were addressed. Proposal One, titled “the Volume Equivalent Compromise” requires natural gas to be measured in mass and indicated in equivalent gallon units or mass. The second proposal titled, “The Mass Compromise” would require natural gas to be measured and indicated in mass with supplemental equivalent information to be displayed on the dispenser for value comparison.

Proposal One was supported by industry representatives and several weights and measures officials. Some reasons for supporting Proposal One is it will cause less consumer confusion. Having one method of sale that consumers are currently familiar with allows them to make value comparisons at the pump and quickly compare street signage with various stations. It would be costly to manufacturer dispensers that can indicate in both mass and equivalent gallons.

The second proposal was supported by numerous weights and measures officials who favor a traceable unit. Equivalent values are not NIST traceable units of measurement. The equipment currently can indicate in mass units. Currently, there are several products that allow for supplemental information to be posted (e.g., paint and fertilizer.) Natural gas composition fluctuates and the equivalent values have not been validated. With new fuels being developed, the correct decision needs to be made on this matter because it may affect future proposals bought before

the Conference. The NIST Technical Advisor requested that the FALS review the references and data that are used for the values on the equivalent units. The FALS has agreed to put together a work group and provide additional feedback on this area. After solicitation for volunteers a mixed work group comprised of FALS and NGSC members was formed and is currently functioning under the NGSC. However, should the NGSC dissolve prior to completion of this review, the work group would move under FALS.

Mr. Ethan Bogren, NGSC Chair, provided the following write up from their NGSC's meeting on January 14, 2015.

Natural Gas Steering Committee Update Report – January 14, 2015:

The NGSC has been working diligently at achieving a compromise proposal regarding the sale of CNG/LNG as an alternative motor fuel. While the group has found success in establishing a consensus opinion in many aspects of the regulations, the group remains divided as to what unit of measure should be used for primary method of sale.

As you all know, there has been a proposal submitted urging NCWM to adopt gallon equivalent units (GGE/DGE) as the primary method of sale for natural gas products to be used as an alternative motor fuel. There has been a feeling by many members of NCWM that this would be considered a diversion from the customary units in which commodities are sold in the United States causing concern.

Since a consensus regarding the units used for the primary method of sale for natural gas products was unable to be achieved the NGSC is prepared to submit two proposals to the L&R and S&T Committees for comment and review. It was agreed by NGSC members that this was the only fair way to represent the whole group.

While both proposals have many similarities, I would like to summarize the major differences regarding the method of sale as it pertains to each document.

Volume Equivalent Compromise Version: CNG/LNG shall be measured in mass and indicated in gallon equivalent units unless the weights and measures official having jurisdiction mandates otherwise through local regulation. This would make GGE/DGE units the only unit of quantity required to be displayed on the dispenser during a retail transaction.

Mass Compromise Version: CNG/LNG shall be measured in mass and indicated in mass. The display of supplemental information would also be permitted on the dispenser. This would allow GGE/DGE units to be indicated on the dispenser display face as long as it is stated the GGE/DGE units are for value comparison purposes only.

There is a willingness to accept equivalent units for advertising purposes such as street signs.

The NGSC is confident that a compromise will be found with the guidance of the S&T and L&R Committees. Along with input coming from the floor during open hearings at the NCWM Interim Meeting, a sense of which proposal best represents the body of the National Conference of Weights and Measures may be determined.

At the 2015 NCWM Interim Meeting, a joint session was held with the L&R and S&T Committees to hear this item along with Item 232-4 of the L&R report. Documentation for the S&T Item 337-1 can be found within the S&T report. Proposal One, titled "The Volume Equivalent Compromise" requires natural gas to be measured in mass and indicated in equivalent gallon units or mass. Proposal One was supported by industry representatives and several weights and measures officials. Reasons for supporting Proposal One is it will cause less consumer confusion. Having one method of sale that consumers are currently familiar with allows them to make value comparisons at the pump and quickly compare street signage with various stations. It would be costly to manufacturer dispensers that can indicate in both mass and equivalent gallons.

Proposal Two titled, "The Mass Compromise" would require natural gas to be measured and indicated in mass with supplemental equivalent information to be displayed on the dispenser for value comparison. Proposal Two was supported by numerous weights and measures officials who favor a traceable unit. Equivalent values are not NIST traceable units of measurement. The equipment is currently able to indicate in mass units. Currently there are several products that allow for supplemental information to be posted (e.g., paint and fertilizer.) Natural gas composition fluctuates and the equivalent values have not been validated. With new fuels being developed, the correct decision needs to be made on this matter because it may affect future proposals brought before the Conference. A NIST S&T

Technical Advisor requested that the FALS review the references and data that are used for the values on the equivalent units. The FALS has agreed to put together a work group and provide addition feedback on this area.

Proposal Two, “The Mass Compromise” recommended the following:

1.XX. Diesel Gallon Equivalent (DGE). – Diesel Gallon Equivalent (DGE) means 6.384 pounds of compressed natural gas or 6.059 pounds of liquefied natural gas.

1.25. Gasoline Gallon Equivalent (GGE). – Gasoline Gallon Equivalent (GGE) means ~~to 2.567 kg~~ (5.660 lb) of compressed natural gas.

~~**1.26. Gasoline Liter Equivalent (GLE).**~~ – ~~Equivalent to 0.678 kg (1.495 lb) of natural gas.~~

1.35. Liquefied Natural Gas (LNG). – Natural gas that has been liquefied at – ~~126.1~~ 162 °C (– ~~259~~ °F) and stored in insulated cryogenic tanks for use as an engine fuel.

3.11. Compressed Natural Gas (CNG).

3.11.1. How Compressed Natural Gas is to be Identified. – For the purposes of this regulation, compressed natural gas shall be identified by the term “Compressed Natural Gas” or “CNG.”

3.11.2. Retail Sales of Compressed Natural Gas Sold as a Vehicle Fuel.

3.11.2.1. Method of Retail Sale. – All CNG kept, offered, or exposed for sale or sold at retail as a vehicle fuel shall be either in terms of the gasoline ~~liter equivalent (GLE) or gasoline~~ gallon equivalent (GGE), the diesel gallon equivalent (DGE), or in mass if required by the weights and measures authority having jurisdiction.

3.11.2.2. Retail Dispenser Labeling.

3.11.2.2.1. Identification of Product. – Each retail dispenser of CNG shall be labeled as “Compressed Natural Gas.”

3.11.2.2.2. Conversion Factor. – All retail CNG dispensers shall be labeled with the conversion factor in terms of ~~kilograms or~~ pounds. The label shall be permanently and conspicuously displayed on the face of the dispenser and shall have either the statement ~~“1 Gasoline Liter Equivalent (GLE) is equal to 0.678 kg of Natural Gas” or~~ “1 Gasoline Gallon Equivalent (GGE) is equal to means 5.660 lb of Compressed Natural Gas”, or “1 Diesel Gallon Equivalent (DGE) means 6.384 lb of Compressed Natural Gas”, consistent with the method of sale used.

3.11.2.2.3. Pressure. – CNG is dispensed into vehicle fuel containers with working pressures of ~~16 574 kPa,~~ 20 684 kPa (3,000 psig), or 24 821 kPa (3,600 psig). The dispenser shall be labeled ~~16 574 kPa,~~ 20 684 kPa (3,000 psig), or 24 821 kPa (3,600 psig) corresponding to the pressure of the CNG dispensed by each fueling hose.

3.11.2.2.4. NFPA Labeling. – NFPA Labeling requirements also apply. (Refer to NFPA 52.)

3.11.3. Nozzle Requirements for CNG. – CNG fueling nozzles shall comply with ANSI/AGA/CGA NGV 1.

3.12. Liquefied Natural Gas (LNG).

3.12.1. How Liquefied Natural Gas is to be Identified. – For the purposes of this regulation, liquefied natural gas shall be identified by the term “Liquefied Natural Gas” or “LNG.”

3.12.2. Retail Sales of Liquefied Natural Gas Sold as a Vehicle Fuel.

3.12.2.1. Method of Retail Sale. – All LNG kept, offered, or exposed for sale or sold at retail as a vehicle fuel shall be in terms of the diesel gallon equivalent (DGE), or in mass if required by the weights and measures authority having jurisdiction.

3.12.23. Labeling of Retail Dispensers of Liquefied Natural Gas Sold as a Vehicle Fuel Labeling.

3.12.23.1. Identification of Product. – Each retail dispenser of LNG shall be labeled as “Liquefied Natural Gas.”

3.12.3.2. Conversion Factor. – All retail LNG dispensers shall be labeled with the conversion factor in terms of pounds. The label shall be permanently and conspicuously displayed on the face of the dispenser and shall have the statement “1 Diesel Gallon Equivalent (DGE) means 6.059 lb of Liquefied Natural Gas”.

3.12.23.23. Automotive Fuel Rating. – LNG automotive fuel shall be labeled with its automotive fuel rating in accordance with 16 CFR Part 306.

3.12.23.34. NFPA Labeling. – NFPA Labeling requirements also apply. (Refer to NFPA ~~575~~2.)

Based upon information from the NGSC and information in Proposal One “Volume Equivalent Compromise Version” the Committee removed the following language that appeared in NCWM Publication 15 (2015) from the Item for Consideration:

Section 1. Definitions

1.XX. Diesel Gallon Equivalent (DGE). – means 6.384 lb of compressed natural gas or 6.059 lb of liquefied natural gas.

1.XX. Diesel Liter Equivalent (DLE). – means 0.765 kg of compressed natural gas or 0.726 kg of liquefied natural gas.

1.26. Gasoline Gallon Equivalent (GGE). – means 2.567 kg (5.660 lb) of compressed natural gas.

1.27. Gasoline Liter Equivalent (GLE). – means 0.678 kg (1.495 lb) of compressed natural gas.

Based upon information from the NGSC the Committee deleted Section 3.11.2.1. Method of Retail Sale and Section 3.11.2.2. Conversion Factor, and the entire Section for 3.12. Liquefied Natural Gas (LNG) from the Item Under Consideration in the 2015 NCWM Interim Report. The Committee is recommending it move forward as a Voting item.

Section 3. Classification and Method of Sale of Petroleum Products

3.11.2.1. Method of Retail Sale. – All CNG kept, offered, or exposed for sale or sold at retail as a vehicle fuel shall be measured in terms of mass, and indicated in the gasoline liter equivalent (GLE), gasoline gallon equivalent (GGE), diesel liter equivalent (DLE), or diesel gallon equivalent (DGE) units.

3.11.2.2.2. Conversion Factor. – All retail CNG dispensers shall be labeled with the equivalent conversion factor in terms of kilograms or pounds. The label shall be permanently and conspicuously displayed on the face of the dispenser and shall have either the statements “1 Gasoline Liter Equivalent (GLE) is Approximately Equal to 0.678 kg of Natural Gas” and “1 Diesel Liter Equivalent (DLE) is Approximately Equal to 0.765 kg of Compressed Natural Gas” or the statements “1 Gasoline Gallon Equivalent (GGE) is Approximately Equal to 5.660 lb of Compressed Natural Gas” and “1 Diesel

Gallon Equivalent (DGE) is Approximately Equal to 6.384 lb of Compressed Natural Gas” consistent with the method of sale used.

3.11.2.2.5. Automotive Fuel Rating. – CNG automotive fuel shall be labeled with its automotive fuel rating in accordance with 16 CFR Part 309.

At the 2015 NCWM Annual Meeting, a joint session was held with the L&R and S&T Committees to hear this item along with Item 232-4 and S&T Item 337-1. (Documentation for the S&T Item 337-1 can be found within the S&T report.) The Committee acknowledged receiving letters in support of these items and the majority of comments made during the open hearings were also in support of this proposal. It was noted that measurement principles, value comparisons, traceability (note: equivalents are not traceable) need to be analyzed. It is difficult to work with equivalent values that fluctuate in value. There is a task group under the FALS that is currently looking at the equivalent numbers. A corrected document was received for Appendix A., Background and Justification for NIST Handbook 130, Definition of “Diesel Gallon Equivalent (DGE)” of Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) as a Vehicular Fuel.

A majority of the Committee believes the changes submitted during open hearings are fully developed and will align with language proposed in S&T Item 337-1. The language changes support clarifying that two types of natural gas exist as a motor vehicle fuel [compressed and liquefied]. Additionally, the proposal makes it clear that the method of sale for compressed natural gas may be either GGE, DGE, or mass, and for liquefied natural gas the method of sale may be DGE or mass; however, all natural gas sold as a vehicle fuel shall be measured in mass. This item along with Item 232-4 and S&T Committee Item 337-1 received a split vote, therefore it was returned to the Committee.

At the 2016 NCWM Interim Meeting, Dr. Curran (Florida and FALS Chair) remarked that this is separate than Item 232-8 and he supports this item and recommends it as a Voting item. Ross Andersen (retired state director) remarked that he questions significant figures on the PSI versus pascals, there is too much precision. A NIST Technical Advisor remarked that they were informed that the information focus group sent out information on January 8, 2016, and there may be changes to the equivalency factors. Dr. Curran remarked that the focus group has no recommendation for changes. The Committee was concern that changes to values may occur at the NCWM Annual Meeting. If this does occur, they would like validation of any figures not currently in the publication. The Committee is recommending this as a Voting item.

At the 2016 NCWM Annual Meeting, a joint Open Hearing session was held with S&T Committee to hear testimony on all the LNG/CNG agenda items. Mr. Jeff Clarke remarked that the Conference should adopt a uniform standard that is used by all states. Mr. Randy Moses suggest changing the language to have the conversion at the end of the receipt in mass. NIST/OWM submitted a technical analysis to the Committee that expresses that a method of sale should provide uniformity, transparency, and accuracy. Ms. Butcher also discussed weights and measures principles, limited supporting data, supplemental information, among many other factors to be reviewed. Dr. Curran (FALS Chair) remarked that there is a CNG/LNG Equivalent Values informal focus group, but they do not have an official position. Some states expressed support for this item and remarked this is what their customers are supporting. Several states remarked that they currently have legislative law. Some commented that this needs to align with the current tax regulation. Again, the topic of the dual display was discussed; however, would this cause consumer confusion?

Regional Association Comments:

At the 2015 WWMA Annual Meeting, support was heard from seven regulators that this be a Voting item. One regulator objected to the fact that it violates weights and measures principles and referred to the NIST, OWM Technical Analysis document, against the use of equivalent units for natural gas. Another regulator would like a grandfather period of ten years and then a conversion to mass units on dispensers and advertising. WWMA believes this item is fully developed with the recommended amendment as noted above, which emphasizes that the dispenser labeling is only needed when the equivalent units are used (not necessary when indications are in mass). WWMA recommended that this item be a Voting item.

At the 2015 CWMA Interim Meeting, an industry representative from National Association of Convenience Stores (NACS), National Association of Truck Stop Operators (NATSO), Petroleum Marketers Association of America (PMAA) and Society of Independent Gasoline Marketers of America (SIGMA) supported this proposal as a Voting item and further stated that it strikes the appropriate compromise for regulators and consumers. He urged the group

to maintain relevance by moving this issue forward. A state regulator commented that there should be a reference at the point of sale that indicates a mass reading such as pounds since the volume of gallons is not based on energy but only on weight. Instead of comparing energy content to energy content, this equivalency factor would only equate weight with weight. The industry representative indicated that whatever is on the price sign must be exactly what is on the pump. The industry representative also indicated that the industry would not have issue with having an equivalency statement on the pump. A state regulator recommended that this proposal move forward as a Voting item. A state regulator commented that tax officials in his state had a difficult time understanding the equivalency concepts and how to apply tax to those equivalencies. He believes the disparity between a diesel gallon equivalent and a gasoline gallon equivalent will be very problematic and confusing. The industry representative commented that while the diesel and gasoline gallon equivalents are different conversion factors today, he anticipates the conversion factor becoming a single equivalency rate in the near future. A state regulator commented that until a study is done to determine the economic impact of this proposal regarding assessing tax of the product per pound, the proposal should be Withdrawn. A state industry representative reminded the group that this body is contributing to consumer confusion and runs the risk of irrelevancy if the Conference does not move this proposal forward. A state regulator commented that politics has gotten interjected into a scientific discussion, but this is one of the rare occasions where elected politicians have come to the Conference and told regulators what they want and what they need, even though it may not be the best measurement method. Another state regulator commented that he disagreed with this statement, and suggested it is the role of the regulatory community to be the stopgap to advise policy makers of the best metrological provable and traceable units. Since there is no new information or data forthcoming, CWMA recommended that this be a Voting item.

At the 2015 NEWMA Interim Meeting, there were no comments heard. NEWMA believes this item is fully developed and recommends this be a Voting item.

At the 2015 SWMA Annual Meeting, Dr. Curran recommended that this item be a stand-alone item and not be batched with the other LNG items on the agenda. The SWMA recommended it be a Voting item.

At the 2016 NEWMA Annual Meeting, Mr. Ethan Bogren (Chair of the WG) commented that new language is being proposed under S&T Item 337-2. There is one change to the current language in this item, found under printer requirements NIST Handbook 44, Section S.6.(b) that states anytime an equivalency value is used for method of sale, the corresponding quantity in mass must be listed on the receipt. An industry representative with fuel marketing and retail groups directed a question to the representative from Gilbarco – is what gets printed on the receipt a point of sale issue or a method of sale issue? The Gilbarco representative commented it was a point of sale issue. The fuel marketer representative asked if this was practically achievable in the equipment world. Mr. Bogren indicated that discussion during WG meetings seemed to indicate it was practical – only one line would be added to the receipt. The Gilbarco representative indicated that his company cannot currently convert an equivalency value into mass onto a receipt. This issue was discussed with other manufacturers, and it is feasible but does not currently exist. Another fuel marketer industry representative commented that the information from the dispenser to the point of sale is programmed to convey on the sales transaction information. He further commented that under this new option, the conversion calculation, would then become the responsibility of the point of sale manufacturers to accurately capture that conversion. A retired regulator commented that there is no requirement for dual pump displays, so why this information? He added that a single conversion statement could be added as a line of text, but not the calculation itself. Mr. Bogren commented that without this change, the WG would be submitting the same item that has failed for the past three years. The representative from Wayne Fueling commented he thinks this provision is possible, but is not recommending it. A retired state weights and measures official commented that the sellers and the buyers don't care about this, and regulators should not be interfering. Mr. Bogren explained that altering the point of sale (POS) software is a relatively easy way to introduce something new for the Conference body to consider. An industry representative from the fuel marketers commented that he is concerned that the POS companies should be consulted on this proposal. Mr. Bogren commented that there were POS industry attendees at the joint session who had an opportunity to comment on this proposal, and they did not object. The fuel marketer industry representative indicated that his members were trying to gather information from their vendors. The NIST Technical Advisor commented that items that are designated as Voting are considered fully developed. If they are not technically fully developed, their status may need to be deescalated. NEWMA considers this item to be fully developed and ready as a Voting item.

At the 2016 CWMA Annual Meeting, there was considerable discussion, the Committee was split evenly as to whether the item should move forward as with Voting status or be Withdrawn. During the voting session, a state regulator

from Kansas indicated he wondered why we are essentially proposing selling one item as two items (GGE and DGE). A state regulator from Minnesota commented that the item was fully developed and should move forward as a Voting item. A state regulator from Missouri stated that the Central Region should differentiate between actual support of the item and recommending it move forward as a Voting item strictly because it is fully developed. A state regulator commented that the region's views be stated in the regional report, including the comment that the region was divided in its support of the item. An API representative commented that if the body does not pass this provision, each state will enact its own version of this law. A state regulator from Missouri indicated there may be some additional language that modifies the proposal during the Annual Meeting in July. Following a hand vote, the region determined the item should move forward as a Voting item with the proposed change: Paragraph 2.27.1.4. – correction 14.696 psi should read 14.696 psia.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 100th National Conference on Weights and Measures" (SP 1210, 2015).

237-2 V Section 2.1.2. Gasoline-Ethanol Blends

(This item was Adopted.)

Source:

American Petroleum Institute (2016)

Purpose:

Extend the effective date of the 1 psi vapor pressure exception to May 1, 2017, and make the effective date for this change July 28, 2016.

Item under Consideration:

Amend the NIST Handbook 130, Engine Fuels and Automotive Lubricants Regulation as follows:

2.1.2. Gasoline-Ethanol Blends. – When gasoline is blended with ethanol, the ethanol shall meet the latest version of ASTM D4806, "Standard Specification for Denatured Fuel Ethanol for Blending with Gasolines for Use as Automotive Spark-Ignition Engine Fuel," and the blend shall meet the latest version of ASTM D4814, "Standard Specification for Automotive Spark-Ignition Engine Fuel," with the following permissible exceptions:

- (a) The maximum vapor pressure shall not exceed the ASTM D4814 limits by more than:
 - (1) 1.0 psi for blends containing 9 to 10 volume percent ethanol from June 1 through September 15.
 - (2) 1.0 psi for blends containing one or more volume percent ethanol for volatility classes A, B, C, D from September 16 through May 31.
 - (3) 0.5 psi for blends containing one or more volume percent ethanol for volatility Class E from September 16 through May 31.

The vapor pressure exceptions in subsections 2.1.2. Gasoline-Ethanol Blends will remain in effect until May 1, ~~2016~~ **2017**, or until ASTM incorporates changes to the vapor pressure maximums for ethanol blends, whichever occurs earlier.

(Effective July 28, 2016)

(Amended 2016)

NOTE 1: The temperature values (e.g., 54 °C, 50. °C, 41.5 °C) are presented in the format prescribed in ASTM E29 "Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications."

(Added 2009) (Amended 2012 **and 2016**)

Background/Discussion:

The exception to the ASTM standard that allowed a 1.0 psi vapor pressure waiver for ethanol blended gasoline (0.5 psi for Class E modified at that time) was allowed to remain in the NIST Handbook 130 until May 1, 2016, or upon completion of the ASTM work to incorporate the “vapor pressure exception” into D4814, whichever occurs first.

However, as explained below, if the issue is not resolved at ASTM prior to the effective date of May 1, 2016, additional time will be needed to pursue the change to the ASTM specification. It is for this reason that API, supported by National Association of Convenience Stores (NACS), National Association of Truck Stop Operators (NATSO), Petroleum Marketers Association of America (PMAA) and Society of Independent Gasoline Marketers of America (SIGMA), is pursuing this one-year extension to the original effective date.

To generate data in support of a ballot at ASTM for the vapor pressure exception, significant research by the Coordinating Research Council (CRC) has been completed, which shows that the drivability of the vehicle is not negatively impacted by the vapor pressure exception (CRC Report No. 668). It is important to note that significant resources were expended to complete this research in an expedient manner so that the research results would be available to the ASTM members. Using the CRC research as background, this year (2015) ASTM conducted a Subcommittee A ballot for the vapor pressure exception that closed with one negative vote which has since been resolved. The document is currently being balloted by the main ASTM Committee on fuels and the ballot closed September 17.

The ASTM ballot to incorporate the 1-psi vapor pressure exception into D4814 is scientifically and technically sound. However, there is a possibility that the ballot could be held up from further consideration or even defeated at the Main Committee at this time because of ongoing issues with separate ballots that propose to incorporate 15-volume percent ethanol blends (E15) into D4814. If the RVP ballot does not pass at ASTM, then the vapor pressure exception that is currently available in NIST Handbook 130, “Uniform Engine Fuels and Automotive Lubricants Regulation,” will expire, removing the exception from many states, largely on the Midwest and East Coast.

The vapor pressure exception is critical to the fungibility of the U.S. gasoline supply during the winter months of September 16 to May 31. The map (www.ncwm.net/meetings/interim/archive), 12 states have adopted the vapor pressure exception provided by NIST Handbook 130 including: Maine, New Jersey, Pennsylvania, Virginia, West Virginia, Tennessee, Texas, Arkansas, Missouri, Illinois, Iowa, and Washington. If the ASTM ballot does not pass the D02 Committee, the states that are served by the Colonial Pipeline and Buckeye Pipeline could also be impacted as they may not have the tank storage necessary to manage the additional products that would be needed in those states that would continue to grant the exception and those that would eliminate the vapor pressure exception. Consequently, the 13 states that would be impacted on May 1, 2016, would be expanded to include an additional 10 states served by Colonial (Louisiana, Mississippi, Alabama, Georgia, South Carolina, North Carolina, and Maryland) and by Buckeye (Kentucky, Ohio, and Indiana) and the District of Columbia. This impact could possibly create fuel shortages in these states putting upwards pressure on the gasoline markets.

When this issue was being debated in 2012, several pipeline companies identified issues with the proposal relating to supply and hose issues are still applicable today. Refer to Magellan’s and Colonial’s letters to the FALS that identify the concerns with the loss of the vapor pressure exception:¹

[Magellan is] opposed to the elimination of the [vapor pressure exception] because it would (1) create a boutique fuel in several states (2) reduce pipeline efficiency which would result in supply disruptions (3) reduce gasoline supply by requiring a reduction of RVP and (4) impact the price unsuspecting motorists pay at the pump.” [January 19, 2012]

It is Colonial’s understanding that all states along our system grant a 1.0 psi waiver for Non-VOC controlled RVP with the exception of Virginia, which adopts the latest version of HB 130. If this

¹ <http://www.nist.gov/pml/wmd/pubs/upload/07-lr-appx-d-237-1-12-annual-final.docx>

proposal were to go into effect, it would create a unique fuel to the State of Virginia markets. [January 20, 2012]

All efforts are being made to ensure that the vapor pressure exception will be implemented in ASTM D4814 in a timely manner so that the U.S. fuel supply will not be negatively influenced.

The proposal to make the one-year extension effective July 28, 2016, will ensure that the vapor pressure exception continues to be available starting September 16, 2016. If the date is effective on January 1 of the following year (2017) then this would translate into a loss of the 1.0 psi (and 0.5 psi) waiver from September 16, 2016, to December 31, 2016, with the resulting consequences identified above.

NIST Handbook 130 (2015) Introductions allows for the effective date to be something other than January 1 of the year following adoption. Specifically, Section R of the Introduction, page 6, states, “**Unless otherwise specified**, the new or amended regulations listed in this section are intended to become effective and subject to enforcement on January 1 of the year following adoption by NCWM.” [Emphasis added]. The language, “**unless otherwise specified**” allows the NCWM to set the effective date for changes subject to enforcement to any date in the calendar year. The July 28, 2016, date was chosen as it is hoped that this proposal will be adopted by the Conference on the last day of the 2016 Annual NCWM Conference and would then be implemented immediately, which would allow certainty in the market place and assist in limiting supply disruptions that might be seen by the consumer.

During the original debate, there was a strong sentiment from a few states that the date should not be extended. Statements at the time supported the argument that ASTM was the proper venue to grant a waiver and that work should be done to ensure that the consumer’s engine would operate properly in the heat and cold (i.e., drivability was not impacted). Since that time, a very significant research project (> \$1MM) was conducted by the CRC that found that drivability was NOT negatively impacted. Drivability is effectively the ability of the vehicle’s ease of start (whether engine is cold or hot), warm up performance, and smooth responsive acceleration.

EPA grants a 1.0 psi RVP exception for non-RFG areas during the summer months (June 1 through September 15). For example, during the summer months, gasoline sold in an area with a 9.0 RVP gasoline specification when blended with 10 % volume ethanol can have a 10.0 RVP. The NCWM has granted a 1.0 psi RVP exception during the non-summer months and has not had any significant or meaningful impact to the consumer’s drivability.

The vapor pressure exception is critical to the fungibility of the U.S. gasoline supply during the winter months of September 16 to May 31. Without the 1.0 psi (0.5 psi) RVP exception, there is a possibility of reducing supply in nearly all the states from Iowa to Pennsylvania down to Georgia and back to Texas putting upwards pressure on gasoline markets in those states.

At the 2016 NCWM Interim Meeting, Mr. Prentiss Searles (API) provided a presentation. The NIST Technical Advisor remarked that the term “unless otherwise specified” is intended for effective dates that were after the January adoption date. There is concern that this would set a precedent in allowing other items to have early adoption dates. It was understood that this is a unique request and it was encouraged that API not request another extension, and that this be resolved through ASTM. Mr. Searles stressed that if this extension did not proceed it would disrupt the fuel supply and have significant impact on the marketplace. Several states remarked that they had alternative ways to handle the exception through their states. The Committee agreed to recommend this as a Voting item.

At the 2016 NCWM Annual Meeting, Dr. Curran (FALS Chair) commented that FALS does support this item. Several states spoke in support of this item

Regional Association Comments:

At the 2015 WWMA Annual Meeting, Mr. Prentiss Searles (API) gave a brief presentation. The proposal includes a request to extend the date of the 1-psi waiver pending the development of the issue at ASTM. ASTM must adjudicate the comments that have been received. The Committee received a letter of support from Tim Columbus (Stephoe & Johnson, LLP), representing four trade associations (NACS, NATSO, PMAA and SIGMA). A regulator supports but recognizes this is an east coast issue and this proposal’s exceptions in 2.1.2.(a)(2) do conflict with one state’s existing statute. An industry representative expressed support for this item and stated that ASTM’s vote would harmonize

with NIST Handbook 130 and encouraged NCWM members who are also ASTM members to vote in favor of the ASTM item. WWMA forwarded the item to NCWM, recommending it as a Voting item.

At the 2015 CWMA Interim Meeting, Mr. Chuck Corr (ADM) representative member of the FALS work group to update Engine Fuels and Automotive Lubricants Regulations remarked that based on the language of NIST Handbook 130, gasoline ethanol blends would receive the waiver, but not all fuels today are gasoline blends. He believes this item should be developed further. A state regulator commented that this proposal is hanging on to an advantage that gasoline has had over ethanol. If this waiver were removed, it would force industry to make a blendstock that could be blended to E15. She believes we should not extend the waiver. If consumers want to purchase E15, they should be allowed to do so. To extend the waiver would continue to provide an advantage in the marketplace. The regulator suggested a better alternative would be to extend the waiver to E15. A consultant for the Illinois Corn Growers commented that the original goal in the change of NIST Handbook 130 was to take away exceptions to the performance specification developed at ASTM. The regulator further commented that the full ASTM D02 Committee is balloting this item, and there were seven negative votes. The regulator believes the item should remain as a developmental item and should be referred to FALS. A state regulator agreed there is a need to push this issue back to ASTM to get these parameters included in the standard. He recommended the item be Withdrawn. A state regulator commented there are deeper implications to this proposal than some might realize. The regulator commented that the definitions are a critical component of this issue. The sunset date listed in NIST Handbook 130 is May 2016, and the handbook is published in the fall of every year. So, if the date is not changed, the waiver will sunset. This issue is a fuels issue and should be considered and deliberated with the expertise of the FALS. CWMA forwarded the item to NCWM and recommended it be an Informational item assigned to FALS.

At the 2015 NEWMA Interim Meeting, they received written comments from an industry representative suggesting that this item be referred to FALS. One regulator asked how this would impact his state if the waiver expires. There was concern that the sunset date will occur before a vote may occur on this item. A retired regulator suggested this item move forward because the sunset date will expire prior to when NCWM can extend it. Another state regulator also commented that a state sealer has some leeway in local jurisdictions. He commented that overall, regulators should be very careful about setting regulations that can impact fuel prices in various states. A regulator commented that earlier discussion revealed that a sunset date can be changed or implemented under certain circumstances. A state regulator cautioned that EPA allows the variation in the summer, but not in the winter. NEWMA forwarded the item to NCWM, recommending that it be a Voting item with an accelerated implementation date (30 days after passage).

At the 2015 SWMA Annual Meeting, Mr. Russ Lewis (representing API) gave a presentation. Comments were heard stating that the item is going through the ASTM process. This issue is complicated with data that needs to be reviewed; therefore, the one-year extension is needed. SWMA believes this item is fully developed and forwarded it to NCWM, recommending that it be a Voting item.

At the 2016 NEWMA Annual Meeting, an API representative gave an update on the most recent ASTM ballot for this item which closed in April and had two negatives submitted. Consequently, there are still inconsistencies regarding vapor pressure limits between NCWM regulations and ASTM language. The one-pound vapor pressure waiver needs to be extended until May 2017; otherwise, several states will have fuel that does not meet the vapor pressure requirement for gasoline. The API representative further commented that there is a chance that this issue could be resolved at ASTM by the July 2016 NCWM Annual Meeting. In the event, it is not resolved this item needs to remain as a Voting item on the NCWM L&R agenda. The State of Maine supports this item. A representative from the Society for Independent Marketers of America and National Assn. of Convenience Stores supports the item. NEWMA considers this item fully developed and supports it as a Voting item.

At the 2016 CWMA Annual Meeting, an individual from API commented they are in support of this item and it should continue to be a Voting item. A representative from Flint Hills commented that they support the item. The Committee feels this item is fully developed and is ready for Voting status.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 100th National Conference on Weights and Measures" (SP1210, 2015).

237-3 W Sections 2.1.3. Minimum Antiknock Index (AKI), 2.1.4. Minimum Motor Octane Number, and 3.2.5. Prohibition of Terms – Table 1.

(This item was Withdrawn.)

Source:

General Motors (2013)

Purpose:

Remove obsolete Altitude De-rating of Octane practice, establish a National Octane Baseline, and harmonize Octane Labeling from state to state.

Item under Consideration:

Amend the NIST Handbook 130, Engine Fuels and Automotive Lubricants Regulation as follows:

Section 2. Standard Fuel Specification

2.1.3. Minimum Antiknock Index (AKI). – The AKI of gasoline and gasoline-oxygenate blends shall not be less than 87. The AKI shall not be less than the AKI posted on the product dispenser or as certified on the invoice, bill of lading, shipping paper, or other documentation;

(Amended 20XX)

2.1.4. Minimum Motor Octane Number. – The minimum motor octane number shall not be less than 82. ~~for gasoline with an AKI of 87 or greater;~~

(Amended 20XX)

Section 3. Classification and Method of Sale of Petroleum Products

3.2. Automotive Gasoline and Automotive Gasoline-Oxygenate Blends

3.2.5. Prohibition of Terms. – It is prohibited to use specific terms to describe a grade of gasoline or gasoline-oxygenate blend unless it meets the minimum antiknock index requirement shown in Table 1. Minimum Antiknock Index Requirements.

Table 1. Minimum Antiknock Index Requirements		
Term	Minimum Antiknock Index	
	ASTM D4814 Altitude Reduction Areas IV and V	All Other ASTM D4814 Areas
Premium, Super, Supreme, High Test	90	91
Midgrade, Plus	87	89
Regular Leaded	86	88
Regular, Unleaded (alone)	85	87
Economy	--	86

(Table 1. Amended 1997 and 20XX)

Background/Discussion:

These recommended changes to NIST Handbook 130, Engine Fuels and Automotive Lubricants Regulations to the octane will harmonize with an effort underway in the ASTM International (ASTM) Gasoline and Oxygenates

Subcommittee to include a minimum motor octane number (MON) performance limit in gasoline. The naming of the various octanes is a function for weights and measures.

Nominally, vehicles manufactured after 1984 include engine computer controls maintaining optimal performance while using gasoline octane of 87-AKI or higher. The practice of altitude de-rating of octane, resulting in octanes below 87-AKI, reduces a vehicle's efficiency and fuel economy. Increasingly, more vehicles are boosted (turbocharged/supercharged) eliminating altitude intake air effects. Additionally, consumers using gasoline with an octane AKI below 87 will void their vehicle owner's warranty. The Coordinating Research Council (CRC) Report No. 660, "*Fuel Anti-knock Quality – Engine Response to RON (Research Octane Number) versus MON*," May 2011 demonstrates the continued need for gasoline MON octane for the large bored, naturally aspirated U.S. engines. Setting an 82-MON minimum maintains the current MON level for today's 87-AKI Regular Unleaded gasoline. A common U.S. octane specification between ASTM, NCWM, and Vehicle Owners Manuals will give states clear direction on how best to enforce proper fuel pump octane labeling and quality levels on behalf of vehicle consumers.

Leaded gasoline is not available at retail and, therefore, labeling guidance is not needed.

NCWM 2013 Interim Meeting: The FALS could not reach agreement on this item during their Sunday work session. The Committee received and reviewed several letters in support of this proposal. During open hearings, Mr. Studzinski (General Motors) provided a presentation. The Committee also received comments in opposition to the proposal citing the lack of consumer complaints with suboctane and it was requested that the Committee wait until the CRC study provides data that can be used by ASTM and NCWM to determine whether or not a change is necessary. The Committee recommended this be an Informational item.

During the 2013 NCWM Annual Meeting, Mr. Hayes, FALS Chair, provided a presentation and stated that the CRC study has been expanded and finalized data is expected by year end. It was also noted the ASTM ballot failed. The Committee concurs to await a recommendation from FALS once they have considered all the data. At the 2014 NCWM Interim Meeting, Mr. Studzinski provided an update that the CRC study is almost finalized and then a ballot will be prepared for ASTM. Mr. Studzinski will have additional information for the 2015 NCWM Interim.

At the NCWM 2014 Annual Meeting, Dr. Matthew Curran, FALS Chair, remarked that the FALS is recommending this remain an Informational item until the CRC study results are complete. Mr. Bill Studzinski provided a briefing that a report should be issued in the fall of 2014.

At the NCWM 2015 Interim Meeting, the FALS Chair notified the Committee that the CRC study is still being addressed. The 2015 L&R Committee designated this as an Informational item.

At the 2015 NCWM Annual Meeting, the FALS Chair provided an update that this item was on the ASTM ballot and did not pass at the June 2015 ASTM Meeting. ASTM is evaluating the negative ballots. FALS would like to wait further action within ASTM before changes can be considered by the Conference.

At the 2016 NCWM Interim Meeting, the submitter of this proposal asked the Committee to Withdraw this item. The submitter would like to reenergize this issue through ASTM.

Regional Association Comments:

At the 2015 WWMA Annual Meeting, there were comments from several regulators and an industry representative requesting that the item be Informational, since work is still being done by ASTM. A regulator stated that 85-octane has been prevalent in the marketplace for decades in the west and high altitude areas and this proposal would have a significant impact in the marketplace. WWMA supports ASTM's continued work and recommended that this remain an Informational item.

At the 2015 CWMA Interim Meeting, a comment from a representative of the Illinois Corn Growers suggested the Committee see a presentation by Oak Ridge Laboratories and the ASTM Octane Working Group regarding octane trends, as regulators should understand the evolution of octane requirements in gasoline. Many regulators commented on confusion regarding octane issues in their states. Since octane and volatility are the two key performance indicators, it is important to move forward with a new baseline that is optimized for today's cars and provides the best mileage

for consumers. A representative from ADM recommended this item remain Information or Developmental to allow other organizations the time to continue to work on gathering data to further vet this issue. It is the opinion of the Committee that this item is waiting on ASTM action. CWMA recommended that it remain an Informational item.

At the 2015 NEWMA Interim Meeting, the members concurred that the issue is still being vetted through ASTM and should be an Informational item.

At the 2015 SWMA Annual Meeting, the FALS Chair requested that the item be Informational, since it is a contentious item that is being addressed at ASTM. The SWMA concurred and recommended this be an Informational item.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 100th National Conference on Weights and Measures" (SP 1210, 2015).

237-4 I Sections 2.14. Products for Use in Lubricating Automatic Transmission Fluids and 3.14. Automatic Transmission Fluid. (See Related Item 232-9)

Source:

American Petroleum Institute (API) (2016)

Purpose:

Define how transmission fluids shall be identified in the marketplace on delivery documents and invoices and receipts from service.

Item under Consideration:

Amend the NIST Handbook 130, Engine Fuels and Automotive Lubricants Regulation as follows:

2.14. Products for Use in Lubricating Automatic Transmissions. – Any automatic transmission fluid sold without limitation as to type of transmission for which it is intended shall meet all automotive manufacturers' recommended requirements for transmissions in general use in the state. Automatic transmission fluids that are intended for use only in certain transmissions, as disclosed on the label of its container **or on an invoice or receipt when dispensed from a receptacle, dispenser or storage tank**, shall meet the latest automotive manufacturers' recommended requirements for those transmissions. Adherence to automotive manufacturers' recommended requirements shall be based on tests currently available to the lubricants' industry and the state regulatory agency. Any material offered for sale or sold as an additive to automatic transmission fluids shall be compatible with the automatic transmission fluid to which it is added, and shall meet all performance claims as stated on the label **or on an invoice or receipt when dispensed from a receptacle, dispenser or storage tank**. Any manufacturer of any such product sold in this state shall provide, upon request by a duly authorized representative of the Director, documentation of any claims made on their product label **or on an invoice or receipt when dispensed from a receptacle, dispenser or storage tank**.

(Amended 20XX)

3.14. Automatic Transmission Fluid.

3.14.1. Labeling. – The label on a container of automatic transmission fluid ~~or, as well as the invoice or receipt from bulk distribution and service on an automatic transmission that includes the installation of automatic transmission fluid dispensed from a receptacle, dispenser, or storage tank~~ shall not contain any information that is false or misleading.

In addition, each **packaged** container shall be labeled with the following:

- (a) the brand name
- (b) the name and place of business of the manufacturer, packer, seller, or distributor;

- (c) the words “Automatic Transmission Fluid”;
- (d) ~~the duty type of classification~~ **the performance claim or claims for the fluid;** and
- (e) an accurate statement of the quantity of the contents in terms of liquid measure.

Each receptacle and/or storage tank of automatic transmission fluid shall be labeled with the following:

- (a) the brand name;**
- (b) the name and place of business of the manufacturer, packer, seller, or distributor; and**
- (c) the performance claim or claims for the fluid; and**
- (d) the words “Automatic Transmission Fluid.”**

(Amended 20XX)

3.14.2. Documentation of Claims Made Upon Product Label. – Any manufacturer, ~~or~~ packer, **or distributor** of any product subject to this article and sold in this state shall provide, upon request of duly authorized representatives of the Director, documentation of any claim made upon their product label.

(Added 2004) **(Amended 20XX)**

Background/Discussion:

Many original equipment manufacturers (OEMs) set their own transmission fluid standards and recommend that consumers use these fluids in their designated applications. However, the current version of NIST Handbook 130 does not adequately define how transmission fluids shall be identified in the marketplace on delivery documents and invoices and receipts from service. Requiring more specific information on invoices and receipts will provide some assurance to consumers that recommended automatic transmission fluids are being installed in their cars and trucks.

The changes proposed are consistent with those approved for gasoline and diesel engine (motor) oils sold in packages or dispensed from bulk containers.

At the 2016 NCWM Interim Meeting, Dr. Curran (FALS Chair) recommended that this and (related Item 232-9) be an Informational item, so that the language can be worked on. Several members supported additional work on this proposal. Mr. Ferrick (API) will be circulating to all interested parties for review. The Committee recommended this be an Informational item.

At the 2016 NCWM Annual Meeting, Mr. Ferrick (API submitted modified language to FALS and the Committee for consideration. The Committee moved forward this new language and looks forward to receiving feedback from the Fall Regional Meetings.

Regional Association Comments:

At the 2015 WWMA Annual Meeting, Mr. Ferrick, commented that there is a need to better define ATF in the marketplace and the Automotive Oil Change Association supports this item. NIST provided some formatting edits to conform with the handbook standard. A regulator expressed concerns for the term “performance claim for fluid” which would be challenging to enforce. The WWMA recommends removing the word “package from Section 3.14.1.(a). WWMA forwarded the amended item to NCWM, recommending it as a Voting item.

2.14. Products for Use in Lubricating Automatic Transmissions. – Any automatic transmission fluid sold without limitation as to type of transmission for which it is intended shall meet all automotive manufacturers’ recommended requirements for transmissions in general use in the state. Automatic transmission fluids that are intended for use only in certain transmissions, as disclosed on the label of its container **or on an invoice or receipt when dispensed from a receptacle, dispenser, or storage tank**, shall meet the latest automotive manufacturers’ recommended requirements for those transmissions. Adherence to automotive manufacturers’ recommended requirements shall be based on tests currently available to the lubricants’ industry and the state regulatory agency. Any material offered for sale or sold as an additive to automatic transmission fluids shall be compatible with the

automatic transmission fluid to which it is added and shall meet all performance claims as stated on the label **or on the invoice or receipt when dispensed from a receptacle, dispenser or storage tank**. Any manufacturer of any such product sold in this state shall provide, upon request by a duly authorized representative of the Director, documentation of any claims made on their product label **or on an invoice or receipt when dispensed from a receptacle, dispenser, or storage tank**.

3.14. Automatic Transmission Fluid.

3.14.1. Labeling. – The label on a container of automatic transmission fluid **as well as the invoice or receipt from bulk distribution and service on an automatic transmission that includes the installation of automatic transmission fluid dispensed from a receptacle, dispenser, or storage tank** shall not contain any information that is false or misleading. ~~In addition, each container of automatic transmission fluid shall be labeled with the following:~~

(a) Each ~~packaged~~ container shall be labeled with the following:

- (1) the brand name;
- (2) the name and place of business of the manufacturer, packer, seller, or distributor;
- (3) the words “Automatic Transmission Fluid”;
- (4) ~~the duty type of classification;~~ **the performance claim or claims for the fluid;** and
- (5) an accurate statement of the quantity of the contents in terms of liquid measure.

(b) Each receptacle and/or storage tank of automatic transmission fluid shall be labeled with the following:

- (1) the brand name;**
- (2) the name and place of business of the manufacturer, packer, seller, or distributor; and**
- (3) the performance claim or claims for the fluid; and**
- (4) the words “Automatic Transmission Fluid.”**

3.14.2. Documentation of Claims Made Upon Product Label. – Any manufacturer, ~~or~~ packer, ~~or~~ distributor of any product subject to this article and sold in this state shall provide, upon request of duly authorized representatives of the Director, documentation of any claim made upon their product label.

(Added 2004) **(Amended 20XX)**

At the 2015 CWMA Interim Meeting, a comment was received from a representative of the American Petroleum Institute (API) that NIST Handbook 130 does not allow for proper identification of transmission fluids sold in states, and API supports adding new language for both the Method of Sale Regulation and the Engine Fuels and Automotive Lubricants Regulation. He indicated the term “receptacle” might need to be changed in the proposal as well as performance claim language to performance specification instead. He explained that most engine manufacturers (OEMs) have their own transmission fluid standards, unlike motor oil. An industry representative from the Automotive Oil Change Association commented that one possibility could be a part number for transmission fluid labeling. Most OEMs will provide a preferred brand as well as at least one alternate option. Industry representatives recommended this proposal continue as a Developing item. A state regulator commented this is an important proposal and should move forward, but should be fully vetted. CWMA believes that industry will continue to work on collaboration and education with regard to this item and believes the item is sufficiently developed. CWMA forwarded the item to NCWM, recommending that it be a Voting item.

At the 2015 NEWMA Interim Meeting, a representative of the American Petroleum Institute (API) commented that this item is intended to add some definition to transmission fluid so the consumer knows what they are getting, and so transmission fluid is properly labeled. A state regulator asked how the product is displayed or where it is stored at a retail oil change facility. He asked if you have a service station with a permanent tank for transmission fluid, do they pour one type over another. The API representative said that different types of transmission fluids should not be

commingled, but common ATFs from different manufacturers can be commingled. Another state regulator asked for clarification on why item d – “duty type” of classification was changed to performance claim or claims for the fluid. Some who attended the CWMA meeting commented that API made comments during the meeting regarding the change, and would provide further clarification at the 2016 NCWM Interim Meeting. NEWMA considered the item to be fully developed and forwarded it to NCWM, recommending that it be a Voting item.

At the 2015 SWMA Annual Meeting, Mr. Ferrick stated that the proposed language has been shared with the WWMA, CWMA, and NEWMA; API’s Lubricants Group; AOCA; and others. API’s plan is to provide an amended version in time for the NCWM 2016 Interim Meeting. It was noted that NIST provided some formatting edits and API recommends that version be submitted for inclusion into NCWM Publication 15. Dr. Curran (FALS Chair) stated that the FALS Committee would review the item and have comments for the 2016 NCWM Interim Meeting. The SWMA supported the item with the formatting changes recommended by NIST (refer to 2015 WWMA Annual Meeting and to Item 237-4). SWMA is recommended that this be a Voting item.

At the 2016 NEWMA Annual Meeting, an API representative commented that this item should remain an Informational item with new language coming in subsequent meetings. NEWMA awaits the new language and recommended that this be an Informational item.

At the 2016 CWMA Annual Meeting, Mr. Ferrick commented that it should remain Informational until additional details are compiled and presented to FALS.

Additional letters, presentations, and data may have been part of the Committee’s consideration. To review the supporting documentation, please refer to the “Report of the 100th National Conference on Weights and Measures” (SP 1210, 2015).

237-5 I Section 4.1. Water in Retail Engine Fuel Storage Tanks, Gasoline Alcohol Blends, Biodiesel Blends, Ethanol Flex Fuel, Aviation Gasoline, and Aviation Turbine Fuel. and 4.2. Water in Gasoline, Diesel, Gasoline-Ether, and Other Fuels.

Source:
Colorado (2016)

Purpose:
Provide a consistent best management practice regarding managing water in any engine fuel utilizing current detection technology.

Item under Consideration:
Amend NIST Handbook 130, Uniform Engine Fuels and Automotive Lubricants Regulation as follows:

4.1. Water in Retail Engine Fuel Storage Tanks, Gasoline Alcohol Blends, Biodiesel Blends, Ethanol Flex Fuel, Aviation Gasoline, and Aviation Turbine Fuel. – No water phase greater than 6 mm (¼ in) as determined by an appropriate detection paste or other acceptable means, is allowed to accumulate in any retail tank utilized in the storage of engine fuels including, gasoline, gasoline-alcohol blend, biodiesel, biodiesel blends, ultra-low sulfur diesel, ethanol flex fuel, aviation gasoline, and aviation turbine fuel, gasoline ether blends, kerosene, or any other engine fuels.

(Amended 2008, 2012, ~~and 2014, and 20XX~~)

4.2. ~~Water in Gasoline, Diesel, Gasoline Ether, and Other Fuels. Water shall not exceed 25 mm (1 in) in depth when measured with water indicating paste or other acceptable means in any tank utilized in the storage of diesel, gasoline, gasoline ether blends, and kerosene sold at retail except as required in Section 4.1. Water in Gasoline Alcohol Blends, Biodiesel Blends, Ethanol Flex Fuel, Aviation Gasoline, and Aviation Turbine Fuel.~~

~~(Amended 2008, 2012, and 2014)~~

Background/Discussion:

All engine fuels degrade more rapidly in the presence of water and can result in an off spec product, microbial growth, and internal corrosion of tanks and tank equipment. Besides impacting the quality of fuel such as when ethanol dissolves in water causing phase separation, affecting RVP and reducing AKI or octane number, the occurrence of microbial growth and corrosion particulates clog dispenser filters and affect other fuel clarity parameters. The fuels landscape has changed significantly across the country and currently almost all gasoline is blended with ethanol and all diesel is now Ultra Low Sulfur Diesel with up to 5 % biodiesel. This proposal provides a consistent best management practice regarding managing water in any engine fuel utilizing current detection technology (water finding paste or other acceptable means), and also simplifies the handbook by eliminating the necessity for paragraph 4.2.

At the 2016 NCWM Interim Meeting, Dr. Curran (FALS Chair) remarked that they will form an informal focus group with Mr. Albuquerque being the lead on this item. Mr. Albuquerque will be collecting additional data on this proposal. Mr. Bill Hornback (Chevron Products Co.) remarked that this is no way to detect ¼ in water. The Committee agrees that additional work needs to be done and recommends this as an Informational item.

At the 2016 NCWM Annual Meeting, Dr. Curran commented that this item was discussed extensively in the Sunday FALS meeting. It is recommended that this retain an Informational status and let the informal focus group continue to work on it. Mr. Mahesh Albuquerque (Informal Task Group Chair) provided a presentation during Open Hearing testimony.

Regional Association Comments:

At the 2015 WWMA Annual, Mr. Mahesh Albuquerque (Colorado and submitter) said this proposal would serve to protect fuel quality from degradation caused by water contamination and provides best management practices to prevent microbial growth, particulate accumulation, and tank corrosion in underground storage tanks. It would also simplify NIST Handbook 130 by eliminating redundancy. During the voting session, a regulator suggested to have data collected to support the allowance of ¼ in water phase for all the listed products. WWMA forwarded the item to NCWM, recommending it be a Voting item.

At the 2015 CWMA Interim Meeting, multiple state regulators support this proposal as a Voting item. CWMA believes it sufficiently developed to forward to NCWM, recommending that it be a Voting item.

At the 2015 NEWMA Interim Meeting, no comments were heard and this item was forwarded to the NCWM, recommending that it be a Voting item.

At the 2015 SWMA Annual Meeting, Mr. Walter Huff (Mississippi Petroleum Marketers Assoc.) spoke in opposition of this item. The Committee heard several comments from state officials and industry that support this item. The SWMA believes the item is fully developed and forwarded it to NCWM recommending it as a Voting item.

At the 2016 NEWMA Annual Meeting, the NIST Technical Advisor commented that an informal focus group met at the beginning of May to discuss this item, and indicated the notes from the working group's conference call along with a PPT presentation are posted on the L&R Committee website. A state weights and measures official commented that the title "Retail Engine Fuel Storage Tanks" is awkward. Another option is "Retail Storage Tanks for Engine Fuel." An industry official recommended the need for differentiation from other fuel storage tanks (such as at bulk terminals). Another state weights and measures official asked if the many K1 (kerosene) tanks would be exempt from this provision. He recommends taking out the word "Engine." NEWMA recommended that this item remain Informational.

At the 2016 CWMA Annual Meeting, Mr. Scott Simmons (Colorado) made comments on behalf of the informal task group on water in storage tanks. Mr. Simmons commented that all engine fuels are affected negatively by water, and the occurrence of microbial growth clogs filters and damages fuel systems. Currently, almost all gasoline is blended with ethanol and all diesel is ultra-low sulfur diesel. The absence of sulfur, which is a natural biocide, leaves fuel systems more vulnerable. The proposal puts all requirements in one place and makes the requirement consistent across different types of fuels. A representative from API commented that he believes the item should continue to remain Informational because not all fuel is blended with biodiesel or has ethanol in it. The Committee feels that this item should remain Informational for additional input from stakeholders.

237-6 V Section 4.3. Dispenser Filters

(This item was returned to the Committee.)

Source:

Missouri Department of Agriculture (2012)

Purpose:

Recognize the need for 10 micron or smaller nominal pore-sized filters for today's diesel engines.

Item under Consideration:

Amend the NIST Handbook 130, Engine Fuels and Automotive Lubricants Regulation as follows:

4.3. Dispenser Filters.**4.3.1. Engine Fuel Dispensers.**

- (a) All gasoline, gasoline-alcohol blends, gasoline-ether blends, ethanol flex fuel, and M85 methanol dispensers shall have a 10 micron or smaller nominal pore-sized filter.
- (b) All biodiesel, biodiesel blends, diesel, and kerosene dispensers shall have a ~~30~~ 10 micron or smaller nominal pore-sized filter **with the following exceptions:**
 - (1) **Dispensers with flow rates greater than 15 gal per minute shall use a 30 micron or smaller nominal pore size filter.**
 - (2) **Dispensers with flow rates less than or equal to 15 gal per minute in the following states may use a 30 micron or smaller nominal pore size filter during the months of December through March. These states include: Nevada, Idaho, Montana, Wyoming Colorado, South Dakota, Nebraska, Minnesota, Iowa, Wisconsin, Michigan, Illinois, Pennsylvania, New York, Vermont, New Hampshire, and Maine. This exception has a sunset date of April 2020.**
 - (3) **Dispensers with flow rates less than or equal to 15 gal per minute in North Dakota may use a 30 micron or smaller nominal size filter during the months of November through March. This exception has a sunset date of April 2020.**

(Amended 2014 ~~and 20XX~~)

Background/Discussion:

Abnormal dispenser filter plugging at retail will alert the retailer of potential storage tank problems. Requiring 10-micron filters for all products will reduce the inventory and the potential of installing the wrong filter for all products at the same site.

At the NCWM 2012 Interim Meeting, Mr. Ronald Hayes, FALS Chair, informed the Committee that FALS recommended that this be an Informational item due to industry concerns that 10-micron filters would be too restrictive of flow in high-flow systems. One industry representative expressed opposition for the use of 10 micron filters and recommends this item to be Withdrawn. A representative of an automobile manufacturer claimed diesel passenger vehicles do not have the sophisticated filtration systems commonly found on commercial duty vehicles and 10-micron filters on dispensers are needed for protection from particulate contamination. As proposed, this item could cause clogging of diesel dispenser filters in colder climates. The Committee believes this item has merit but lacks a consensus and believes that FALS needs to address these concerns. The 2012 L&R Committee designated this item as an Informational item and assigned it to FALS for further development.

At the 2012 NCWM Interim Meeting, it was apparent to the Committee that there are many unresolved issues related to passenger vehicles. The Committee encourages the FALS to continue Developing this item.

At the 2012 NCWM Annual Meeting, several stakeholders spoke in opposition of this item. Mr. Ronald Hayes, FALS Chair, remarked that the FALS worked on this item in 2007 and believes FALS needs to continue to work on this item. The NCWM L&R Committee agreed that this item is not ready and supports the continued development by FALS.

At the 2013 NCWM Interim Meeting, Mr. Hayes remarked that a similar item was brought before the Committee in 2007. FALS did not have enough time in their work session to work on this item. There are several stakeholders and states that are having issues with the terminology and would like it removed from the agenda. Mr. Hayes (Missouri) remarked that they supported this item because contamination is an issue with cars that do not have filtering systems. The Committee reviewed comments from the regional associations; however, FALS did not have sufficient time review and make a recommendation to the Committee. The Committee would like for FALS to continue to work on this item and is proposing this as an Informational item.

At the 2013 NCWM Annual Meeting, Mr. Hayes requested that the Committee allow them to continue to work on a recommendation for this item. There was opposition on moving this item forward. In less than two years since this proposal came forward, there has been no data developed. The Committee reviewed Regional Association reports, open hearing comments and letters received and changed the status of this item to Developing.

At the 2014 NCWM Interim Meeting, Mr. Hayes, who submitted the proposal, offered modified language and supporting data to support the flow rate on 10-micron diesel filters. There was considerable discussion regarding the fill time reduction, burdensome cost for station owners, and equipment and filter maintenance. It was noted that there is work being done within ASTM but at this time that information cannot be shared. The Committee reviewed the Item Under Consideration within NCWM Interim Publication 15 (2014). The Committee moved forward the modified language provided by Mr. Hayes for consideration as a Voting item.

At the 2014 NCWM Annual Meeting, the Committee reviewed several letters and additional data submitted by the Petroleum Marketers Association of American (PMAA). The FALS recommended this item move forward for a Vote. During open hearings, comments were mixed regarding this item. Numerous concerns were expressed concerning the data from PMAA. Several comments were heard that ASTM should be allowed to develop a standard.

At the 2015 NCWM Interim Meeting, the FALS Chair notified the Committee that this proposal was discussed in their work session and the FALS group is divided on a recommendation. Mr. Russ Lewis (Marathon Petroleum Co.) submitted the CRC Report "Diesel Fuel Storage and Handling Guide." In addition, Mr. Prentiss Searles (API) provided the Committee with a listing of the various studies and the findings, which support moving this item forward. The Committee reviewed additional letters and regional association recommendations. During Open Hearing testimony, there was discussion as to whether this is a weights and measures issue or a housekeeping issue for the stations. There was lengthy discussion as to the type of particulates and contaminates that a 10 micron could filter. Cost effectiveness was a concern as to who would bear the burden of this cost. With the extensive discussion on this subject matter and new information received the Committee is designating this item as a Voting item.

At the 2015 NCWM Annual Meeting, Mr. Lewis (on behalf of API) provided a presentation on dispenser filters. Mr. Curran (FALS Chair) informed the Committee that FALS is divided on this issue but would like it to proceed with a Vote. There were no new comments other than those that have already been provided in this report. The outcome of the voting session was a split vote; therefore, it was returned to the Committee.

At the 2016 NCWM Interim Meeting, Mr. Searles provided a presentation and remarked that North Dakota is being stricken from Section 4.3.1.(b)(2). Dr. Curran (FALS Chair) remarked that FALS had some opposition from marketers on this proposal. However, FALS is recommending this move forward as a Voting item. There was discussion on the floor as to who is responsible for clean tanks, refiners, terminals, or retailers? It was also mentioned that the ASTM standard may not be sufficient. The Committee is recommending this as a Voting item.

At the 2016 NCWM Annual Meeting, Dr. Curran recommended the item move forward with a Vote even though FALS could not reach a consensus on this item. There were several remarks that this item should be Withdrawn due to the financial burden it would have on small independent operators. Oregon, Maine, and Massachusetts requested that they be added to the exemption listing. States were added to the exemption listing based on temperature studies in the ASTM D975 10 percentile ambient temperature tables (fig. X 5.2. and 5.3.) Those in support of this proposal

agreed that studies on fuel cleanliness have been done, and this item protects the consumer and adds the last line of defense and stations must maintain their tanks. However; retail stations claim contamination is in the product that is being delivered. There was also a comment as to how the sunset date of April 2020 was determined. Mr. Russ Lewis (Marathon Petroleum) remarked that the sunset date was proposed so that if adopted and this did not resolve the issue, then it would allow for a switch back to the 30-micron filter. During the voting session, the item didn't pass or fail and so it was returned to the Committee.

Regional Association Comments:

At the 2015 WWMA Annual Meeting, Mr. Prentiss Searles (API) gave a presentation and provided the following information:

All biodiesel, biodiesel blends, diesel, and kerosene dispensers shall have a ~~30~~ 10 micron or smaller nominal pore-size filter ~~except for dispensers with flow rates greater than 15 gallons per minute which shall have a 30 micron or smaller nominal pore size filter~~ with the following exceptions:

1. Dispensers with flow rates greater than 15 gal per minute shall use a 30 micron or smaller nominal pore size filter.
2. Dispensers with flow rates less than 15 gal per minute in the following states may use a 30 micron or smaller nominal pore size filter during the months of December through March. These states include: Nevada, Idaho, Montana, Wyoming, Colorado, North Dakota, South Dakota, Nebraska, Minnesota, Iowa, Wisconsin, Michigan, Illinois, Pennsylvania, New York, Vermont, New Hampshire, and Maine. This exception has a sunset date of April 2019.
3. Dispensers with flow rates less than 15 gal per minute in North Dakota may use a 30 micron or smaller nominal pore size filter during the months of November through March. This exception has a sunset date of April 2019.

A regulator was concerned with problems related to low temperatures in above ground diesel fuel storage tanks. Another regulator was concerned with the proposed sunset date approaching quickly. WWMA recommends the revised language that appears below be recommended as a Voting item. This will address concerns for cold flow, which were raised at previous meetings. WWMA recommended that the item be a Voting item with the following language:

4.3. Dispenser Filters.

4.3.1. Engine Fuel Dispensers.

- (a) All gasoline, gasoline-alcohol blends, gasoline-ether blends, ethanol flex fuel, and M85 methanol dispensers shall have a 10 micron or smaller nominal pore-sized filter.
- (b) All biodiesel, biodiesel blends, diesel, and kerosene dispensers shall have a **30 10** micron or smaller nominal pore-sized filter **with the following exceptions:**

- (1) Dispensers with flow rates greater than 15 gal per minute shall use a 30-micron or smaller nominal pore size filter.**
- (2) Dispensers with flow rates equal to or less than 15 gal per minute in the following states may use a 30-micron or smaller nominal pore size filter during the months of December through March. These states include: Nevada, Idaho, Montana, Wyoming, Colorado, North Dakota, South Dakota, Nebraska, Minnesota, Iowa, Wisconsin, Michigan, Illinois, Pennsylvania, New York, Vermont, New Hampshire, and Maine. This exception has a sunset date of April 2020.**

(3) Dispensers with flow rates equal to or less than 15 gal per minute in North Dakota may use a 30 micron or smaller nominal pore size filter during the months of November through March. This exception has a sunset date of April 2020.

(Amended 2014 ~~and 20XX~~)

(Added 2008) (Amended 2014 ~~and 2016~~)

At the 2015 CWMA Interim Meeting, a state regulator supported the language provided by API at the 2015 WWMA Annual Meeting. This modified language provides some flexibility to utilize a 10-micron filter in warm weather and switch back to 30-micron filter during cold weather months in specified states. This language also has sunset dates, which allows for the eventuality of standardized 10-micron filters on all diesel dispensers with a flow rate of 15 gpm or less. An industry representative from the fuel marketers spoke in opposition of this proposal. A state regulator commented that she would encourage ASTM to develop a tighter specification for fuel purity rather than rely on filters to catch particulate matter. The CWMA believes this item is fully developed and industry has sought a reasonable compromise position, and recommends the API version of this move forward as a Voting item.

At the 2015 NEWMA Interim Meeting, the L&R Chair presented the revised proposal submitted at the WWMA. A state regulator commented that with the new item to limit water, he does not think this item should move forward. They further commented that state exceptions from the industry proposal, presented at the WWMA, seems arbitrary. NEWMA recommended that this be a Voting item.

At the 2015 SWMA Annual Meeting, Mr. Russ Lewis (representing API) provided a presentation and following revisions. The SWMA accepts the revisions and believes this item is fully developed. The SWMA recommends that the revised language submitted (refer to the 2015 WWMA Annual Report) be a Voting item.

At the 2016 NEWMA Annual Meeting, an industry representative from Gilbarco commented that the current provision differentiates the requirement for flow rates of 15 gpm or greater. He suggested considering changing the flow rate exemption threshold from 15 gpm to 30 gpm since that rate is already referenced as a high flow rate in NIST Handbook 44. This item was considered fully developed and NEWMA recommends this as a Voting item.

At the 2016 CWMA Annual Meeting, a state regulator from Missouri commented that this proposal came from an update in Missouri's state fuel quality requirements and commented that regardless of whether diesel fuel has biodiesel in it or not is irrelevant – the fuel needs to be cleaner. He added that a recent volume of the PEI (Petroleum Equipment Institute) Journal has an article about coverage of current NCWM items being considered. He said that the article points out that off-road equipment has better coverage and protection when it comes to fuel quality, but a customer at a retail station is at the mercy of what fuel housekeeping practices the retail fuel station operator provides. A representative from API commented they support the proposal. During the voting session, a state regulator from Illinois spoke in support of the item. A state regulator from Missouri commented that the current language is a compromise from the original proposal and addresses some of the concerns fuel marketers had regarding cold weather issues. A state regulator from Minnesota commented that she supports a workmanship standard on all fuels at all levels. She believes the item is fully developed and ready for Voting status. The CWMA also agreed this should be a Voting item.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 100th National Conference on Weights and Measures" (SP 1210, 2015).

260 HANDBOOK 133

260-1 V Section 1.2.1. Inspection Lots and Section 3.10. Mulch and Soils Labeled by Volume

(The Committee returned this item to Informational status.)

Source:

Mulch & Soil Foundation and NIST OWM (2016)

Purpose:

Clarify test procedures and promote uniform practices.

Item under Consideration:

Amend NIST Handbook 133 as follows:

Chapter 1- General Information

1.2. Package Requirements

1.2.1. Inspection Lot

An “inspection lot” (called a “lot” in this handbook) is defined as a collection of identically labeled (except for quantity or identity in the case of random packages) packages available for inspection at one time. The collection of packages will pass or fail as a whole based on the results of tests on a sample drawn from the lot **in accordance with Section 1.3. Sampling Plans and section 2.3.4. Random Sample Selection.** This handbook describes procedures to determine if the packages in an “inspection lot” contain the declared net quantity of contents and if the individual packages’ variations are within acceptable limits.

Chapter 3 – Test Procedures – For Packages Labeled by Volume

3.10. Mulch and Soils Labeled by Volume

Mulch is defined as “any product or material except peat or peat moss that is advertised, offered for sale, or sold for primary use as a horticultural, above-ground dressing, for decoration, moisture control, weed control, erosion control, temperature control, or other similar purposes.”

Soil is defined as “any product or material, except peat or peat moss that is advertised or offered for sale, or sold for primary use as a horticultural growing media, soil amendment, and/or soil replacement.”

3.10.1. Test Equipment:

- A test measure appropriate for the package size that meets the specifications for test measures in Table 3-4. “Specifications for Test Measures for Mulch and Soils”
- Drop cloth/polyethylene sheeting for catching overflow of material
- Level (at least 15 cm [6 in] in length)

**Table 3-4.
Specifications for Test Measures for Mulch and Soils**

Nominal Capacity of Test Measure ⁴	Actual Volume of the Measure	Interior Length ¹	Interior Width ¹	Interior Height ²	Marked Intervals on Interior Wall ³	Volume Equivalent of Marked Intervals
30.2 L (1.07 cu ft) for testing packages that contain less than 28.3 L (1 cu ft or 25.7 dry qt)	31.9 L (1.13 cu ft)	213.4 mm (8.4 in)	203.2 mm (8.0 in)	736.6 mm (29 in)	12.7 mm (¹ / ₂ in)	550.6 mL (33.6 cu in)
28.3 L (1 cu ft)	28.3 L (1 cu ft) <u>33.04</u> (1.16 cu ft)	304.8 mm (12 in)	304.8 mm (12 in)	304.8 mm (12 in) <u>355.6 mm</u> (14 in)		1179.8 mL (72 cu in)
56.6 L (2 cu ft)	63.7 L (2.25 cu ft) <u>61.3 L</u> (2.16 cu ft)	304.8 mm (12 in)	304.8 mm (12 in)	685.8 mm (27 in) <u>660.4 mm</u> (26 in)		
		406.4 mm (16 in)	228.6 mm (9 in)	685.8 mm (27 in) <u>660.4 mm</u> (26 in)		
84.9 L (3 cu ft)	92 L (3.25 cu ft) <u>89.4 L</u> (3.16 cu ft)	304.8 mm (12 in)	304.8 mm (12 in)	990.6 mm (39 in) <u>965.2 mm</u> (38 in)		
		406.4 mm (16 in)	228.6 mm (9 in)	990.6 mm (39 in) <u>965.2 mm</u> (38 in)		

Measures are typically constructed of 1.27 cm (¹/₂ in) marine plywood. **The measure must accommodate the entire contents of the package being tested, and** a transparent sidewall is useful for determining the level of fill, but must be reinforced if it is not thick enough to resist distortion. If the measure has a clear front, place the level gage at the back (inside) of the measure so that the markings are read over the top of the mulch.

Notes

¹. Other interior dimensions are acceptable if the test measure approximates the configuration of the package under test, **can accommodate the entire contents of the package at one time** and does not exceed a base configuration of the package cross-section.

². The height of the test measure **shall be 355.6 mm (14 in) for a 1 cu ft package, 660.4 mm (26 in) for a 1.5 – 2 cu ft package or 965.2 mm (38 in) for a 3 cu ft package. may be reduced, but this will limit the volume of the package that can be tested.**

**Table 3-4.
Specifications for Test Measures for Mulch and Soils**

³. When lines are marked in boxes, they should extend to all four sides of the measure if possible to improve readability. It is recommended that a line indicating the MAV level also be marked to reduce the possibility of reading errors when the level of the mulch is at or near the MAV.

⁴. The Nominal Capacity is given to identify the size of packages that can be tested in a single measurement using the dry measure with the listed dimensions. It is based on the most common package sizes of mulch in the marketplace. If the measures are built to the dimensions shown above the actual volume will be larger than the nominal volume so that plus errors (overfill) can be measured accurately.

(Amended 2010 and 20XX)

3.10.2. Test Procedure

1. Follow the Section 2.3.1. "Define the Inspection Lot." Use a "Category A" sampling plan in the inspection, and select a random sample.
2. ~~Open each package in turn. Empty the contents of the package into a test measure and level the contents by hand. Do not rock, shake, drop, rotate, or tamp the test measure. Read the horizontal marks to determine package net volume.~~
2. **Note** Some types of mulch are susceptible to clumping and compacting. ~~Take steps~~ To ensure that the material is loose and free flowing when placed into the test measure, gently **massage the package while rolling** the bag **on the ground (or flat surface) at least four full rotations (but not more than eight full rotations), without lifting or dropping the package,** before opening to reduce the clumping and compaction of the material.

Note: Mulch products stored exposed to the elements may become saturated with moisture. Excessive moisture adds weight to mulch particles and distorts the volume test results. Test samples with flowing or excessive collected moisture in the package shall be excluded from the test procedure.

3. ~~Exercise care in leveling the surface of the mulch/soil and determine the volume reading from a position that minimizes errors caused by parallax.~~
3. **Placing contents into the test measure.**
 - **Open the bag, gather the bag opening to ensure that no product is lost. Place the gathered bag opening as far into the top of the measure as possible without disturbing or leaning against the measure.**
 - **Release the bag opening and quickly dump the contents of the package into a test measure in a continuous flow**

Note: Do not touch the product or disturb the test measure by rocking, shaking, dropping or tamping it during the test procedure.

- **Massage the outside of the bag to maintain a continuous flow of the product but not for the purpose of de-clumping the product.**
 - **Using your hand, gently level the contents, being careful not to affect the compaction of the product.**
4. **Read the horizontal marks at a position level with the product and round the readings between**

two marked intervals up to the nearest 38.1 mm (½ in) increment to determine the package net volume.

- 5.4.** Determine package errors by subtracting the labeled volume from the package net volume in the measure. Record each package error.

$$\text{Package Error} = \text{Package Net Volume} - \text{Labeled Volume}$$

(Amended 20XX)

3.10.3. Evaluation of Results

Follow the procedures in Section 2.3.7. “Evaluate for Compliance” to determine lot conformance.

Note: In accordance with Appendix A, Table 2-10. Exceptions to the Maximum Allowable Variations for Textiles, Polyethylene Sheeting and Film, Mulch and Soil Labeled by Volume, Packaged Firewood, and Packages Labeled by Count with 50 Items or Fewer, and Specific Agricultural Seeds Labeled by Count, apply an MAV of 5 % of the declared quantity to mulch and soil sold by volume. When testing mulch and soil with a net quantity in terms of volume, one package out of every 12 in the sample may exceed the 5 % MAV (e.g., one in a sample of 12 packages; two in a sample of 24 packages; four in a sample of 48 packages). However, the sample must meet the average requirement of the “Category A” Sampling Plan.

Background/Discussion:

Recent observations of test activities being conducted by industry and states indicate there are areas in the current test procedures that are not sufficiently defined to assure uniform testing practices by all parties. Council testing conducted by Dr. William Fonteno (Horticultural Substrata Lab at North Carolina State University) indicates some reported and observed variations in testing procedures that are not completely defined in NIST Handbook 133 can have an adverse impact on testing results due to the highly variable particle size distribution that is the very nature of the products.

There should be no major costs resulting from this proposal. Some manufacturers and inspectors may need updated test measures suitable for the package size being tested. All stakeholders will benefit from coordinated training by NIST and industry and the uniform application of test procedures in interstate commerce.

At the 2016 NCWM Interim Meeting, it was noted that this proposal clarifies the language of the testing procedures that are currently within NIST Handbook 133. It was noted that the language in Section 1.3.1. Audit Test, which stated “Do not take enforcement action using audit test results,” should be underlined and bold in NIST Handbook 133. Since the change is not a technical correction or clarification, the language was removed from the Item Under Consideration.

The Committee made the following changes

- Remove the term “statistically valid” from Section 1.2.1.

1.2.1. Inspection Lot

An “inspection lot” (called a “lot” in this handbook) is defined as a collection of identically labeled (except for quantity or identity in the case of random packages) packages available for inspection at one time. The collection of packages will pass or fail as a whole based on the results of tests on **a statistically valid, randomly drawn sample drawn from of** the lot. This handbook describes procedures to determine if the packages in an “inspection lot” contain the declared net quantity of contents and if the individual packages’ variations are within acceptable limits.

- Under 3.10.2. Test Procedure modified the second sentence in the note to read: Test samples with flowing or **excessive** collected moisture in the package shall be excluded from the test procedure.

With the modifications stated above the Committee is recommending this be a Voting item.

At the 2016 NCWM Annual Meeting, Mr. Robert LaGasse (MSC) remarked that this clarifies the current test procedures in NIST Handbook 133. Mr. Floren (Los Angeles County, California) remarked that he has no issue with the inspection procedure, but he has major concerns with Section 1.2.1. This section applies to all products in the marketplace, and for that reason, this portion of the proposal should be stricken. The handbook already states how a random selection is to be done. Mr. Mike Sikula (New York) opposed this item because it is difficult to pour the product into the test measure without touching. Mr. Craig VanBuren (Michigan) asked for the supporting data regarding the change in the test measure size. It was also suggested that the term “excessive moisture” is too subjective.

The Committee made the following changes

1.2. Package Requirements

1.2.1. Inspection Lot

An “inspection lot” (called a “lot” in this handbook) is defined as a collection of identically labeled (except for quantity or identity in the case of random packages) packages available for inspection at one time. The collection of packages will pass or fail as a whole based on the results of tests on a randomly drawn sample drawn from of the lot in accordance with Section 1.3. Sampling Plans and Section 2.3.4. Random Sample Selection. This handbook describes procedures to determine if the packages in an “inspection lot” contain the declared net quantity of contents and if the individual packages’ variations are within acceptable limits.

The Committee made a minor editorial change to the note in Section 3.10.2.3. by removing the word “touching” and replacing it with the word “disturbing.”

At the Voting session, a motion to amend was heard from the State of Michigan. This motion was to Withdraw the Table 3-4. Test Measure size until further data can be submitted on why this change is valid. The Committee removed this item from Voting status and noted the following concerns.

1. Additional testing needs to be done on the use and variability of the various test vessels sizes. This data should be shared with membership in advance of any meetings.
2. Modify the language to state that the measurement must be made in a single pour. In stating this, the specifications for the current test measurement are not changed.
3. Concern was voiced regarding the cost of building new test vessels. *Possible solution:* Permit the use of the current test vessels, but have a note that test vessels constructed after a specific date use the new recommended chart.
4. The current practice and use of test measures has been used for an extended period, why is this change before the Conference? The product has not changed, so why is there a proposal before the Conference?
5. When there is “excessive moisture the package is not to be tested. However, because this product is stored outside it could be could be affected by the various weather climates (i.e., rain, sleet, ice, humidity, snow). In some regions, once the product gets wet and then has exposure to freezing temperatures it never dries out. The term “excessive moisture” is too subjective.
6. Replacing the word “touch” with “disturb(ing)” in the test procedure has been a sufficient resolution and this modification will appear in the fall regional reports to get additional feedback.

3. Placing contents into the test measure.

- **Open the bag, gather the bag opening to ensure that no product is lost. Place the gathered bag opening as far into the top of the measure as possible without disturbing or leaning against the measure.**
- **Release the bag opening and quickly dump the contents of the package into a test measure in a continuous flow**

Note: Do not touch the product or disturb the test measure by rocking, shaking, dropping or tamping it during this procedure.

Regional Association Comments:

The WWMA received a presentation from Mr. Robert LaGasse, Executive Director of Mulch and Soil Council, to discuss the proposal, which is a joint effort with NIST. The proposal does not change the procedures, but clarifies the steps that are not being interpreted in the same manner by the states and industries. Changes will promote uniformity. The WWMA supports this item with amendments. Bold and underline the statement “Do not take enforcement action using audit test results” in 1.3.1. Audit Tests. This is meant to bring to the inspectors’ attention the fact that enforcement action should not be taken unless an official test has been conducted.

During the voting session, Mr. Floren (Los Angeles County, California) was concerned about the term “randomly drawn” as it relates to drawing a sample for items in large quantities. This term would cause challenges in conducting the inspection and when facing legal challenges in civil cases. He stated that this addition would apply to all commodities and not only mulch and soils. He recommended removing the suggested addition of “randomly drawn,” and bold the sentence “Do not take enforcement action using audit test results,” and agrees with the suggested changes for Chapter 3, Section 3.10. Mulch and Soils Labeled by Volume. The WWMA forwarded the item to NCWM, recommending that it be a Voting item as modified:

1.2.1. Inspection Lot

An “inspection lot” (called a “lot” in this handbook) is defined as a collection of identically labeled (except for quantity or identity in the case of random packages) packages available for inspection at one time. The collection of packages will pass or fail as a whole based on the results of tests on a ~~statistically valid, randomly drawn~~ sample **drawn from of the lot in accordance with 1.3. Sampling Plans.** This handbook describes procedures to determine if the packages in an “inspection lot” contain the declared net quantity of contents and if the individual packages’ variations are within acceptable limits.

At the 2015 CWMA Interim Meeting, a state regulator asked if this proposal would conflict with the proposal that includes a maximum allowable variation. She wants any conflict between the two proposals related to MAVs resolved before moving forward. She recommended it not move forward as a Voting item. The Committee believed there was still potential for conflict regarding maximum allowable variation; therefore, the CWMA forwarded the item to NCWM and recommended that it be a Developing item.

At the 2015 NEWMA Interim Meeting, a state regulator commented that this should continue as a Developing item. He does not support this method as it is presented because he believes the act of sifting needs to stay in the test method. He would like to see more data in varying climates where moisture exists. Another state regulator commented that this proposal states that this product is similar to animal bedding and the procedures seem to be very different. This proposal does not allow multiple drops, and the animal bedding procedure does allow for multiple drops. He believes this is inconsistent and should be reevaluated. Another regulator agrees it should remain as a Developing item waiting for further data from various climates. NEWMA forwarded the item to NCWM, recommending that it be a Developing item.

At the 2015 SWMA Annual Meeting, Mr. Robert LaGasse (Mulch and Soil Council) spoke in support of this proposal. The SWMA proposes adding the word “excessive” into Section 3.10.2. Test Procedure, Step 2. With this change, the SWMA forwarded the item to NCWM, stating that it is fully developed and recommended that it be a Voting item.

Note: Mulch products stored exposed to the elements may become saturated with moisture. Excessive moisture adds weight to mulch particles and distorts the volume test results. Test samples with flowing or excessive collected moisture in the package shall be excluded from the test procedure.

At the 2016 NEWMA Annual Meeting, Mr. LaGasse commented that these changes are clarifications for NIST Handbook 133 in order to make language consistent with existing training practices and to cover gaps discovered from these training sessions. A state weights and measures official from New York commented that he is not sure there is a need for the language “randomly drawn” in this introductory paragraph since this is covered in the existing testing procedures. The NIST Technical Advisor commented that the phrase was added in this introductory section for clarification. A state weights and measures official from Connecticut asked if there had been any further study on these procedures. The NIST Technical Advisor commented there had been a great deal of testing, and NIST would be interested in hearing feedback from inspectors using this method in the field. The regulator from Connecticut further commented he had concern with the term “dumping quickly.” The representative from the Mulch and Soil Council commented the important step was to massage and roll the package as indicated in the testing methods to break up the material. The New York state official opposed this item because the procedure is too detailed and too constraining to be used in practice. The NIST Technical Advisor commented that inspectors were tapping, knocking, and rocking the measure during training, and these procedures are meant to address that practice. Mr. LaGasse indicated that the test method has always included guidance for no rocking, tapping, or knocking for twenty years but inspectors are at times using these methods. The New York state official commented that the new language calls for not touching the measure, and that is too restrictive. NEWMA believed this item is fully developed and should remain Voting.

At the 2016 CWMA Annual Meeting, Mr. LaGasse commented that this is a joint proposal between the Mulch and Soil Council and NIST to clarify procedures for checking package content of mulch. This proposal updates procedures for containers in the testing protocol. These procedures have been developed from the NIST training sessions so that industry and states can both reference the same materials if training is unavailable. Industry supports the proposal as a Voting item. The L&R Chair commented that the Conference received a letter from Professor Judd Michael (Pennsylvania State University, College of Agricultural Sciences and Engineering) stated that they did not support the proposed changes. Professor Michaels wrote that he is concerned the new procedures will result in more issues rather than fewer issues. The Chair commented that NIST has reached out to the individual to clarify the specific concerns. The Committee felt that the proposal should move forward as a Voting item, with the expectation that NIST will continue communication with Dr. Michael, and he will have the opportunity to attend the Annual Meeting to present his concerns.

260-2 V Section 2.4. Borax Audit Test

(This item was Adopted.)

Source:

NIST Office of Weights and Measures (2016)

Purpose:

Provide clarification for existing steps for the Borax Test Procedure.

Item under Consideration:

Amend NIST Handbook 133 as follows:

2.4. Borax Audit Test

This audit test is only used if the sample fails a net weight test. This method is used to identify possible short-filling by weight at point-of-pack for borax. Since the density of borax can vary at point-of-pack, further investigation is required to determine whether such short-filling has occurred. Use the following procedure to determine if packages of borax are labeled correctly.~~This procedure applies to packages of powdered or granular products consisting predominantly (more than 50 %) of borax. Use the following procedure to determine if packages of borax are labeled correctly.~~**Such commodities are Borax shall be** labeled by weight. Borax can lose more than 23 % of its weight due to moisture loss. However, it does not lose volume upon moisture

loss, and this property makes possible a method of volume testing based on a density determination in the event that the net weight of the ~~product~~ borax does not meet the average or individual package requirements. ~~This method may be used for audit testing to identify possible short filling by weight at point of pack. Since the density of these commodities can vary at point of pack, further investigation is required to determine whether such short filling has occurred.~~

(Amended 2016)

2.4.1. Test Equipment

- ~~Metal density cup~~ Dry measure with a capacity of 550.6 mL (1 dry pt), 1101 mL (dry quart), 1000 mL (liter)
- Metal ~~density~~ funnel with slide-gate and stand
- ~~Scale or balance having a scale division not larger than 1 g or (0.002 lb),~~ A scale that meets the requirements in Chapter 2, Section 2.2. "Measurement Standards and Test Equipment."
- ~~Rigid~~ Straightedge or ruler
- Safety glasses
- Gloves
- Dust mask
- Level (at least 15 cm [6 in] in length)
- Pan or drop cloth/polyethylene sheeting ~~suitable~~ for holding catching overflow of ~~density cup dry measure~~
- Borax Audit Worksheet

2.4.2. Test Procedure

Use this procedure only if the sample fails to meet the package requirements in Section 2.3.7. "Evaluate for Compliance."

1. ~~Follow Section 2.3.1. through 2.3.7. to define the inspection lot, use a "Category A" sampling plan in the inspection; select a random sample, determine tare and package errors and evaluate results.~~ Select the package with the lightest gross weight. Fill out Boxes 1 through 3 of the Borax Audit Worksheet.
2. ~~If the lot does not comply by weight with the sampling plan requirements (either the average or individual package requirements), select the lightest package, and record the net weight of this package.~~ Record the volume declared on the package (Box 4). This volume declaration shall not appear on the principal display panel. Instead, it shall appear on the back, side, or bottom of the package and may read as:

Volume _____ mL per NIST Handbook 133

Note: 1 mL = 1 cm³

3. Determine the ~~empty weight of the density cup.~~ gross weight of the package (Box 5).
4. ~~Place the density cup in the pan and put the funnel on top of the density cup. Close the funnel slide-gate.~~ Look up the dry measure used in the following table and record the volume (Box 8).

<u>Dry Measure</u>	<u>Volume in Milliliters</u>
<u>Dry Pint</u>	<u>550.6 mL</u>
<u>Dry Quart</u>	<u>1101 mL</u>
<u>Liter</u>	<u>1000 mL</u>

5. Pour sufficient commodity into the funnel so that the density cup can be filled to overflowing. Determine the empty weight of the dry measure and record the value (Box 9).
 - (a) Place the dry measure in the pan or on top of drop cloth/polyethylene sheeting and verify that it is level. Place the funnel on top of the dry measure and close the funnel slide gate.
 - (b) Pour an adequate amount of borax into the funnel so that the dry measure will be filled to overflowing.
 - (c) Quickly remove the slide-gate from the funnel, allowing the borax to flow into the dry measure. To ensure that the borax is free-flowing, repeat Steps 5 (a), (b), and (c) at least three times. After the final filling go to Step 5 (d).
 - (d) Carefully, without agitating the dry measure, remove the funnel and level off the borax with the straightedge or ruler at a right angle to the rim of the cup, and carefully draw it across the top of the dry measure to leave an even surface. If the surface of the borax is not smooth, repeat Steps 5 (a), (b), (c), and (d). If the surface of the borax is smooth, proceed to Step 6.
6. ~~Quickly remove the slide-gate from the funnel, allowing the commodity to flow into the density cup. Determine the gross weight of the filled dry measure and borax (Box 10).~~
7. ~~Carefully, without agitating the density cup, remove the funnel and level off the commodity with the ruler or straightedge. Hold the ruler or straightedge at a right angle to the rim of the cup and carefully draw it back across the top of the density cup to leave an even surface. Subtract the empty weight of the dry measure from the gross weight of the dry measure (Box 10 – Box 9) to obtain the net weight of the borax in the dry measure (Box 11).~~
8. ~~Weigh (in pounds) the filled density cup to determine gross weight. Subtract the empty density cup in weight from the gross weight. This will give the net weight of the commodity. Determine the tare weight of the package (Box 6).~~
9. ~~Multiply the package net weight (in pounds) found for the package under test by 550.6. Determine the net weight of package (Box 7).~~
10. ~~Divide the answer just obtained (Step 9) by the weight of the commodity in the density cup determined in Step 8 above. The result is the net volume of commodity in the package in milliliters.~~
11. ~~Compare the net volume of the commodity in the package with the volume declared on the package. The volume declaration must not appear on the principal display panel. Instead, it will appear on the back, side of the package and may appear as:~~

Volume _____ mL per NIST Handbook 133

Note: 1 mL = 1 cm³

Determine the net volume of the borax by dividing the net weight of the package (Box 7) by the net weight of the borax in the dry measure (box 11) and multiply the result by the volume of the dry measure (Box 8). The result is the net volume of the borax in the package in milliliters (Box 12).

- 12. If the net volume of **commodity borax** in the lightest package equals or exceeds the declared volume on the package, treat the lot as being in compliance based on volume and take no further action. If the net volume of borax in the lightest package is less than the declared volume on the package, further compliance testing will be necessary.
- 13. Take further steps to determine if the lot was in compliance with net weight requirements at point-of-pack or was short-filled by weight. To determine this, perform a laboratory moisture loss analysis to ascertain the weight of the original borax ~~product~~ when it was fully hydrated; obtain additional data at the location of the packager; and/or investigate the problem with the packager of the **commodity borax**.

(Amended 2016)

<u>Borax Audit Worksheet</u>	
<u>Use only IF the sample fails the net weight test. Use the lightest package in the sample.</u>	
1. <u>Product:</u>	2. <u>Lot Code:</u>
3. <u>Declared Net Weight on the Package:</u>	
4. <u>Declared Volume on the Borax Package:</u>	
5. <u>Gross Weight of Package:</u>	
6. <u>Tare Weight of Package:</u>	
7. <u>Net Weight of Package:</u>	
8. <u>Volume of Dry Measure - look up the volume of the dry measure in milliliters used to calculate the volume and enter it below:</u> <div style="text-align: center;"> $= \underline{\hspace{2cm}} \text{ mL}$ </div> <u>Dry Measures: Dry Pint = 550.6 mL; Dry Quart = 1101 mL; Liter = 1000 mL</u>	
9. <u>Empty Weight of Dry Measure:</u>	
10. <u>Gross Weight of Dry Measure + Borax:</u>	
11. <u>Net Weight of Borax in the Dry Measure</u> <div style="text-align: right;"><u>(Box 10 – Box 9 =):</u></div>	
12. <u>Net Volume of Borax</u> <div style="text-align: right;"><u>(Box 7 ÷ Box 11) × Box 8 =:</u></div>	
13. <u>Refer to Step 10 to determine if the sample is in compliance or if further action is required.</u>	

Background/Discussion:

NIST, OWM has taught several classes for NIST Handbook 133 Basic and incorporated the Borax procedure as one of the hands-on training modules. Based on comments and recommendations received from the students, NIST has concluded that the current test procedure needs clarification regarding the test equipment and steps that are in the current edition of NIST Handbook 133. NIST is also proposing adding a Borax Audit Worksheet to NIST Handbook 133 – Appendix C to assist inspectors in performing the test.

At the 2016 NCWM Interim Meeting, the NIST Technical Advisor remarked that these modifications clarify the language within NIST Handbook 133. This testing procedure has been used in several NIST Handbook 133 Basic

Training Seminars. Several of these changes result from feedback received from the students. Ms. Kristin Macey (California) noted that the step-by-step procedures are not correct. NIST will review the procedure and make any necessary corrections before the spring regionals. The Committee is recommending this be a Voting item.

Regional Association Comments:

At the 2015 WWMA Annual Meeting, the NIST Technical Advisor remarked that several clarifications were made to the procedure based on input from several NIST Handbook 133 Basic Training Seminars. The WWMA forwarded this item to the NCWM, recommending that it be a Voting item.

At the 2015 CWMA Interim Meeting, there were no comments or new information presented. The CWMA believes the item to be fully developed and forwarded it to NCWM with the recommendation that it be a Voting item.

At the 2015 NEWMA Interim Meeting, no comments were heard. NEWMA believes this item is fully developed and recommends it as a Voting item.

At the 2015 SWMA Annual Meeting, the NIST Technical Advisor remarked that this clarifies the current procedure, which is being used in the NIST Training Handbook 133 Basic Seminar. The SWMA recommends this be a Voting item.

At the 2016 NEWMA and CWMA Annual Meetings, no comments were heard and both regions are recommending this be a Voting item.

260-3 V Section 3.14. Firewood – Volumetric Test Procedures for Packaged Firewood with a Labeled Volume of 113 L [4 ft³] or Less) and Stacked Firewood sold by the Cord or fractions of a Cord. (See Related Items 232-4 and 260-4)

(This item was Adopted.)

Source:

NIST Office of Weights and Measures (2016)

Purpose:

Replace ambiguous test procedures with new procedures that will provide improved national uniformity in test results.

Item under Consideration:

3.14. Firewood – (Volumetric Test Procedure for Packaged Firewood with a Labeled Volume of 113 L [4 ft³]) or Less and Stacked Firewood sold by the Cord or fractions of a Cord.

Unless otherwise indicated, take all measurements without rearranging the wood or removing it from the package. **However**, if the layers of wood are crosshatched or not ranked in discrete sections in the package, remove the wood from the package, re-stack, and measure according **to the procedures described in this section. For boxed firewood, it is the volume of the wood in the box that is determined not the volume of the box.**

Note: The implementation date for this is effective July 1, 2017.

3.14.1. Test Equipment ~~Linear Measure. Take all measurements in increments of 0.5 cm (³/₁₆) or less and round up~~

Linear Measurement: the maximum value of graduations on a ruler or tape shall be equal to or less than:

For testing packaged firewood: SI Units – 1 mL or for U.S. customary units – ¹/₁₆ in (0.0625 in).

For testing stacked firewood: SI Units – 0.5 cm or for U.S. customary units – ¹/₈ in (0.125 in).

Other Equipment:

Except where a long tape measure is needed for measuring stacks of wood and unless otherwise noted below, a precision tempered steel ruler should be used for linear measurements. Current calibration certificates issued by a NIST recognized or accredited laboratory should be available for all measuring devices.

- **To test boxes of firewood, use a straightedge and a 150 mm (6 in) tempered steel pocket ruler to measure the box headspace. A rigid 610 mm (24 in) tempered steel ruler is required to measure piece length and the dimensions of the box.**
- **To test bundles of firewood, use a rigid 610 mm (24 in) tempered steel ruler to measure typical piece length. If the circumference based auditing method is to be conducted, a precision 610 mm (24 in) diameter (pi) tape or flexible steel tape with 1 mm (¹/₁₆ in) graduations may be used to approximate the package volume for screening and audit purposes.**

For testing stacks of firewood, a precision tape or long tape measure are used. For testing bundles and bags of firewood, the following equipment and materials are used in addition to the linear measures listed above:

- Binding Straps - **Straps with ratchet type closures are easily tightened to secure the wood tightly.** The binding straps are used to hold wood bundles together if the bundles need to be removed from the package/wrapping material.
- ~~Tracing Paper~~
- ~~Graduated template in square centimeters or square inches~~
- **Graph Paper - 279.4 mm × 431.8 mm (11 in × 17 in) with 0.5 centimeter or ¼ inch squares. This paper is used for tracing and calculating the areas of the ends of a bundle of firewood. Prior to using any graph paper use a calibrated ruler to verify the dimensions of squares at several random points across the page.**
- **Ruler – 300 mm (12 in) with 0.5 cm (¹/₄ in) graduations. This ruler is used with the graph paper to calculate the area of the bundle ends.**

(Amended 2016)

3.14.2. Test Procedures

General Instructions

- **When testing packaged firewood follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.**
- **Measurements shall be read to the smallest graduation on the ruler or tape. Round any value that falls between two graduations up to the higher value except when making headspace depth measurements in the test procedure for boxes where a value falling between two graduations is rounded down.**
- **Samples for Length – Use Table 1. “Minimum Number of Pieces to be Measured for Length” to determine the minimum number of pieces to measure to determine the average length of the firewood pieces in a package or stack.**

Table 1. <u>Minimum Number of Pieces to be Measured for Length</u>		
	Volume	
<u>1.</u>	<u>Packaged Firewood 453 L (16 cu ft) [$\frac{1}{8}$ cord] or less</u>	<u>Minimum Number of Pieces to be Measured for Length*</u>
<u>a.</u>	<u>For packages with 12 pieces or less</u>	<u>All</u>
<u>b.</u>	<u>For packages with 13 to 50 pieces</u>	<u>At least 12 pieces</u>
<u>c.</u>	<u>For packages with more than 50 pieces</u>	<u>At least 24 pieces</u>
<u>2.</u>	<u>Stacked wood</u>	<u>At least 12 pieces for each $\frac{1}{2}$ cord or fraction thereof</u>
<p><u>*Note: While the packages of firewood to be included in the sample must be selected using the random sampling techniques described in NIST HB133, Section 2.3.4. "Random Sample Selection" those techniques are not used in selecting the individual pieces for measurement of length. Since the packages were selected at random the assumption is made that the length of any piece selected for measuring is generally representative of the other pieces that the packer cut or selected for inclusion in the package under inspection. When selecting pieces of wood for measurement, take them from different locations in the package or stack so they are representative of the total amount of wood under test.</u></p>		

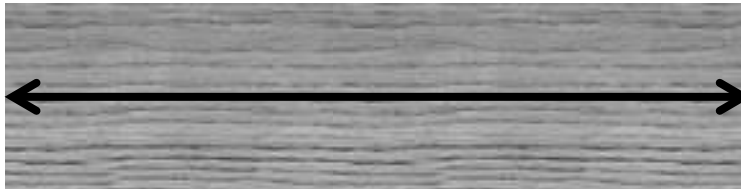
- **Measuring Procedures for Length – Use the instructions and graphics in Table 2. "Determining Piece Length" when measuring the length of pieces to determine the average length of a piece of firewood based on its shape in a package or stack. If a piece of wood does not appear to fall within the examples shown, measure it as if it were an irregular shape and take three or more measurements and average them.**

Table 2.
Determining Piece Length

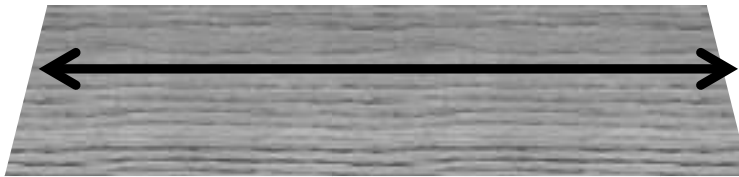
(a) Uniform Shapes

Errors in the length measurement can result in a significant volume errors especially with the small quantities typical of packaged wood. When the pieces are generally cut in a uniform manner, a single measurement along the center line of the longitudinal axis is used to determine piece length. Take the measurement along a straight line between two points over solid wood.

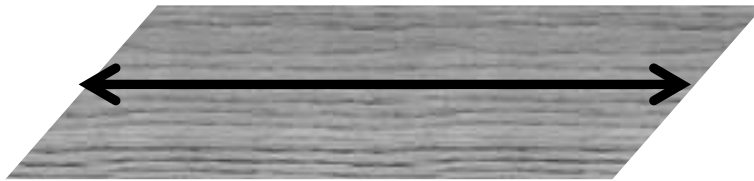
- (i) Most wood pieces are cut perpendicular to their longitudinal axis so one measurement taken from the face of one end to the face of the other end will provide an accurate length determination.**



- (ii) On pieces of wood with “reverse bias” and “bias” end cuts estimate where the center line of the piece is and then measure to these points as shown below. The intent of this measurement is to determine an “average” length that is assumed to fall along the center line of the piece. The top piece is an example of a “reverse” bias cut.**



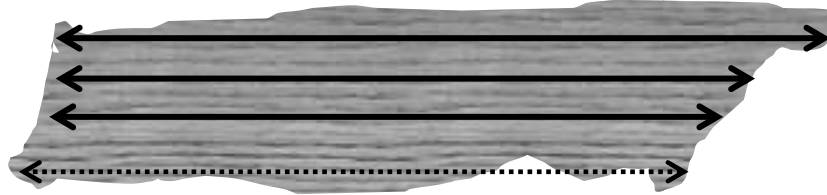
The bottom piece is an example of a bias cut



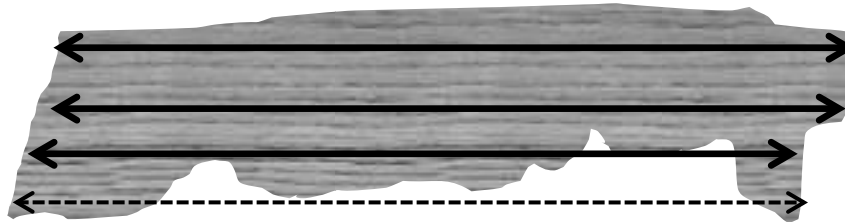
(b) Irregular Shapes

When the pieces have irregular shapes, cuts, or shattered ends, it is necessary to take at least three measurements and average the results to obtain the length of the piece. Take the measurements along a straight line between two points which cover solid wood that appear to be the shortest and longest dimensions and a third measurement at or near the center line of the piece.

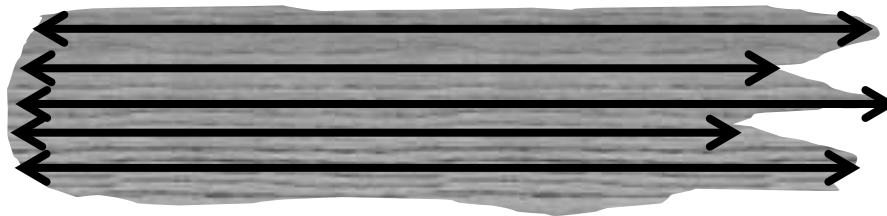
- (iii) This piece has a bias cut end on the left and an irregular end on the right. The measurements are taken at the longest and shortest points where the line crosses over solid wood. The lowest measurement (dotted line over the air space) is not used because it does not cross wood. Only the three upper measurements are used to calculate the average length for this piece unless additional measurements across solid wood are taken.



- (iv) This is a piece with a bias cut on the left and irregular end on the right. Note how the measurements are taken at the longest and shortest points where the line crosses over solid wood. The lowest measurement (the dotted line) would not be used because it does not crossover wood.



- (v) This piece of wood has a “shattered end.” Shattering occurs when wood is stressed beyond its breaking point and the end is not trimmed. The inspector will take additional measurements to account at the shortest point of the voids and longest points at the extensions. In this example, five measurements were taken and averaged to account for the voids and extensions.



a. Boxed Firewood

Note: A packer may place wrapped bundles of firewood in boxes for ease of handling as well as for display on retail store shelves. When a box contains a bundle of wrapped firewood, the volume of the bundle is verified using the test procedure in c. for bundles and bags.

1. Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.
2. Open the box to determine the average height of the stack of wood.
3. Measure the internal height of the box [See Figure 1. Measuring Internal Height of Box]

Figure 1 – Measuring Internal Height of Box



- 4. Determining the Height of the Wood – Take at least five measurements spaced at intervals along each end and center of the wood stack (record as “d₁, d₂, . .etc. Take at least 15 measurements). [See Figure 2.-Top View of Box – Measure at cross bars and Figure 2.a. – Examples of the Headspace Measurement.] Measure from the bottom of a straightedge placed across the top of the box to the highest point on the wood (round the measurements down to the nearest 0.5 cm [¹/₈ in] or less). Calculate the average height of the stack by averaging these measurements and subtracting the result from the internal height of the box using the following formula:**

Average Height of Wood Stack =

(Internal Height of Box) – (Sum of Depth Measurements ÷ Number of Measurements)

Figure 2. Top View of Box – Measure at cross bars.

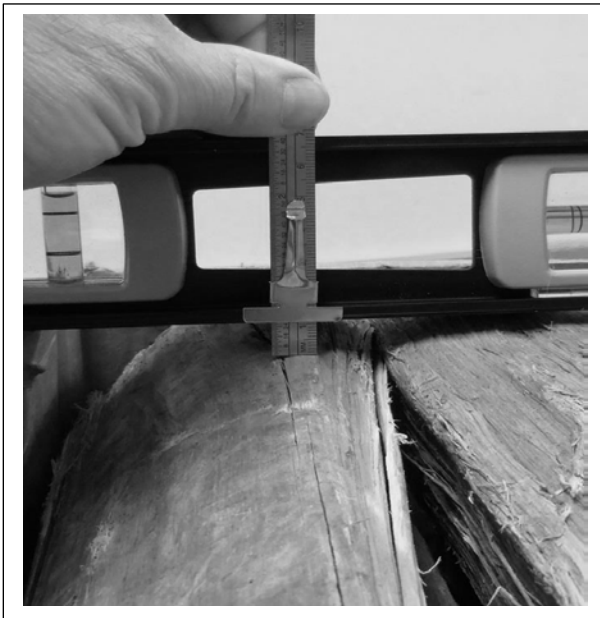
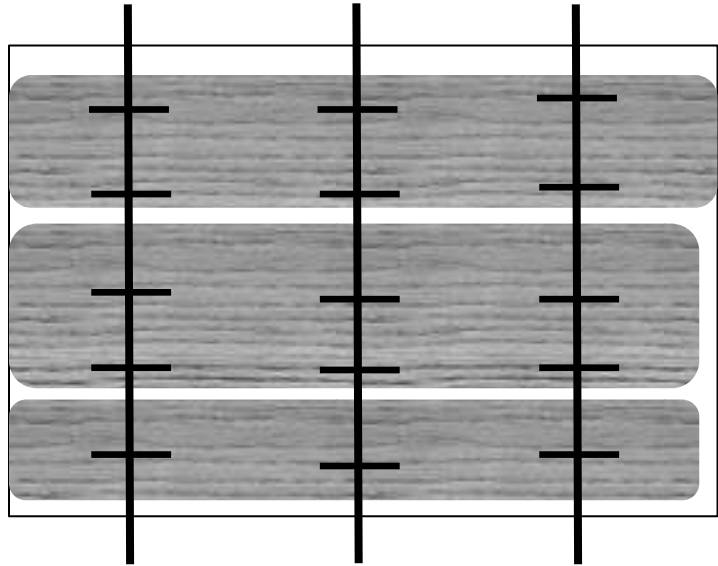


Figure 2.a. – Examples of the Headspace Measurement

35. Width of Wood Stack - Open the box and measure the width of the wood stack. Take at least five measurements at intervals spaced along the length of the stack. Average these values to obtain an Average Width of Wood Stack. [See Figure 3. – Top View of Box – Measure at crosslines and Figure 3.a. – Measuring the Width of the Firewood in a Box] You are measuring the width of the wood, not the width of the box. Determine the average width of the stack of wood in the box by taking measurements at three places along the top of the stack. Measure the inside distance from one side of the box to the other on both ends and in the middle of the box. Calculate the average width.

$$\text{Average Width} = (W_1 + W_2 + W_3) \div (3)$$

$$\text{Average Width of Wood Stack} = (W_1 + W_2 + W_3 + W_4 + W_5) \div 5$$

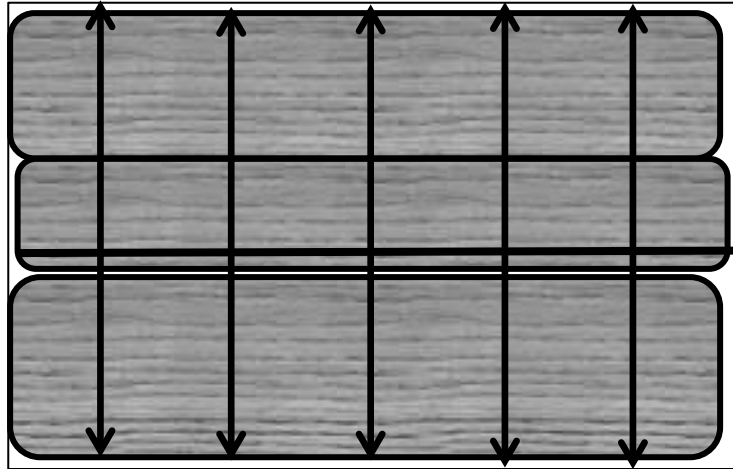


Figure 3. Top View of Box – Measure at crosslines.



Figure 3.a. – Measuring the Width of the Firewood in a Box

- 86. Individual Piece Length – To determine the average length of the piece of wood, Remove the wood from the package and measure the length of each piece of wood (see Table 1. “Minimum Number of Pieces to be Measured for Length.” If the piece of wood is uniform in shape take at least 1 point-to-point measurement along the center line of the longitudinal axis (see Table 2. “Determining Piece Length – (a) Uniform Shapes” for examples) and record the value. ~~box and select the five pieces with the greatest girth.~~ Measure the length of each of the five pieces from center to center. Calculate the average length of the five pieces.**

$$\text{Average Length} = (L_1 + L_2 + L_3 + L_4 + L_5) \div (5)$$

If the wood is irregularly shaped (see Table 2. “Determining Piece Length – (b) Irregular Shapes” for examples) take at least three measurements along a straight line between two points crossing solid wood that appear to be the shortest and longest dimensions, and a third at or near the center-line of the piece. Calculate the average of the measurements to obtain the Average Individual Piece Length and record the length of the piece.

To determine Average Individual Piece Length (AIPL) of irregularly shaped pieces:

$$AIPL = (L_1 + L_2 + L_3) \div 3$$

After all pieces are measured, total the lengths and divide that total by the number of samples to obtain the Average Piece Length for the package.

To determine Average Piece Length (APL) for the package:

$$APL = (L_1 + L_2 + L_3 + L_n) \div (\text{Number of Pieces in Sample})$$

6.7. Use the average values for height, width, and length to calculate the volume of wood **within** in the box.

$$\text{Volume in liters} = (\text{height in } \underline{\text{mm}} \text{ } \cancel{\text{cm}} \times \text{width in } \underline{\text{mm}} \text{ } \cancel{\text{cm}} \times \text{length in } \underline{\text{mm}} \text{ } \cancel{\text{cm}}) \div \underline{1,000,000} \text{ } (\cancel{1000})$$

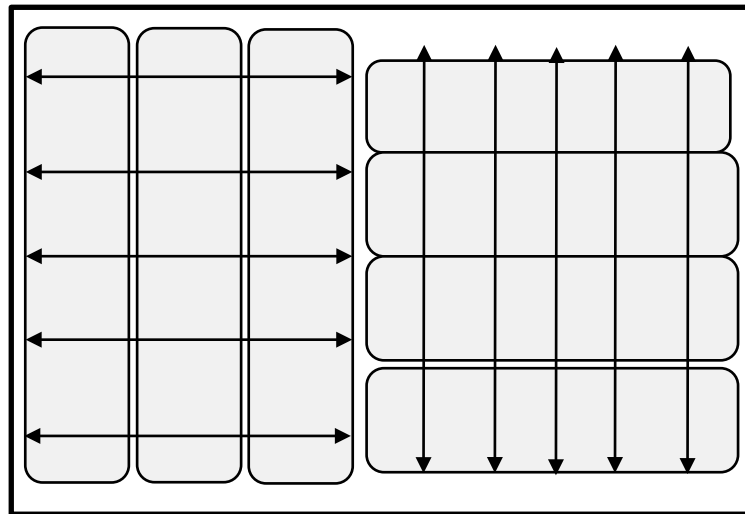
$$\text{Volume in cubic feet} = (\text{height in inches} \times \text{width in inches} \times \text{length in inches}) \div (1728)$$

Note: 1 Cubic Foot = 1728 in³, 1 Cubic Liter = 1,000,000 L³

7.8. For boxes of wood that are packed with the wood ranked in two discrete sections perpendicular to each other, calculate the volume of wood in the box as follows: (1) determine the average height, width, and length as in 1, 2, and 3 above for each discrete section, compute total volume, and (2) total the calculated volumes of the two sections. Compute total volume by adding Volume 1 (V₁) and Volume 2 (V₂) according to the following formula.

$$\text{Total Volume} = V_1 + V_2$$

This illustration shows how the width of the firewood is measured when two perpendicular stacks of firewood are in a box. The height, width and length of the pieces are used to determine the volume of the separate stacks which are then added together to obtain the volume of wood in the package.



Volume 1

Volume 2

b. Crosshatched Stacked Firewood

Bulk deliveries of firewood are typically required by law or regulation to be on the basis of Cord measurement. The “Cord” is defined as the amount of wood contained in a space of 128 cubic feet when the wood is ranked and well stowed. The standard dimensions for a Cord of wood are

4 ft × 4 ft × 8 ft but wood may be stacked and measured any configuration. See Figure 4. for an illustration of how a Cord may be stacked.

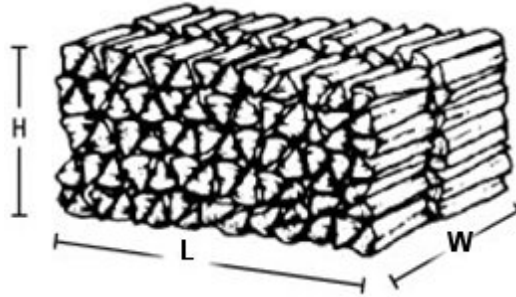


Figure 4. A Cord - 4 ft (Height) × 4 ft (Width) × 8 ft (Length)

- ~~1. Follow Section 2.3.1, “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.~~
- ~~2. Stack the firewood in a ranked and well-stowed geometrical shape that facilitates volume calculations (i.e., rectangular).~~
- ~~3. Determine the average measurements of the stack:~~

~~Note: The number of measurements for each dimension given below is the minimum that should be taken.~~

- ~~➤ Height: Start at one end of the stack; measure the height of the stack on both sides at four equal intervals. Calculate and record the average height.~~
- ~~➤ Length: Start at the base of the stack; Measure the length of the stack in four equal intervals. Calculate and record the average length.~~
- ~~➤ Width: Select the five pieces with the greatest girth. Measure the length of the pieces, calculate and record the average piece length.~~

1. Wood delivered to a consumer: if a delivery ticket or sales receipt is available (these are often required by state regulation) review the delivery ticket or sales receipt and determine the quantity delivered. Identify the wood to be measured and verify that the wood delivered was not mixed with wood that was already present at the location. Also, determine if the delivery was partial or complete (i.e., no additional deliveries are expected) and if any of the delivered wood has been used.

If necessary stack the firewood in a ranked and well-stowed geometrical shape that facilitates volume calculations (i.e., rectangular). Any voids that will accommodate a piece of wood in the stack shall be deducted from the measured volume.

Note: The length measurements of the individual pieces may be made during the stacking process.

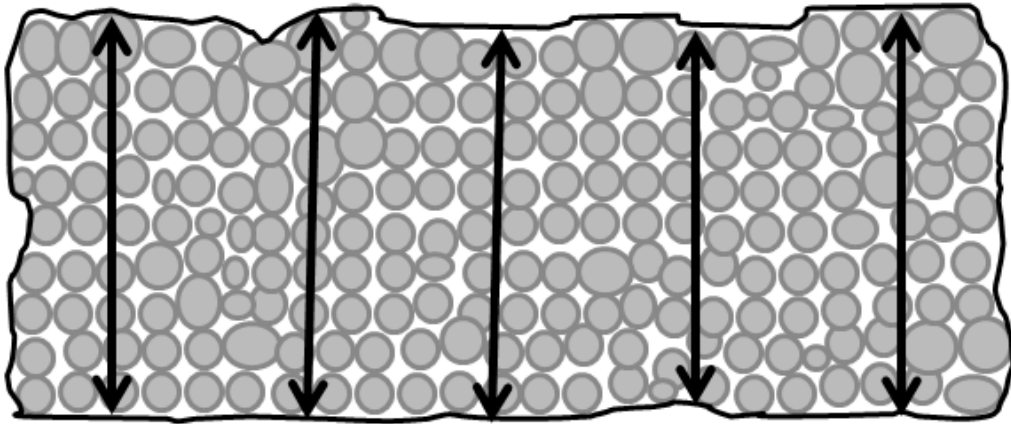
2. Determine the average measurements of the stack: the number of measurements for each dimension given below is the minimum that should be taken.
 - Height of Stack: A height measurement is the vertical distance between the top edge of a piece of wood in the top row and the bottom edge of a piece of wood on the bottom row. Start at one end of the front of the stack; measure the height of the stack at five equally spaced intervals

(e.g., approximately 18 to 24 in) along the length of stack. If the length of the stack is over 10 ft take additional height measurements at equally spaced intervals along its length. If the height of the stack varies significantly (e.g., the pieces are stacked in peaks along the length of the stack) take additional height measurements. Calculate and record the average height for the front of the stack. Repeat the same height measurement procedure along the back of the stack and then calculate and record the average height for the back of the stack. Calculate the average height of the stack by averaging the two results. If the wood to be measured is stacked on a slope, take the height measurements at right-angles to the slope.

$$\text{Average Height}_{\text{Front}} = (h_1 + h_2 + h_3 + h_4 + h_5) \div 5$$

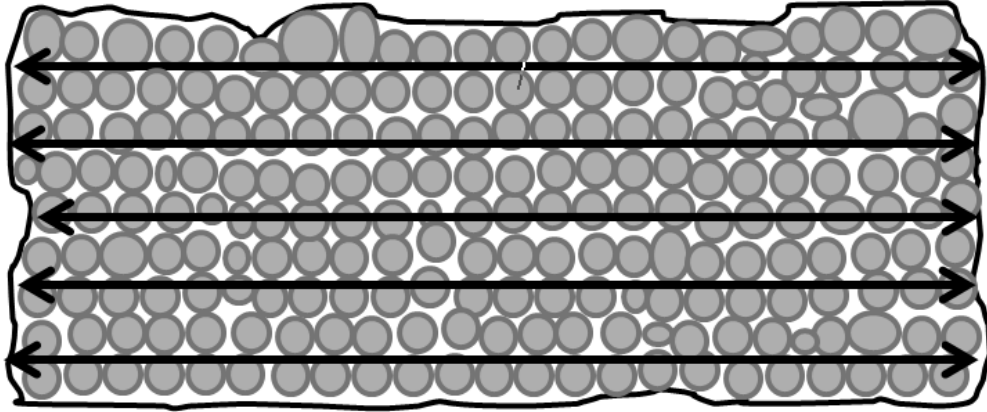
$$\text{Average Height}_{\text{Back}} = (h_1 + h_2 + h_3 + h_4 + h_5) \div 5$$

$$\text{Average Height of Stack} = \text{Average Height}_{\text{Front}} + \text{Average Height}_{\text{Back}} \div 2$$



Average Height Measurement (front and back)

- Length of Stack: A length measurement is the horizontal distance between the left edge of a piece of wood on the left side of the stack and the right edge of a piece of wood on the opposite side of the stack. Start at either side of the stack; Measure the length of the stack in five equal intervals. Calculate and record the average length. If the length of the stack varies significantly (e.g., the ends of the stack bulge out along the height of the stack) take additional measurements.



Average Length Measurement (front and back)

- Calculate and record the average length for the front of the stack. Repeat the length measurement procedure along the back of the stack and then calculate and record the average length for the stack.

$$\text{Average Stack Length}_{\text{Front}} = (l_1 + l_2 + l_3 + l_4 + l_5) \div 5$$

$$\text{Average Stack Length}_{\text{Back}} = (l_1 + l_2 + l_3 + l_4 + l_5) \div 5$$

$$\text{Average Stack Length} = (\text{Average Length}_{\text{Front}} + \text{Average Length}_{\text{Back}}) \div 2$$

- Stack Width is Equal to the Average Length of Pieces that Make up the Width of the Stack – Refer to Table 1. “Minimum Number of Pieces to be Measured for Length” to determine how many pieces are to be measured. This dimension is calculated by averaging the length of individual pieces of wood in the stack. The wood can be stacked in a single or multiple rows. If the wood is stacked in several rows deep select a representative random sample from each row. If the wood needs to be stacked, measure the pieces prior to stacking. If the wood is already stacked, select the pieces at random by moving up and down and across the stack. If it is necessary to remove the wood from a stack to measure the individual piece lengths, always complete the height and length measurements before disturbing the stacked wood.

3. Individual Piece Length - Table 1. “Minimum Number of Pieces to be Measured for Length” requires that at least 12 pieces of wood be measured for every ½ cord estimated to be in the stack.

- If the wood is uniform in shape take at least 1 point-to-point measurement along the center line of the longitudinal axis (see Table 2. “Determining Piece Length – (a) Uniform Shape” for examples) and record the value.
- If the wood is irregularly shaped (see Table 2. “Determining Piece Length – (b) Irregular Shape” for examples) take at least three measurements along a straight line between two points crossing solid wood that appear to be the shortest and longest dimensions, and a 3rd at or near the center-line of the piece. Calculate the average of the measurements to determine Average Individual Piece Length (AIPL) of irregularly shaped pieces:

$$\text{AIPL} = (L_1 + L_2 + L_3) \div 3$$

- After all pieces are measured total the lengths and divide the total by the number of samples to obtain the Average Piece Length for the stack. To determine Average Piece Length (APL) for the package:

$$APL = (L_1 + L_2 + L_3 + \dots + L_n) \div (\text{Number of Pieces in Sample})$$

4. Calculate Volume:

Volume in liters = (Avg. Height [cm] × Avg. Width [cm] × Average Piece Length [cm]) ÷ 1000

Volume in cubic feet = (Avg. Height [in] × Avg. Width [in] × Average Piece Length [in]) ÷ 1728

5. Supplemental Measurement of Stacked Wood

- **Volume of a Triangle Stack of Wood – To calculate the volume of a triangular stack take at least two measurements (one each side) of the height and length, and five measurements of the width of the stack and average each result. Use this formula to calculate the volume.**

$$\text{Volume of Triangular Stack} = (\text{Avg. Height} \times \text{Avg. Length of Base} \times \text{Avg. Width}) \div 2$$

- **The volume of the triangular stack may be added to the volume of other stacks.**



Figure 5. Triangular Stack

e. Bundles and Bags of firewood



Figure 6. Firewood Bundle (left) and Bag (right)

1. Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.

Test Note: To test a bag of firewood remove the wood from the bag and form a compact bundle and strap it as shown in Figure 7 and follow the procedures for measuring a bundle.

2. Average Area of **Bundle** Ends: ~~secure a strap around each end of the bundle or bag of wood to prevent movement during testing and to provide a definite perimeter. Use two or more straps to secure the wood~~
 - **Place a binding strap around each end of the bundle (or bag of wood) to prevent movement of the pieces during test. Place the straps approximately 10 cm (4 in) from the ends (See Figure 7 “Bundle with Straps” placed in 10 cm [4 in]) and tighten them securely.**

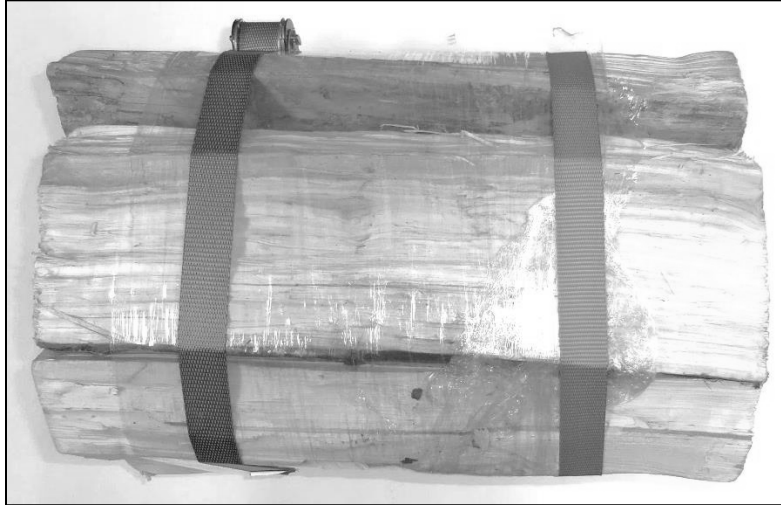


Figure 7. Bundle with Straps placed 10 cm (4 in).

Notice: Do not use shrink wrap or packaging to define the perimeter because it can result in inaccurate measurements. If necessary, trim the shrink wrap back from the ends to allow for the bundle to sit flat on the graph paper.

- **Set one end of the bundle or bag on graph paper large enough to cover the end completely. Draw a line around the outside of the wood perimeter on the graph paper using a sharp point marking pen (see Figure 8. Tracing Perimeter of the Wood).**

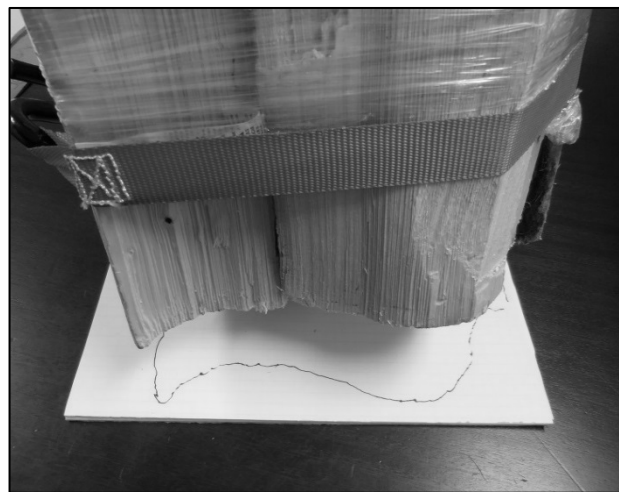


Figure 8. Tracing the Perimeter of the Wood.

- Count the number of square centimeters or square inches that are enclosed within the perimeter line. Determine portions of square centimeters or square inches not completely within the perimeter line to the nearest one-quarter square inch. Repeat this process on the opposite end of the bundle or bag.

Examples:

- (1) Using $\frac{1}{4}$ square inch graph paper and a ruler with $\frac{1}{4}$ inch graduations, large blocks of the area within the perimeter are quickly measured. This is done by using the ruler to determine the length and then width of the area which are each divided by 0.25 ($\frac{1}{4}$ in) {or multiply 4×7.25 } to obtain the number of blocks in that dimension. These two values are multiplied to obtain the total number of blocks enclosed in the area. The areas in the partially covered blocks are rounded up or down to the nearest $\frac{1}{4}$ inch by enclosing the whole square and placing an x in the partial spaces which are included in the blocks where the area has been rounded up. One reason for squaring the graph squares is to simplify the counting.
- (2) Use a ruler to count graph squares: the rulers in Figure 9. "Perimeter of a Bundle Defined by the Wood" indicate the dimensions of the square are $7\frac{1}{4} \times 7\frac{3}{4}$ in. To obtain the number of blocks divide 7.25 by 0.25 {or multiply 4×7.25 }, to obtain the number of blocks along the left hand line ($7.25 \div 0.25 = 29$.) The bottom line measures $7\frac{3}{4}$ in so $7.75 \div 0.25 = 31$ {or $4 \times 7.75 = 31$ }. Multiply the two values to obtain the total number of squares within the area which is: $29 \times 31 = 899$. To obtain square inches divide 899 by 16 (the number of $\frac{1}{4}$ inch graph squares in a square inch) or $899 \div 16 =$ for area of 56.19 in^2 for this area of the bundle.
- (3) Continue to divide the area into blocks to make counting easier and then count the blocks in the remaining areas and sum these values to obtain the total. See the example in Figure 9. "Perimeter of a Bundle of Defined by the Wood." The total number of blocks was calculated by adding: $46 + 145 + 899 + 25 + 8 + 54 = 1177$ squares $\div 16 = 73.56$ square inches for this end of the bundle.

Calculate the Average Area: Average Area = $(\text{Area}_1 + \text{Area}_2) \div 2$

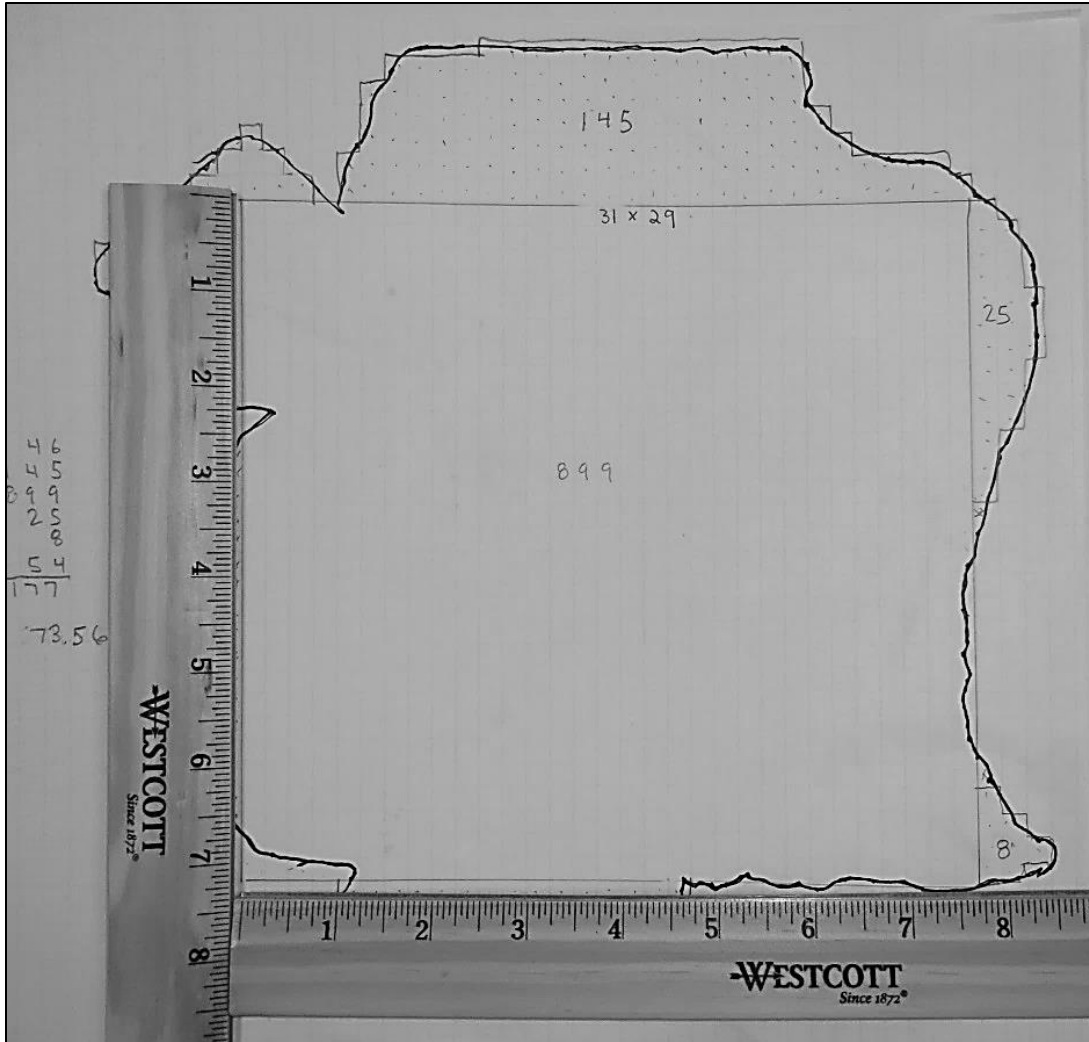


Figure 9. Perimeter of a Bundle Defined by the Wood.

3. Average Length of the Pieces of Wood: **select the five pieces with the greatest girth and measures the length of the pieces. Calculate the average length of the pieces of wood. Individual Piece Length - Remove the wood from the package and measure the length of each piece of wood (see Table 1. "Minimum Number of Pieces to be Measured for Length" for the number of pieces to be measured.) If the piece of wood is uniform in shape take at least one point-to-point measurement along the center line of the longitudinal axis (see Table 2. Determining Piece Length - (a) Uniform Shapes for examples) and record the value.**

$$\text{Average Length} = (L_1 + L_2 + L_3 + L_4 + L_5) \div 5$$

- **If the wood is irregularly shaped (see Table 2. Determining Piece Length - (b) Irregular Shapes for examples) take at least three measurements along a straight line between two points crossing solid wood that appear to be the shortest and longest dimensions, and a t at or near the center-line of the piece. Calculate the average of the measurements to obtain the Average Individual Piece Length and record the length of the piece.**

To determine Average Individual Piece Length (AIPL) of irregularly shaped pieces:

$$\text{AIPL} = (L_1 + L_2 + L_3) \div 3$$

Note: If length measurements are made in millimeters divide the total by 10 to obtain centimeters.

- **After all pieces are measured, total the lengths and divide that total by the number of samples to obtain the Average Piece Length for the package.**

To determine Average Piece Length (APL) for the package:

$$APL = (L_1 + L_2 + L_3 + \dots + L_n) \div (\text{Number of Pieces in Sample})$$

4. **Use the average values for height, width, and length to calculate the volume of wood in the bundle or bag.**

- Calculate Volume:

$$\text{Volume in liters} = (\text{Average Area [cm}^2\text{]} \times \text{Average Length [cm]}) \div 1000$$

$$\text{Volume in cubic feet} = (\text{Average Area [in}^2\text{]} \times \text{Average Length [in]}) \div 1728$$

Note: 1 Cubic Foot = 1728 in³, 1 L³ = 1000 cm

(Amended 2016)

3.14.3. Evaluation of Results

Follow Section 2.3.7. “Evaluate for Compliance” to determine lot conformance.

Note: Specified in Appendix A, Table 2-10. “Exceptions to the Maximum Allowable Variations for Textiles, Polyethylene Sheeting and Film, Mulch and Soil Labeled by Volume, Packaged Firewood **and Stove Wood Labeled by Volume**, and Packages Labeled by Count with 50 Items or Fewer.”

Table 2-10. Exceptions to the Maximum Allowable Variations for Textiles, Polyethylene Sheeting and Film, Mulch and Soil Labeled by Volume, Packaged Firewood <u>and Stove Wood Labeled by Volume</u>, and Packages Labeled by Count with 50 Items or Fewer, and Specific Agricultural Seeds Labeled by Count.	
Maximum Allowable Variations (MAVs)	
Packaged Firewood <u>and Stove Wood Labeled by Volume</u>	<p><u>20 % of labeled quantity</u></p> <p><u>Note: Use Table 2-5 “Maximum Allowable Variations for Packages Labeled by Weight” for packaged artificial and compressed fireplace logs and stove wood pellets and chips labeled by weight.</u></p>

Field Audit Procedure

A circumference estimating method can be used for quickly identifying potentially short measure bundles. The procedure is based on measuring the circumference of the package ends and calculating the areas without using graph paper. It shall be used for audit purposes only and must not be used for official inspection.

Circumference Estimating Method

1. **After the bundle or bag is secured, use a flexible measuring tape to measure the circumference near each end of the bundle or bag of firewood. Using one movement extend the measuring tape around the end of the bundle or bag to obtain its circumference. The tape must be pulled tight. If the wood at the ends of a bag or bundle is not accessible due to plastic wrapping, then wrapping**

should be moved away from the ends so the measuring tape can be placed tightly around the bundle so circumference measurements can be taken.



Figure 13. Strapping the End of a Bundle

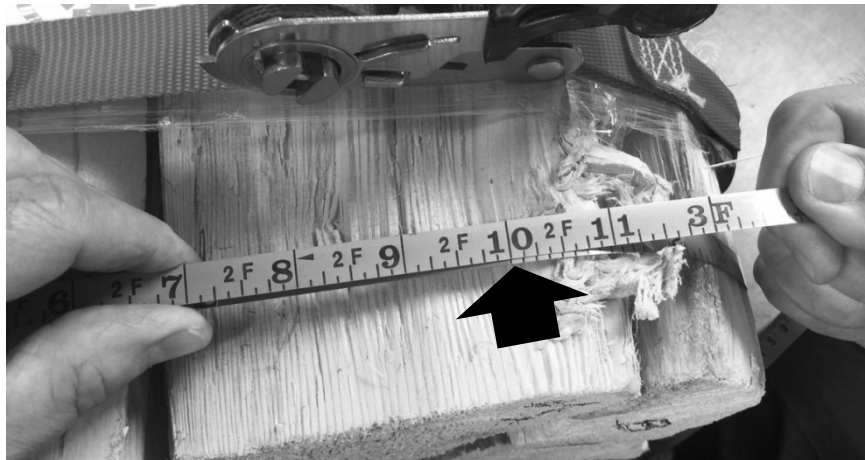


Figure 13a. Measuring the Circumference of the Bundle. At the point of the arrow, the circumference of the bundle is 2 ft 10 in (34 in).

Note: The tape used has a blank end so the “0” line is visible immediately under the 10 in mark.

2. Calculate the Average Circumference:

$$\text{Average Circumference} = (\text{circumference}_1 + \text{circumference}_2) \div 2$$

Example:

If circumference₁ is 34 in and circumference₂ is 33.75 in then:

$$\text{Average Circumference: } 34 + 33.75 \div 2 = 33.875 \text{ in}$$

3. Calculate the radius

$$\text{Radius} = \text{Average Circumference} \div 2\pi$$

Where: $\pi = 3.1415$

Example:

$radius = 33.875 \div (2 \times \pi \text{ or } 6.283) = 5.39 \text{ in}$

4. Calculate the Average Area

$Average Area = \pi r^2$

For example: $Average Area = 3.1415 \times 5.39^2 \text{ (or } 29.06) = 91.3 \text{ in}^2$

5. Calculate the Average Length of the Pieces:

Average length of the pieces of wood - Measure the length of several pieces of wood in the bundle or bag. Measurements are to be taken from center to center at the end of each piece.

Then calculate the average:

$Average length = \text{sum of the length of all pieces} \div \text{number of pieces}$

6. Calculate Volume:

$Volume \text{ in liters} = (Average \text{ area [cm}^2] \times Average \text{ Length [cm]}) \div 1000$

$Volume \text{ in cubic feet} = (Average \text{ Area [in}^2] \times Average \text{ Length [in]}) \div 1728$

Example:

Assume the Average Length of the Pieces is 16 in and Average Area is 91.3 in²

$Bundle Volume = 91.3 \text{ in}^2 \times 16 \text{ in} = 1460 \text{ in}^3 \text{ or } 0.84 \text{ ft}^3$

If results indicate that the sample fails conduct further testing using the reference test procedure for bundles and bags. Do not take any legal action based solely on this audit procedure.

Note: The implementation date for this is effective July 1, 2017.

(Amended 2016)

Background/Discussion:

Recent inspections of packaged firewood by weights and measures officials in different states have uncovered a lack of uniformity in the procedures used to test bundles, boxes and bags of packaged firewood. Section 3.14. Firewood, of NIST Handbook 133 is written ambiguously such that if the same bundle of firewood were tested by different states, the test results would be substantially different. The problems described below were uncovered through limited testing and research. However, after reviewing the test data it is apparent there is a need to clarify the procedures and improve the accuracy of the measurement procedures so that the volume of wood in bags, bundles, boxes and stacks are determined accurately and consistently (refer to the 2015 Executive Summary Information). Improving the test procedures will help ensure that consumers can make value comparisons and reduce unfair competition. The current procedure for measuring the length of the pieces of wood, regardless of whether it is offered for sale in a box, bag, bundle or stack requires that only one measurement be taken on a piece of wood along its centerline. While one measurement may be adequate for uniformly cut pieces, it is not suitable for use with non-uniform pieces such as those with irregular cuts. The proposal includes new procedures that allow for averaging multiple measurements to improve the accuracy of length determinations. Another concern with the current test method is that it only requires that five pieces with the largest girth be measured in any package or stack to determine an average length, which can lead to significant differences between the average length of those pieces as compared to the average length obtained when most or all the pieces are measured. The proposal includes a recommendation to increase the number of pieces measured to increase the accuracy of length determinations in the test procedures for bags, boxes, bundles and stacks

of firewood. In addition to the proposals aimed at improving length determinations, suggested changes to the test procedures for boxed firewood are proposed to clarify how to measure the amount of firewood and this includes taking additional measures to improve the accuracy of the average measurements of height and width of the stack of wood that the box contains. To improve the testing procedures for bags and bundles, the proposal includes a recommendation to use grid paper with a finer resolution. Several photographs have been added to better illustrate how the wood is to be secured for measurement. One significant issue which the proposal asks the NCWM to resolve is how the perimeter of the bundle is to be defined for use in determining the areas of each end. This issue arose because several states interpret the current procedure as requiring that the perimeter of the bundle be defined by the wood, while at least one state interprets the procedure as requiring that the perimeter be defined by a strap or tape affixed at the extreme ends of the bundles. When the areas of the bundle ends are determined using the wood to define the perimeter, the volume of a bundle is less than if the volume of the bundle is determined using a strap define the perimeters. The proposal also includes a recommendation that the NCWM amend NIST Handbook 133 to apply a Maximum Allowable Variation (MAV) to packaged firewood so that the sale of unreasonably short-measure bags, bundles and boxes can be prohibited. In addition to these proposed revisions, suggested improvements to the test procedures for determining the volume of stacked firewood are also included. Finally, an audit test procedure for use with bundles and bags (which uses a circumference measurement as the means to determine the volume) was recommended by a major packer of firewood. Preliminary testing has shown that it could be developed for use in the field to conduct quick audits to determine if a sample should be tested using the more accurate procedures that are needed for accurate determination.

At the 2016 NCWM Interim Meeting, comments were taken for this item and Item 260-4. Mr. Kurt Floren (Los Angeles County, California) recommended that the option 2 within the proposal proceed as a Voting item. Mr. Floren also remarked that he felt that the 25 % MAV for this proposal was extreme. The NIST Technical Advisor clarified that based upon the limited test data, having no limit on minus errors does not appear to be reasonable. The 25 % is a recommended MAV to be adopted for the limit on minus errors pending further study unless packers can provide an alternative number. It was also derived based on what a reasonable consumer would consider an unreasonable minus error. Mr. Floren then concurred with the MAV findings, but also wanted the math calculations (page 45) to be reviewed for accuracy. The NIST Technical Advisor reviewed the math, and this can either be divided or multiply the calculations, and you will have the same results. The Committee reviewed the two different approaches in the proposal and selected approach two to move forward. The Item under Consideration in NCWM Publication 16 (2016) will have the formatting (bold underline/underscore) and will only reflect the test procedure with approach two language.

At the NCWM Annual Meeting, comment was made stating the MAV was too high. The Committee recommended that the MAV be 20 % and evaluated once additional data is available for review. The NIST Technical Advisor recommended a six-month extension on the implementation date (amend to July 1, 2017); if this passes, to allow the industry to change its methods and procedures to ensure they meet the volume statement and correct labels based on the new test procedures. This item was voted on and adopted as a Consent Calendar item.

Regional Association Comments:

At the 2015 WWMA Annual Meeting, an industry representative expressed supported for the NIST proposal for measuring the actual perimeter of the wood. Another representative stated that air space is allowed in the testing of cords. Several officials expressed concern that a 25 % MAV was excessive. WWMA requested that NIST determine the variance in results using the methods in approaches one and two. A more thorough analysis of other feasible test methods such as water displacement and laser measuring devices be studied as well for an understanding of measuring accuracy. They also requested that NIST work with industry to define a more appropriate MAV. WWMA does not have a recommendation regarding requested input by NIST on chunks and split wood for flavoring and smoking, and recommends obtaining additional input from industry. WWMA forwarded the item to NCWM, recommending that it be an Informational item.

At the 2015 CWMA Interim Meeting, there were no comments heard. The Committee did not have adequate information regarding comparisons between new Item 3 and new Item 4 on their agenda. Consequently, CWMA forwarded the item to NCWM and recommended that it be an Informational item.

At the 2015 NEWMA Interim Meetings, the Committee reached consensus that the region does not have enough information and recommends that this be an Informational item.

At the 2015 SWMA Annual the NIST Technical Advisor provided an overview of this test procedure. The SWMA believes that the NIST proposal is a more accurate method of testing the quantity of packaged firewood rather than the procedure proposed in Item 260-4. NIST did incorporate a portion of Item 260-4 as an audit test. The SWMA agrees with this proposal and recommends “Approach 1-Tape Defines the Perimeter” since it provides accuracy in addition to efficiency for the inspector. SWMA forwarded the item to NCWM and recommended that it be a Voting item.

At the 2016 NEWMA Annual Meeting, a Connecticut weights and measures inspector opposed this item due to the cumbersome test procedure. The NIST Technical Advisor commented that in NIST Handbook 133 there are several procedures that are lengthy, but we need to obtain accurate results. NEWMA considers this item to be fully developed and supports it as a Voting item.

At the 2016 CWMA Annual Meeting, there were no comments heard during open hearings. CWMA considers this item to be fully developed and supports it as a Voting item.

260-4 W Section 3.14. Firewood – Volumetric Test Procedures for Packaged Firewood with a Labeled Volume of 113 L [4 ft³] or Less) and Stacked Firewood sold by the Cord or fractions of a Cord. (See Related Items 232-4 and 260-3)

(This item was Withdrawn.)

Source:

California HotWood, Inc. (2016)

Purpose:

To provide a more uniform and concise method for measuring packaged firewood, an inherently irregular and challenging material to measure, and to clarify existing procedures.

Item under Consideration:

Amend the NIST Handbook 133 as follows:

3.14. Firewood –Volumetric Test Procedure for Packaged Firewood with a Labeled Volume of 113 L [4 ft³] or Less)

Unless otherwise indicated, take all measurements without rearranging the wood or removing it from the package. If the layers of wood are crosshatched or not ranked in discrete sections in the package, remove the wood from the package, re-stack, and measure accordingly.

3.14.1. Test Equipment Linear Measure. Take all measurements in increments of 0.5 cm (³/₁₆ in) or less and round up.

- ~~Binding Straps. Binding straps are used to hold wood bundles together if the bundles need to be removed from the package/wrapping material.~~
- ~~Tracing paper~~
- ~~Graduated template in square centimeters or square inches~~

Test equipment needed:

A. Boxed Firewood

1. Straight Edge
2. Linear Tape Measure

B. Crosshatched Firewood

1. Measuring Tape

C. BUNDLES AND BAGS OF FIREWOOD

1. Binding Straps – Two binding straps, 1 to 2 inches wide with connecting buckles and long enough to easily encircle the Bundle or Bag to secure the wood during testing.

2. Flexible Measuring Tape

3.14.2. Test Procedures

a. Boxed Firewood

1. Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.

Open the box and if the box contains a bundle or bag of firewood remove the bundle or bag and calculate the volume in accordance with Section C (Bundles and Bags of Firewood).

2. Open the box to determine the average height of wood within the box; measure the internal height of the box. Take three measurements (record as “d₁, d₂, . .etc.”) along each end of the stack. Measure from the bottom of a straightedge placed across the top of the box to the highest point on the two outermost top pieces of wood and the center-most top piece of wood. Round measurements down to the nearest 0.5 cm (1/8 in). If pieces are obviously missing from the top layer of wood, take additional height measurements at the highest point of the uppermost pieces of wood located at the midpoints between the three measurements on each end of the stack. Calculate the average height of the stack by averaging these measurements and subtracting from the internal height of the box according to the following formula.

$$\text{Average Height of Stack} = (\text{Internal Height of Box}) - (\text{sum of measurements}) \div (\text{number of measurements})$$

3. Determine the average width of the stack of wood in the box by taking measurements at three places along the top of the stack. Measure the inside distance from one side of the box to the other on both ends and in the middle of the box. Calculate the average width.

$$\text{Average Width} = (W_1 + W_2 + W_3) \div (3)$$

4. To determine the average length of the pieces of wood, remove the wood from the box and select the five pieces with the greatest girth. Measure the length of each of the five pieces from center-to-center. Calculate the average length of the five pieces.

$$\text{Average Length} = (L_1 + L_2 + L_3 + L_4 + L_5) \div (5)$$

5. Calculate the volume of the wood within the box. Use dimensions for height, width, and length.

$$\text{Volume in liters} = (\text{height in cm} \times \text{width in cm} \times \text{length in cm}) \div (1000)$$

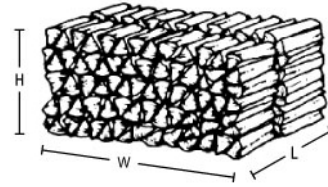
$$\text{Volume in cubic feet} = (\text{height in inches} \times \text{width in inches} \times \text{length in inches}) \div (1728)$$

6. For boxes of wood that are packed with the wood ranked in two discrete sections perpendicular to each other, calculate the volume of wood in the box as follows: (1) determine the average height, width, and length as in 1, 2 and 3 above for each discrete section, compute total volume, and (2) total the calculated volumes of the two sections. Take the width measurement for Volume 2 (V₂) from the inside edge of the box adjacent to V₂ to the plane separating VR₁ and V₂. Compute total volume by adding Volume 1 (V₁) and Volume (V₂) according to the following formula.

$$\text{Total Volume} = V_1 + V_2$$

b. Crosshatched Firewood

Figure 3-3. Stacked Firewood



1. Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.
2. Stack the firewood in a ranked and well-stowed geometrical shape that facilitates volume calculations (i.e., rectangular).
3. Determine the average measurements of the stack:

Note: The number of measurements for each dimension given below is the minimum that should be taken.

- Height: Start at one end of the stack; measure the height of the stack on both sides at four equal intervals. Calculate and record the average height.
 - Length: Start at the base of the stack; Measure the length of the stack in four equal intervals. Calculate and record the average length.
 - Width: Select the five pieces with the greatest girth. Measure the length of the pieces, calculate and record the average piece length.
4. Calculate Volume.

$$\text{Volume in liters} = (\text{Avg. Height [cm]} \times \text{Avg. Width [cm]} \times \text{Avg. Length in [cm]}) \div 1000$$

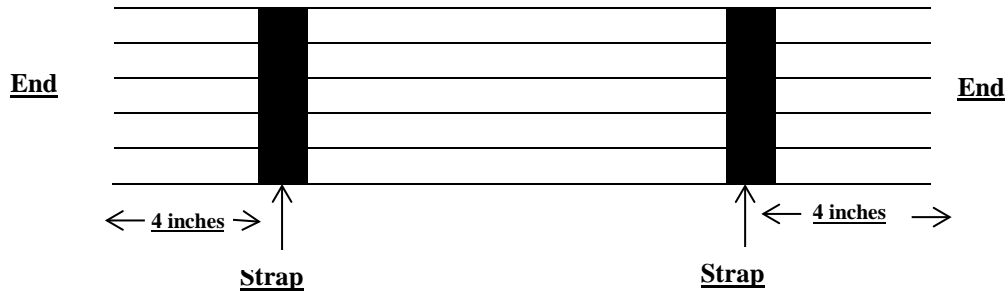
$$\text{Volume in cubic feet} = (\text{Avg. Height [in]} \times \text{Avg. Width [in]} \times \text{Avg. Length [in]}) \div 1728$$

c. Bundles and Bags of Firewood



Figure 3-4. Bundle of Firewood

- Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.
- Average area of ends: secure a strap around each end of the bundle or bag of wood to prevent movement during testing ~~and to provide a definite perimeter. Use two or more straps to secure the wood.~~ **Each strap is to be placed approximately 4 inches from each end of the Bundle or Bag. See Diagram.**



- Set one end of the bundle or bag on tracing paper large enough to cover the end completely. Draw a line around the perimeter of the bundle or bag on the tracing paper.
- Transfer the tracing paper to a template graduated in square centimeters or square inches. Count the number of square centimeters or square inches that are enclosed within the perimeter line. Estimate portions of square centimeters or square inches not completely within the perimeter line to the nearest one quarter square inch.
- Repeat this process on the opposite end of the bundle or bag.
- Calculate the Average Area:

$$\text{Average Area} = (\text{Area 1} + \text{Area 2}) \div 2$$

- Average length of the pieces of wood—select the five pieces with the greatest girth and measure the length of the pieces. Calculate the average length of the pieces of wood:

$$\text{Average Length} = (L_1 + L_2 + L_3 + L_4 + L_5) \div 5$$

- Calculate Volume:

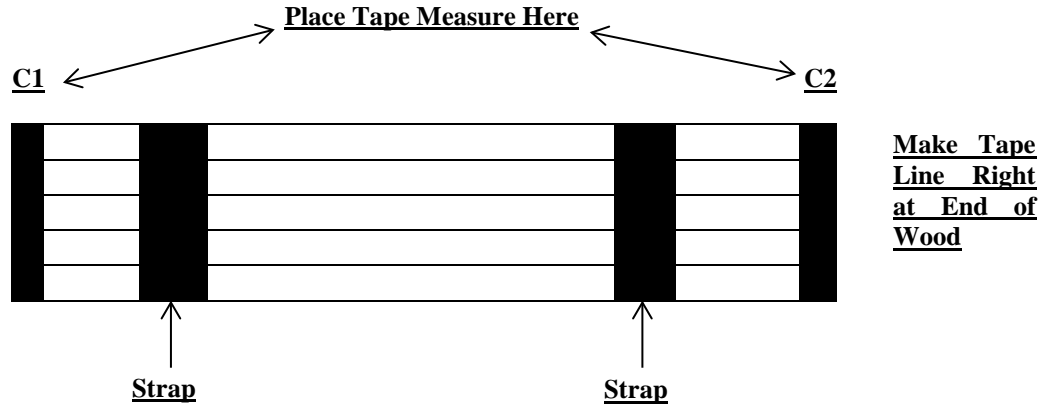
$$\text{Volume in liters} = (\text{Average Area [cm}^2\text{]} \times \text{Average Length [cm]}) \div 1000$$

$$\text{Volume in cubic feet} = (\text{Average Area [in}^2\text{]} \times \text{Average Length [in]}) \div 1728$$

3.14.3. Evaluation of Results

Follow Section 2.3.7. “Evaluate for Compliance to determine lot conformance.

After the Bundle or Bag is secured and utilizing a flexible measuring tape, measure around each end of the bundle or bag of firewood with one movement by extending the measuring tape around the entire end of the bundle or bag in order to obtain a circumference. If the wood at the ends of a bag or bundle is not accessible due to plastic wrapping, then the flexible measuring tape is placed tightly around the outside of the plastic wrapping and circumference measurements are taken. See Diagram:



- Calculate the average Circumference

$$\underline{\text{Average Circumference} = (\text{circumference1} + \text{circumference2}) / 2}$$

- Calculate the Average Area using the average circumference (from above)

$$\underline{\text{AREA} = \pi R^2}$$

$$\underline{R} = C/2\pi$$

$$\underline{\pi} = 3.1415$$

- Calculate the Average Length

Average length of the pieces of wood - Measure the length of each piece of wood in the bundle or bag. Measurements are to be taken from center to center at the end of each piece. Then calculate their average: Average length = sum of all pieces/ number of pieces.

- Calculate Volume:

$$\underline{\text{Volume in liters} = (\text{Average area [cm}^2\text{]} \times \text{Average Length [cm]}) / 1000}$$

$$\underline{\text{Volume in cubic feet} = (\text{Average Area [in}^2\text{]} \times \text{Average Length}) / 1728}$$

Background/Discussion:

This proposal is intended to clarify the existing method of measurement, reduce the risk of varied interpretations, and concisely describe the method for measuring packaged firewood.

Historically, the measurement of firewood, whether in a box, a bundle, or a cord, has been a challenge due to the inherent irregularity of firewood, and the unavoidable airspace in the product. One method was examined in 1991 in litigation against the California Department of Food and Agriculture (responsible for weights and measures). The volumetric test procedure for measuring firewood in containers was found by the court to be unconstitutionally vague and ambiguous. Owing to the need to develop a new methodology, the California Department of Food and Agriculture met with representatives of the California firewood industry, including California HotWood, to establish a standardized method of measurement for firewood, including the measuring procedures for bundled firewood. Various methods were extensively explored and studied, and a new method was developed satisfactory to the California Department of Food and Agriculture and the industry, including California HotWood. The method was subject to repetition without appreciable variation by the industry and by enforcement. The standard adopted by California in 1995 was later adopted by NIST, and has been functioning for some 20 years. Recently questions surfaced regarding the procedure, and the proposed methodology is to resolve those questions.

At the 2016 NCWM Interim Meeting, comments were taken for this item and Item 260-3. The Committee heard support for Item 260-3. The Committee recommended this be Withdrawn.

Regional Association Comments:

At the 2015 WWMA Annual Meeting, the Committee believed the area calculation suggested is not appropriate for firewood bundling. Errors can be introduced using a circumference measure because the formula is intended for a circle or cylinder. Therefore, the WWMA did not forward this item to NCWM.

At the 2015 CWMA Interim Meeting it was reported that multiple state regulators were curious to hear more about this proposal, as well as the related NIST proposal and how the two proposals differ. One regulator recommended the item remain Informational until more information can be presented to the CWMA. The CWMA forwarded the item to NCWM and recommended that it be an Informational item due to a lack of information.

At the 2015 NEWMA Interim Meeting, there were no comments or support of this item. NEWMA is recommending this item be Withdrawn.

At the 2015 SWMA Annual Meeting, the Committee did not forward this item to NCWM and recommended that this item be Withdrawn. The SWMA supported the advancement of Item 260-3 and the inclusion of the audit procedure that incorporates the Hot Wood proposal.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 100th National Conference on Weights and Measures" (SP 1210, 2015).

260-5 V Section 3.15. Test Procedure for Verifying the Usable Volume Declaration on Packages of Animal Bedding

(This item was Adopted.)

Source:

NIST Office of Weights and Measures (2015)

Purpose:

Add a test procedure in NIST Handbook 133, Section 3.15. Test Procedure for Verifying the Usable Volume Declaration on Packages on Animal Bedding. This test procedure will be used for verifying the compressed volume and usable (uncompressed) volume on packages of animal bedding.

Item under Consideration:

Amend NIST Han

3.15. Test Procedure for Verifying the Usable Volume Declaration on Packages of Animal Bedding

3.15.1. Test Equipment

- **Calculator or spreadsheet software**
- **Modified Standard Package Report Form for Animal Bedding**
- **Package Inspection Worksheet Appropriate for Test Measure:**

- **9-Point Measurement Grid and Package Error Worksheet for Cylindrical, Square or Rectangular Test Measures**
- **Permanent ink marking pen.**
- **Knife or razor cutter (for use in opening packages and unwrapping shrink-wrapped pallets in warehouses)**
- **Cellophane Tape, Duct Tape (for repairing chutes and sealing packages)**
- **Polyethylene Bags (49 L to 113.5 L [13 gal to 30 gal]) (to hold product once it is uncompressed)**
- **Rigid Rulers – Starrett² or equal with 1.0 mm graduations. The edges of a ruler used with a measuring frame must be straight and the edges must be the zero point.**
 - **300 mm (12 in)**
 - **500 mm (19.5 in)**
 - **1 m (39 in)**
- **Tarp – Canvas 3 m × 3 m (10 ft × 10 ft)**
- **Broom and dust pan**
- **Levels – for verifying the level of the test measure and taking headspace readings.**
 - **152 mm (6 in) Bubble Level**
 - **1 m (40 in) Carpenter Level**
- **Scale 15 kg (30 lb) (only used if the audit procedure is utilized.)**
- **Chutes for uncompressing and pouring the bedding into a test measure**
- **Test Measures (see Table 2. “Test Measures for Animal Bedding”)**

² Notice: The mention of trade or brand names does not imply endorsement or recommendation by the U.S. Department of Commerce over similar products available from other manufacturers.

Table 1. Recommended Chute Dimensions

<u>Nominal Capacity</u>	<u>Height</u>	<u>Width</u>	<u>Length</u>
<u>70 L (2.5 ft³)</u>	<u>254 mm (10 in)</u>	<u>228 mm (9 in)</u>	<u>1219 mm (48 in)</u>
<u>100 L (3.5 ft³)</u>	<u>254 mm (10 in)</u>	<u>279 mm (11 in)</u>	<u>1397 mm (55 in)</u>
<u>170 L (6 ft³)</u>	<u>279 mm (11 in)</u>	<u>355 mm (14 in)</u>	<u>1727 mm (68 in)</u>
<u>240 L (8.5 ft³)</u>	<u>304 mm (12 in)</u>	<u>406 mm (16 in)</u>	<u>2006 mm (79 in)</u>
<u>283 L (10 ft³)</u>	<u>304 mm (12 in)</u>	<u>406 mm (16 in)</u>	<u>2286 mm (90 in)</u>

NOTE: Chutes (see Figure 1. Testing Chutes) may be constructed using hinges and pins so that they lie flat for transporting. They can be constructed of sheet metal or with other slick surface material which enable the bedding to flow easily. The construction of the chutes used in this study allows the sides to move in or out slightly so that the bedding does not become clogged at the outlet. The heights and lengths may be adjusted slightly to fit into vehicles for transport but the widths should not be reduced because narrowing the opening can restrict material flow and result in “bridging” where the bedding collects and creates a block. Also, the width should be kept smaller than the opening of the test measure so that spillage does not occur during pouring.

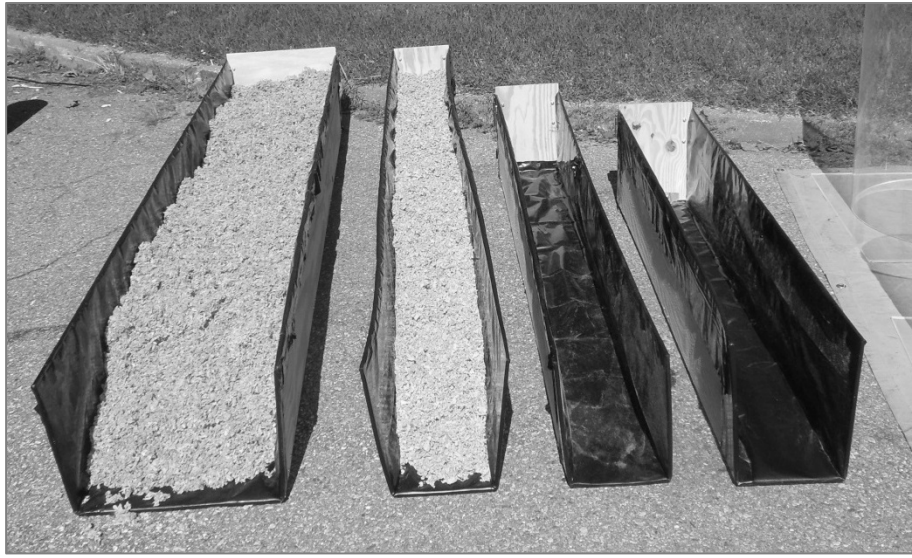


Figure 1. Testing Chutes.

Table 2. Test Measures for Animal Bedding <small>NOTES: a, b, c, and d</small> Only Interior Dimensions are Used for Volume Calculations Must Be Calibrated with Traceable Measurement Standards Prior to Use						
Rectangular and Square Test Measures						
Actual Volume of the Measure ^{b & d}	Interior Wall Dimensions			Surface Area	Marked Increments on Ruler	Increment Volume
	Length	Width	Height^d			
<u>31.9 L</u> <u>1.13 ft³</u>	<u>213.4 mm</u> <u>(8.4 in)</u>	<u>203.2 mm</u> <u>(8 in)</u>	<u>736.6 mm</u> <u>(29 in)</u>	<u>43 362 mm²</u> <u>(67.2 in²)</u>	<u>12.7 mm</u> <u>(0.5 in)</u>	<u>550.6 mL*</u> <u>0.55 L</u> <u>(33.6 in³)</u>
<u>28.3 L</u> <u>1 ft³</u>	<u>304.8 mm</u> <u>(12 in)</u>	<u>304.8 mm</u> <u>(12 in)</u>	<u>304.8 mm</u> <u>(12 in)</u>	<u>92 903 mm²</u> <u>(144 in²)</u>		<u>1.18 L**</u> <u>(72 in³)</u>
<u>63.7 L</u> <u>2.25 ft³</u>	<u>304.8 mm</u> <u>(12 in)</u>	<u>304.8 mm</u> <u>(12 in)</u>	<u>685.8 mm</u> <u>(27 in)</u>			
	<u>406.4 mm</u> <u>(16 in)</u>	<u>228.6 mm</u> <u>(9 in)</u>	<u>685.8 mm</u> <u>(27 in)</u>			
<u>92 L</u> <u>3.25 ft³</u>	<u>304.8 mm</u> <u>(12 in)</u>	<u>304.8 mm</u> <u>(12 in)</u>	<u>990.6 mm</u> <u>(39 in)</u>			
	<u>406.4 mm</u> <u>(16 in)</u>	<u>228.6 mm</u> <u>(9 in)</u>	<u>990.6 mm</u> <u>(39 in)</u>			
*1.0 mm = 43 mL (2.6 cu in) ** 1.0 mm = 92 mL or 0.09 L (5.6 cu in)						
Square Test Measures						
Actual Volume of the Measure ^{b & d}	Interior Wall Dimensions			Surface Area	Marked Increments On Ruler	Increment Volume
	Length	Width	Height^d			
<u>77.4 L</u> <u>(2.73 ft³)</u>	<u>381 mm</u> <u>(15 in)</u>	<u>381 mm</u> <u>(15 in)</u>	<u>533.4 mm</u> <u>(21 in)</u>	<u>145 161 mm²</u> <u>(225 in²)</u>	<u>1.0 mm</u> <u>(0.03937 in)</u>	<u>0.14 L</u> <u>(8.5 in³)</u>
<u>144 L</u> <u>(5.09 ft³)</u>	<u>508 mm</u> <u>(20 in)</u>	<u>508 mm</u> <u>(20 in)</u>	<u>558.8 mm</u> <u>(22 in)</u>	<u>258 064 mm²</u> <u>(400 in²)</u>		<u>0.25 L</u> <u>(15.2 in³)</u>
<u>283 L</u> <u>(10 ft³)</u>	<u>609.6 mm</u> <u>(24 in)</u>	<u>609.6 mm</u> <u>(24 in)</u>	<u>762 mm</u> <u>(30 in)</u>	<u>371 612 mm²</u> <u>(576 in²)</u>		<u>0.37 L</u> <u>(22.5 in³)</u>
Cylindrical Test Measures						
These dimensions are based on the tube having a ¼ inch wall thickness. Other tube thicknesses may be used.						
Actual Volume <i>Volume = $\pi r^2 h$</i>	Interior Diameter (Outside Diameter)	Height	Surface Area <i>Area = πr^2</i>	Increment	Increment Volume	
<u>52 L</u> <u>(1.8 ft³)</u>	<u>292.1 mm (304.8 mm)</u> <u>11.5 in (12 in)</u>	<u>780 mm</u> <u>(30.70 in)</u>	<u>67 012 mm²</u> <u>(103.8 in²)</u>	<u>1.0 mm</u> <u>(0.03937 in)</u>	<u>0.06 L</u> <u>(4 in³)</u>	
<u>124 L</u> <u>(4.3 ft³)</u>	<u>444.5 mm (457.2 mm)</u> <u>17.5 in (18 in)</u>	<u>800 mm</u> <u>(31.49 in)</u>	<u>155 179 mm²</u> <u>(240.52 in²)</u>		<u>0.15 L</u> <u>(9.4 in³)</u>	
<u>279 L</u> <u>(9.8 ft³)</u>	<u>596.9 mm (609.6 mm)</u> <u>23.5 in (24 in)</u>	<u>1000 mm</u> <u>(39.37 in)</u>	<u>279 829 mm²</u> <u>(433.76 in²)</u>		<u>0.27 L</u> <u>(16.4 in³)</u>	

Table 2. Test Measures for Animal Bedding NOTES: a, b, c, and d
Only Interior Dimensions are Used for Volume Calculations
Must Be Calibrated with Traceable Measurement Standards Prior to Use

Notes for Table 2:

- a. Rectangular and Square Based Dry Measures are typically constructed of 12.7 mm to 19.05 mm (0.5 in to 0.75 in) marine plywood. A 4.76 mm (³/₁₆ in) transparent sidewall is useful for determining the level of fill, but must be reinforced or be made of thicker material if it distorts when the measure is filled. If the measure has a clear front, place the level gage at the back (inside) of the measure so that the markings are read over the top of the animal bedding. Any of these measures may be made without an attached bottom for ease of emptying if they are placed on a solid level base during filling and measurement.**
- b. Other size measures may be used if calibrated and the volume equivalence of the increment of 1.0 mm is no greater than ¹/₆ the MAV. Widening the base of a measure reduces the column height of the product and will reduce compression but the trade-off is that the larger surface area increases the volume so the potential for measurement errors increase. One of the benefits of the cylindrical design is that, in addition to eliminating the 90 degree angles of the corners where gaps in fill frequently occur, the surface area of a cylinder is less than an equal volume square measure and that results in better resolution in the volume measurements (i.e., compare the readability of a 24 in sq box which has a surface area of 576 in², to the 24 in cylinder which has a surface area of 433 in²). The height of the test measure may be reduced, but this will limit the volume of the package that can be tested.**
- c. If lines are marked in any test measures, they should extend around all sides of the measure if possible to improve readability. It is recommended that a line indicating the MAV level also be marked to reduce the possibility of reading errors when the level of the product is at or near the MAV.**
- d. If the measures are built to the dimensions shown above, the actual volume of most of the measures will be larger than the nominal volume so that plus errors (overfill) can be measured accurately.**

Test Note: Nothing in this section should be construed or interpreted as prohibiting the use of test measures meeting these specifications, or constructed in other geometric shapes or dimensions, or those made of other materials to test any other products.

3.15.2. Test Procedure

Test Notes:

Rounding: When a volume measurement falls between graduations on a ruler, round the value in the direction that favors the packer. This practice eliminates the issue of rounding from the volume determination and provides packagers the benefit of the doubt. The ruler graduation is 1.0 mm so the rounding error will be limited to 0.5 mm or less. It is good practice to circle a measurement that has been rounded up or make a statement to such effect so that it becomes a part of the inspection record.

Safety:



This procedure does not address all of the safety issues that users need to be aware of in order to carry out the following tasks. Users are sometimes required to conduct test in warehouse spaces

or retail stores where fork-trucks are in motion – care must be taken to warn others to avoid or exercise care around the test site. The procedure requires users to lift heavy objects including large bulky packages and test measures and includes the use of sharp instruments to obtain packages from shrink-wrapped pallets. Users may be required to climb ladders or work platforms to obtain packages. When opening and emptying packages, dust, and other particles may be present or escape from the packages which may cause eye injuries and respiratory or other health problems. Users must utilize appropriate safety equipment and exercise good safety practice. If safe working conditions cannot be ensured, suspend testing until the situation is corrected.

1. Follow the Section 2.3.1. “Define the Inspection Lot” select “Category A, Sampling Plan” in this inspection. Determine the Sample Size based on the size of the Inspection Lot using Category A. Collect the sample packages from the Inspection Lot using Section 2.3.4. “Random Sampling Selection.”

Test Note: Place the test equipment and sample packages in a location where there is adequate lighting and ample space around the packages and equipment so the packages can be opened and the chutes and test measures used safely.

Test Note: If the package is not labeled with a usable volume it is opened and the contents are poured directly into the test measure.

Optional – Audit Screening by Weight

The full test procedure requires that all of the packages be opened for testing. Regardless of the type of bedding, the product cannot be returned to the original package. An alternative gravimetric auditing procedure may be used to reduce the amount of destructive testing and conserve inspection resources.

Audit Procedure: After randomly selecting the sample packages from the Inspection Lot, obtain the gross weight for each package. Select the lightest and heaviest packages and conduct a usable volumetric test these two packages. If the lightest and heaviest packages pass (i.e., each contains at least the useable volume declared on the label), it is highly likely that the remaining packages in the sample will also pass. Accept these two package samples as an AUDIT TEST and move on to inspect other types of bedding or Inspection Lots of other types or brands of bedding. If either of the two packages is found to have a minus error that exceeds the Maximum Allowable Variation, the sample fails. No further testing is required (i.e., assuming no MAV is allowed for the sample size (see Appendix A, Table 2-1. “Sampling Plans for Category A”).) If either of the packages is found to have a minus error that does not exceed the MAV, continue to test all of the packages and take action based on the final results from the complete sample.

Test Note: If the gravimetric audit procedure is used, ensure that the scale is placed on a solid level support and that its accuracy has been verified to a test load that is at least 10 percent more than the gross weight of the packages (e.g., to estimate that load, place one of the packages on the scale and then test the scale with a load above the package’s gross weight). See Section 2.2. “Measurement Standards and Test Equipment” for additional information.

2. Select the appropriate test measure for the package size.
 - Spread a tarp large enough to hold a chute and test measure.
 - Place the chute and test measure on the tarp. Verify that the test measure is level.
3. Select a chute of appropriate capacity (see Table 1) for the package size and position it on the tarp.
4. Open the Packaging, Uncompressing and Pouring the Bedding into the Test Measure Twice.

- **Open Package:** Place the package in the chute and use a knife or box cutter to open and remove the wrapper. Spread the bedding uniformly along the length of the chute. The bedding is uncompressed in two steps. The first step is to loosen the clumps of bedding by gently pulling them apart (do not tear the fibers of cellulose bedding or “grind” any bedding between your hands because these practices break the material down). Spread your fingers and pick the material up using your hands from beneath to loosen it up. There should be no clumps of bedding in the chute. If any bedding has fallen out of the chute onto the tarp, collect it and return it to the chute. The following pictures illustrate this step of the procedure. The second step of the expanded volume recovery process is to pour the bedding into a test measure as described in Step 2.

Exhibit 1.



Exhibit 2.



Exhibit 3. First pour into the test measures.



- **First Pour:** The first pour into the test measure is only used to further un-compress the bedding so no measurements are taken. Hold the chute above the test measure and tilt it so that you pour the bedding into the center of the test measure. The bedding should be poured slowly into the test measure in one continuous stream and not “dumped” (if it is “dumped” or poured too quickly some of the bedding will blow out of the measure or the bedding will be packed down and its volume reduced). The flow rate should be controlled by the tilt angle of the chute. The chute itself can be shaken but **DO NOT HIT OR SHAKE THE TEST MEASURE**. Also, do not touch the product to facilitate flow. (Do not adjust the flow by closing the opening of the chute as that may cause the bedding to heap up and then fall into the measure in clumps which may result in impact compression). Empty the bedding back into the chute and spread it out evenly along its length.



Exhibit 4. Showing how to hold a chute for the pour.



Exhibit 5. Showing how to cradle the chute on one arm and holding it with one hand while tilting it with the other hand.

- **Second Pour:** The second pour into the test measure is used to make the volume determination. Hold the chute above the test measure and tilt it so that you pour the bedding into the center of the test measure. The bedding should be poured slowly into the test measure in one continuous stream and not “dumped.” The flow rate should be controlled by the tilt angle of the chute. The chute can be shaken but DO NOT HIT OR SHAKE THE TEST MEASURE.

Test Note: Stop filling the measure if it appears that the test measure will overflow. The overflow product should be measured separately (use a smaller test measure of adequate size and capacity if one is available) and the multiple measurement volumes are added. If pouring into a square test measure, pour at an angle to two corners for the widest opening (see Exhibit 7).



Exhibit 6. Filling a 44 L Test Measure.



Exhibit 7. Filling a Square Test Measure at an Angle to use the Larger Opening.

5. Volume Determination.

DO NOT HAND LEVEL THE SURFACE OF THE BEDDING AS MANUAL LEVELING “PACKS” THE BEDDING AND REDUCES ITS VOLUME. DO NOT JAR OR SHAKE THE TEST MEASURE.

Test Note: Before using a test measure for volume determinations, place a level of adequate length on top of the test measure at five approximately equal measuring points across the top. A permanent marking pen can be used to evenly space the marks across the top edge of the test measure so that it can be positioned to take the measurements (see Exhibit 8. “Marking the evenly spaced measuring points across the top of the test measure.”)



Exhibit 8. Marking the evenly spaced measuring points across the top of the test measure.

- **Place a rigid level or straight edge of adequate size on top the test measure and select a ruler of adequate length to reach to the lowest level of the top surface of the bedding. Start at the measuring points to your left or right, place the ruler against the side of the level, and hold it with either hand. The zero graduation is pointed down so the ruler can be lowered into the test measure for measurement. Lower the ruler into the test measure slowly until its end is at the surface level of the bedding (see Exhibits 9 and 10).**



Exhibit 9. Placing ruler into the test measure with zero end down.



Exhibit 10. Ruler shown with zero end at surface of the bedding.

- **Determine the depth of each measurement point from the surface of the bedding to the bottom edge of the straight edge and record the value in the appropriate space on the worksheet. Take a minimum of 9 measurements (at least 9 for cylindrical measures) across the top of the test measure in a grid pattern. Read the graduations on the ruler from a position that minimizes errors caused by parallax.**

Table 2. Illustrations of Depth Determinations with Cylindrical Test Measures



Figure 1. Shows how to read the depth of container.

The picture on the left (Figure 1) shows how to read the depth from the bottom of the straightedge (top edge of measure) down to the bedding in a 44 L test measure from a position that reduces parallax. The graphic below (Figure 2) illustrates the actual worksheet with the headspace procedure on the 44 L cylinder test measure (its internal radius is 151 mm and its height is 610 mm). The bedding was poured into the test measure but not leveled. Then 9 measurements were made at the locations shown on the grid to determine the depth of the product from the top edge of the measure. The average of the 9 values was 479.88 mm which was subtracted from the height of the test measure to obtain 130.12 mm for the average height of the column of bedding in the measure.

The volume was calculated using: $Volume\ in\ liters = \pi r^2 h$ Pi) $3.14159265 \times 23035.69 \times 130.12\ mm = 9.41\ L^*$

*After the calculation was completed the result was divided by 1 000 000 to obtain the volume in liters.

Figure 2. Illustration of Worksheet.

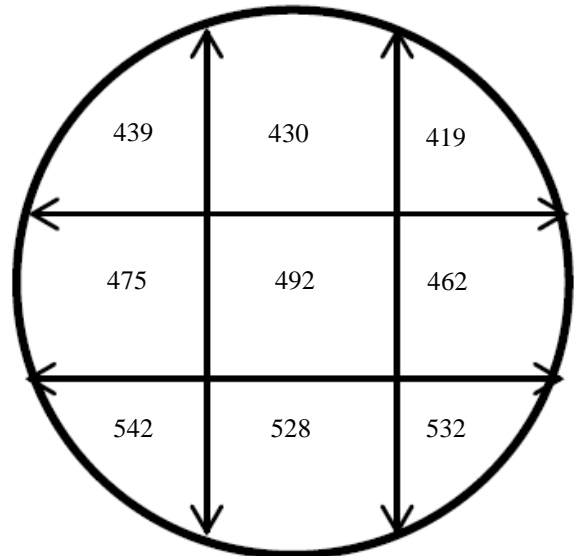


Table 2. Illustrations of Depth Determinations with Cylindrical Test Measures



Figure 3. Using the headspace measurement on a 279 L test measure. The ruler is read from the bottom edge of a straight edge or level from a position that reduces parallax.



Figure 4. Illustrating how the ruler is placed on the bedding with the headspace method. The ruler is read from the bottom edge of a straight edge or level from a position that reduces parallax.

Table 3. Illustrations of Depth Determinations with Square Test Measures



Figure 1.

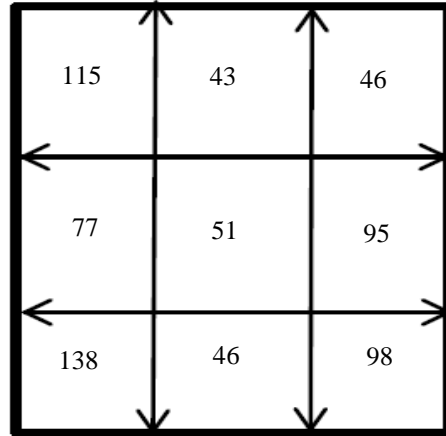


Figure 2.

The picture on the left (Figure 1) shows how to read the depth from the bottom of the straightedge (top edge of measure) down to the bedding in a 283 L square test measure from a position that reduces parallax. The graphic on the right (Figure 2) illustrates the actual worksheet with the headspace procedure on the square test measure (its internal dimensions are 609.6 mm × 609.6 mm × 762 mm (24 in × 24 in × 30 in). The bedding was poured into the test measure but not leveled. Then nine measurements were made at the locations shown on the grid to determine the depth of the product from the top edge of the measure. The average of the nine values was 78.77 mm that was subtracted from the height of the test measure to obtain 683.23 mm for the average height of the column of bedding in the measure.

The volume was calculated using: Volume in liters = lwh 609.6 mm × 609.6 mm × 683.23 mm = 253.89 L*

***After the calculation was completed, the result was divided by 1 000 000 to obtain the volume in liters.**



Figure 3. Using the headspace measurement on 56.6 L (2 cu ft) test measure. The ruler is read from the bottom edge of a straight edge or level from a position that reduces parallax.

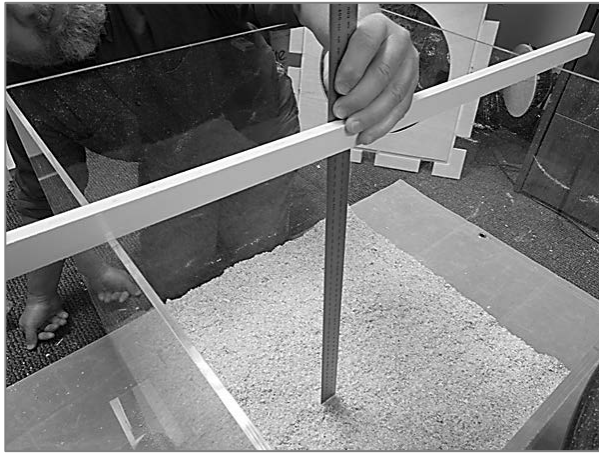
Table 3. Illustrations of Depth Determinations with Square Test Measures

Figure 4. Showing how the ruler is placed on the bedding with the headspace method. The ruler is read from the bottom edge of a straight edge or level from a position that reduces parallax.

6. Using a Worksheet for Volume Calculation

- Enter the sample number of the package on the worksheet along with its labeled usable volume.
- Test Measure Information
 - For a cylindrical test measure, enter its interior height and radius in the spaces labeled A and B.
 - For a square or rectangular test measure enter its interior height and the area of its base (i.e., length × width) in spaces labeled A and B.
- Sum the measurements in the grid, divide the value by the number of measurements (i.e., 9), and enter this value in the space labeled C, Average Depth.
- Calculate the Average Height of the Bedding (subtract C [Average Depth] from A [Interior Height of Test Measure]) and enter this value in the space labeled D.
- Calculate the Volume of Bedding in the Package:
 - For a cylindrical test measure, the formula ($Volume\ in\ Liters = \pi r^2 h$) is shown in E on the worksheet. It is $Volume\ (Liters) = 3.14159265 \times r^2 (B^2) \times Average\ Height\ (D) \div 1\ 000\ 000$. Enter the package volume in the space provided for this value in E.
 - For a square or rectangular test measure the formula ($Volume\ in\ Liters = LWH$) is shown in E on the worksheet. It is $Volume\ (Liters) = B\ (Area\ of\ Test\ Measure\ Base) \times D\ (Average\ Height) \div 1\ 000\ 000$. Enter the package volume in the space provided for this value in E.
- Calculate the Package Error using the following formula:
 - Package Error = Labeled Usable Volume (Liters) – E Package Volume (Liters)

$$\text{Package Error (Liters)} = \text{Labeled Expanded Volume} - \text{Package Volume}$$

- Transfer the individual package errors (verify whether they are positive or negative) to the “Modified Standard Package Report for Animal Bedding” in Appendix D. Fill in the required header information. For Box 7, “Number of Unreasonable Package Errors Allowed for Sample Size, use Appendix A, to Table 2-1. “Sampling Plans for Category A, Column 4.”, Based on the sample size, determine how many packages may have minus package errors that exceed the MAV (i.e., unreasonable package error).

Then:

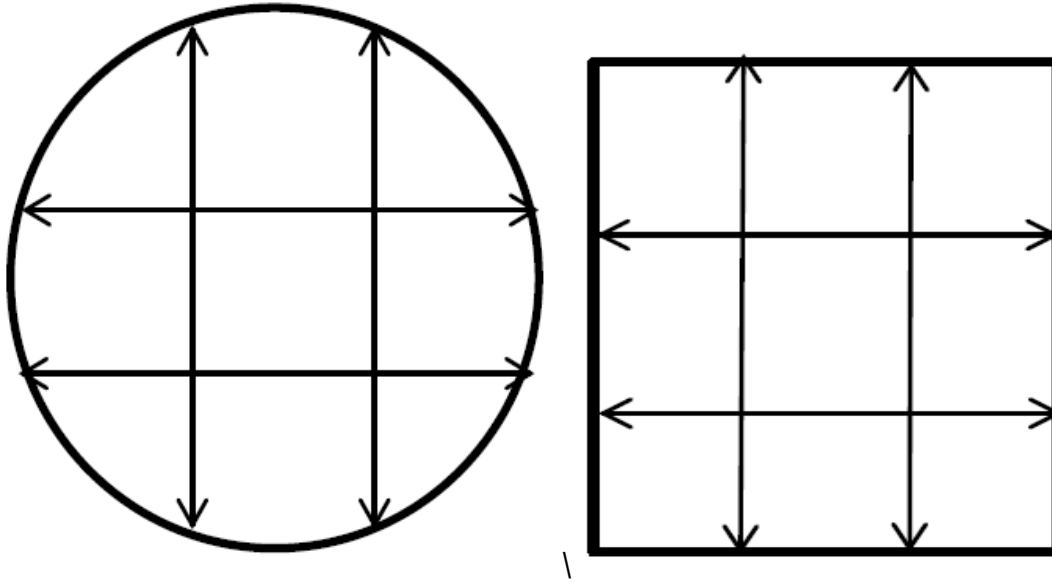
- Calculate the Total Error (Enter in Box 8. “Total Error”).

7. Evaluation of the Test Results and Determination of Pass or Fail

- Determine if any of the minus package errors exceeds the MAV. Apply a MAV value of 5 % ($0.05 \times$ labeled expanded volume) to single measurement volume determinations. If none of the minus package errors exceeds the MAV, go to Step 3. If any of the minus package errors exceed the MAV, enter the number of packages in Box 9 “Number of Unreasonable Minus Errors.” Go to Box 10 “Is Box 9 Greater than Box 7?” and determine if the value exceeds the number in Box 7 “Number of Unreasonable Package Errors Allowed for Sample Size.” If the number of packages with unreasonable errors exceeds the number permitted in Box 7 “Number of Unreasonable Package Errors Allowed for Sample Size,” the sample fails. Go to Box 17 “Disposition of the Inspection Lot” and reject the Inspection Lot.
- Calculate the Average Error for the sample by dividing Box 8 “Total Error,” by Box 6 “Sample Size” and enter the value in Box 11 “Calculate Average Error,” then go Box 12 “Does Box 11 equal Zero or Plus?” If the Average Error is zero or a positive number the sample passes, go to Box 17 “Disposition of the Inspection Lot” and approve the inspection lot. If the Average Error is a negative value go to Step 4. If the Average Error is a negative value go to Step 4 on the Inspection Worksheet.
- Calculate the Sample Standard Deviation and enter in Box 13. “Compute Sample Standard Deviation.” To obtain the Sample Correction Factor for the sample size use Appendix A, Table 2-1. “Sampling Plans for Category A,” Column 3 “Sample Correction Factor” and enter that in Box 14 “Sample Correction Factor.” Then calculate the Sample Error Limit by multiplying Box 13 “Compute Sample Standard Deviation” and Box 14 “Sample Correction Factor.” Enter the value in Box 15 “Compute Sample Error Limit.”
 - Disregarding the signs, determine if the minus in Box 11 “Calculate Average Error” is larger than the value in Box 15 “Compute Sample Error Limit.”
 - If yes, the sample fails, go to Box 17 “Disposition of Inspection” and reject the Inspection Lot.
 - If no, the sample passes, go to Box 17 “Disposition of Inspection” and approve the Inspection Lot
- Prepare a comprehensive report of the test results and enforcement action taken and present the information to the party responsible for the product.

Table 2-10. Exceptions to the Maximum Allowable Variations for Textiles, Polyethylene Sheeting and Film, Mulch and Soil Labeled by Volume, Packaged Firewood, <u>Animal Bedding</u>, and Packages Labeled by Count with 50 Items or Fewer, and Specific Agricultural Seeds Labeled by Count.	
	Maximum Allowable Variations (MAVs)
<u>Animal Bedding</u>	<u>5 % of the labeled volume</u>

Worksheet A – 9-Point Measurement Grid and Package Error Worksheet for Cylindrical and Square or Rectangular Test Measures



Complete this for Cylindrical Test Measures	
Sample Package _____	Labeled Expanded Volume (L): _____
A. Interior Height of Test Measure: _____	B. Radius of Test Measure (r): _____
C. Average Depth (Sum of Measurements ÷ 26): _____	
D. Average Height of Bedding (= A – C): _____	
E. Volume (L): _____ = $3.14159265 \times r^2 (B^2)$: _____ \times D: _____ \div 1 000 000	
F. Package Error (L): _____ = Labeled Volume (L): _____ – E (L): _____	
Volume is calculated using: <i>Volume in liters = $\pi r^2 h$</i> For example: if r^2 is 23035 and height of bedding is 109.26 then $((\text{Pi}) 3.14159265 \times r^2 (23035) \times 109.26) \div 1\,000\,000 = 7.90 \text{ L}$	

Complete this for Square or Rectangular Test Measures

Sample Package _____ Labeled Expanded Volume (L): _____

A. Interior Height of Test Measure: _____ B. Area of Test Measure Base (L × W): _____

C. Average Depth (Sum of Measurements ÷ 25): _____

D. Average Height of Bedding (= A – C): _____

E. Volume (L): _____ = B. Area of Test Measure Base: _____ × D: _____ ÷ 1 000 000

F. Package Error (L): _____ = Labeled Volume (L): _____ – E (L): _____

Volume is calculated using: *Volume in liters = (lw)h* For example: *If length and width are 609.6 the area of the measure's base is 371612. If the Average Height of the Bedding is 109.26 then:*

$$\text{B. Area of Test Measure Base (371612)} \times \text{Average Height of Bedding (109.26)} \div 1\,000\,000 = 40.6 \text{ L}$$

Date:		Modified Standard Package Report for Animal Bedding		Sampling Plan A – Table 2-1., Appendix A. in NIST Handbook 133		Report Number:			
Location (name, address):			Product/Brand Identity		Manufacturer:			Container Description:	
			Lot Codes						
1. Labeled Quantity (Usable Volume):		2. Unit of Measure:		3. MAV: (5 % of labeled quantity)		4. MAV: (0.05 × Box 1. Usable Volume)		5. Inspection Lot Size:	6. Sample Size (n):
								7. Number of Unreasonable Package Errors Allowed for Sample Size:	
Gross Weight for Audit Testing			Package Error		Test Notes				
			<table border="1"> <tr> <td style="text-align: center;">-</td> <td style="text-align: center;">+</td> </tr> </table>						
-	+								
<i>1.</i>									
<i>2.</i>									
<i>3.</i>									
<i>4.</i>									
<i>5.</i>									
<i>6.</i>									
<i>7.</i>									
<i>8.</i>									
<i>9.</i>									
<i>10.</i>									
<i>11.</i>									
<i>12.</i>									
			Total:	Total:					
8. Total Error:		9. Number of unreasonable minus (-) errors (compare each package error with Box 4):			10. Is Box 9 greater than Box 7? <input type="checkbox"/> Yes, lot <u>fails</u> go Box 17 <input type="checkbox"/> No, go to Box 11.		11. Calculate Average Error: (Box 8 ÷ Box 6 =)		
12. Does Box 11 = Zero (0) or Plus (+)? <input type="checkbox"/> Yes, lot <u>passes</u> , go to Box 17 <input type="checkbox"/> No, go to Box 13, 14, 15 & 16		13. Compute Sample Standard Deviation:		14. Sample Correction Factor:		15. Compute Sample Error Limit (SEL): (Box 13 × Box 14 =)			
16. Disregarding the signs, is Box 11 larger than Box 15? <input type="checkbox"/> Yes, lot <u>fails</u> , go to Box 17 <input type="checkbox"/> No, lot <u>passes</u> , go to Box 17					17. Disposition of Inspection Lot <input type="checkbox"/> Approve <input type="checkbox"/> Reject				
Comments:					Official's Signature				
					Acknowledgement of Report				

Background/Discussion:

This proposal will provide a standardized test method that will improve measurement accuracy at the point of pack and in testing at other locations. The test procedures recommend the use of a gravimetric audit procedure that may reduce destructive testing and reduce inspection time.

Even though some existing test measures may still be used, the proposal encourages users to purchase the prescribed volumetric test measures, chutes and measuring instruments.

The NIST, OWM will develop and provide technical training on this subject matter and develop detailed equipment designs and drawings, which will be made available on its website. The OWM will assist the animal bedding industry in implementing the proposed method of sale as well as developing and incorporating good manufacturing practices to ensure that the requirements of NIST Handbook 133 are met.

At the 2015 NCWM Interim Meeting, Mr. Whiting (American Wood Fiber) spoke in support of this test procedure. Mr. Whiting worked closely with NIST, OWM on reviewing this test procedure and agrees this procedure has less variability, sensitivity, is not time consuming, and is easier to perform in the field. A California county representative (regulator) suggested the definition for animal bedding should account for wood shavings and chips. He also inquired about the results when the procedure is used to test ground corn and cat litter? It was also remarked that building a chute as specified and lifting it on shoulders and pouring needs to be examined. Could this be done with smaller chutes and multiple pours? Mr. Whiting, who has performed this procedure, remarked that this may need two inspectors. He also remarked that denser particle sizes have repeatability. The NIST Technical Advisor remarked that the background information is being reviewed for formatting by the office publication coordinator and advised there would be no technical changes made as a result, and the revised item would be resubmitted in NCWM Publication 16 (2015). Refer to 2015 NCWM Interim Meeting, Report, Appendix C. for the Executive Summary, additional background and supporting information for “Testing Packages of Animal Bedding and Peat Moss with Compressed and Expanded Volume Declarations.” The Committee agreed to move this forward as a Voting item.

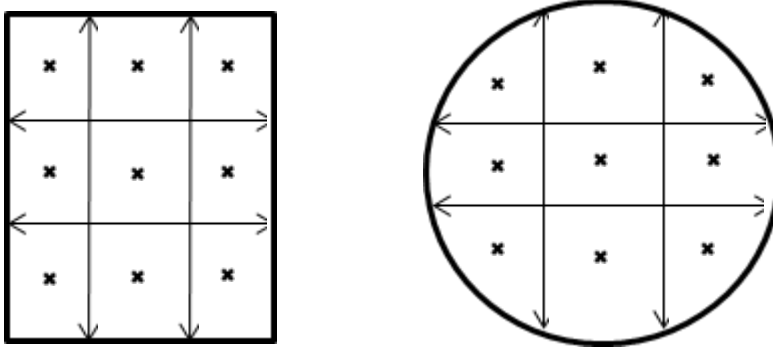
At the 2015 NCWM Annual Meeting, it was noted by the NIST Technical Advisor that the term “expanded volume: should read “usable volume” and the term “compressed” should be deleted from the section title. There was discussion as to how to test clay products when using chutes. Concern was expressed regarding the cost of purchasing testing equipment. The reason for the various vessel sizes is due to the variety of package sizes in the marketplace. The term “expanded” was changed to “usable” throughout the proposal along with minor editorial changes. This item was moved from Voting to Informational status.

At the 2016 NCWM Annual Meeting, the Committee reviewed the comments from the regional reports. The regional modifications were from NIST, OWM. The Committee also concurs that there should be nine volume measurements across the surface area of the product to measure the depth in the vessel. Along with the following, there will need to be a review of the entire procedure by the NIST Technical Advisor to check the test procedure, math calculations, and modify the MAV table. The Committee is recommending that this be a Voting item with all applicable changes.

- To address the Test Procedure for Uncompressed Animal Bedding:
 - Add to Step 1 in the procedure the following test note: **Test Note: If the package is not labeled with a useable volume, it is opened and the contents are poured directly into the test measure.**
- To address the Test Measure Specifications and Designs:
 - Add the following test note to Section 3.10. and to the Tables for Recommended Test Measures for animal bedding. **Test Note: Nothing in 3.10. should be construed or interpreted as prohibiting the use of test measures meeting these specifications, or constructed in other geometric shapes or dimensions, or those made of other materials to test any other product.**
- To address comments on the Number of Volume Determination Measurements –

- Delete references in Step 5 and Tables 2 and 3 in regards to taking 26 measurements and replace with the following new language and graphics. **Take at least nine measurements across the surface area of the product to measure the depth of the product..**

For example:

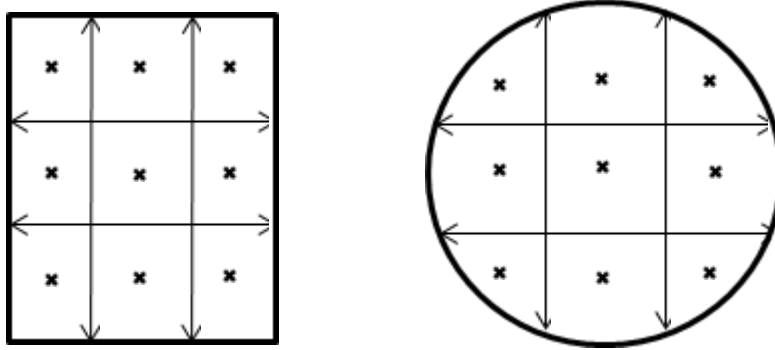


- In regards to comments on the Maximum Allowable Variation (MAV): The current recommendation that a 10 % MAV be applied when multiple measurements are taken to determine total package volume, pending future study, will be replaced with a 5 % MAV be applied to all tests of animal bedding.

Regional Association Comments:

At the 2015 WWMA Annual Meeting, a NIST Technical Advisor reported on the changes that are being submitted on the test procedure to address concerns raised at the 2015 NCWM Annual Meeting. The WWMA recommended that this be a Voting item with the following modifications:

- To address the Test Procedure for Uncompressed Animal Bedding:
 - Add to Step 1 in the procedure the following test note: **Test Note: If the package is not labeled with a useable volume, it is opened and the contents are poured directly into the test measure.**
- To address the Test Measure Specifications and Designs:
 - Add the following test note to Section 3.10. and to the Tables for Recommended Test Measures for animal bedding. **Test Note: Nothing in 3.10. should be construed or interpreted as prohibiting the use of test measures meeting these specifications, or constructed in other geometric shapes or dimensions, or those made of other materials to test any other product.**
- To address comments on the Number of Volume Determination Measurements –
 - Delete references in Step 5 and Tables 2 and 3 in regards to taking 26 measurements and replace with the following new language and graphics. **Take at least nine measurements across the surface area of the product. Take the measurements at points approximately equidistant from each other and the sides of the test measure.**

For example:

- Regarding comments on the Maximum Allowable Variation (MAV): The current recommendation that a 10 % MAV be applied when multiple measurements are taken to determine total package volume, pending future study, will be replaced with a 5 % MAV be applied to all tests of animal bedding.

At the 2015 CWMA Interim Meeting, a state regulator remarked that even though her state does not proactively regulate animal bedding, she appreciates having this method developed in the event there is a complaint in her state. CWMA believes the item is fully developed and recommended it be a Voting item.

At the 2015 NEWMA Interim Meeting, a comment was received from a state regulator noting his state uses this procedure and it works, but it is unlikely to be completed in one day. It is a long and tedious procedure and the commenter suggested there is room for improvement. The region believes this item has been fully developed and recommended that it be a Voting item.

At the 2015 SWMA Annual Meeting, it was recommended this be a Voting item with the amendments shown in the 2015 WWMA Annual Meeting report recommendation. The SWMA would like NIST to verify the accuracy of the “actual volume” compared to “dimensions” in Table 2. The SWMA recommends this be a Voting item.

At the 2016 NEWMA Meeting, Mr. Mike Sikula (New York) indicated support for this item and appreciates the reduction in measurements. NEWMA considers this item to be fully developed and supported the Voting status.

Additional letters, presentations, and data may have been part of the Committee’s consideration. To review the supporting documentation, please refer to the “Report of the 100th National Conference on Weights and Measures” (SP 1210, 2015).

260-6 D Recognize the Use of Digital Density Meters

Source:

Missouri (2016)

Purpose:

Allow the use of digital density meters for package checking of viscous fluids such as motor oils, diesel exhaust fluid (DEF) and antifreeze.

Item under Consideration:

Amend NIST Handbook 133 as follows:

Develop specific test procedures for NIST Handbook 133, “Chapter 3. Test Procedures – For Packages Labeled by Volume” that would recognize the use of digital density meters in lieu of volumetric flasks and thermometers when testing certain viscous fluids such as motor oil, DEF, antifreeze, syrups, etc.

Background/Discussion:

Current test procedures are slow and awkward due to the need of using borosilicate glassware for package checking. Digital density meters are fast, use small samples size (2 ml) and have built in thermometers.

Digital density meters are fast and accurate in comparison with recognized NIST Handbook 133 test procedures for viscous fluids. Using digital density meters equipped with built-in API density tables will not require the cooling samples to 60 °F. There is no need to “wet down” volumetric flasks before each measurement. Most non-food products may be recovered without contamination. Only a small sample size (2 ml) of the product is needed for testing. There is no need for a partial immersion thermometer or volumetric flasks. The current method in “Section 3.4. Volumetric Test Procedures for Viscous Fluids – Headspace” does not work for plastic oblong bottles often used for motor oil. This new test procedure would eliminate the entrapment of air in testing viscous fluids (i.e., motor oil, DEF, antifreeze, syrups, etc.). Well established ASTM and other international standard test methods are available with precision statements.

At the 2016 NCWM Interim Meeting, Mr. Ron Hayes (Missouri) spoke in regards to his submittal of this proposal. The Committee believes this item has merit and requested the submitter form an informal task group to further develop. Mr. Hayes agreed that this item needs to have additional data gathered to support the use and accuracy of the digital density meters. The American Petroleum Institute (API) remarked that they would like to assist the task group on this project. The Committee is recommending this as a Developing item.

Regional Association Comments:

At the 2015 CWMA Interim Meeting, Mr. Hayes (submitter) remarked that this proposal was submitted for both NIST Handbook 133 and NIST Handbook 44 and would streamline the process of volume measurement. Using one of several commercially available densitometers would eliminate the cost of extra work and time to wet and clean the flask for each measurement. It also eliminates cost due to breakage. This would be an alternative to the refereed method for volume measurement. An industry representative asked about products that did not have consistent density throughout such as hair conditioner. Mr. Hayes commented all products may not work with this alternate method but many would. Mr. Hayes recommended this be considered as a Developing item. CWMA forwarded the item to NCWM and recommended it be a Developing item to allow other regions an opportunity to comment.

At the 2015 SWMA Annual Meeting, a state official spoke in support of this item. The SWMA believes this item is fully developed and forwarded it to NCWM, recommending that it be a Voting item

Additional letters, presentations, and data may have been part of the Committee’s consideration. To review the supporting documentation, please refer to the “Report of the 100th National Conference on Weights and Measures” (SP 1210, 2015).

260-7 D Incorporating Efficiencies into Inspections

Source:

Ventura County, California (2016)

Purpose:

Improve efficiency in the time and resources to conduct inspections where it is determined early in the testing that the lot is going to fail (NIST Handbook 133).

Item under Consideration:

1.2.3. Individual Package Requirement

The variation of individual packages contents from the labeled quantity must not be “unreasonably large.” In this handbook, packages that are under filled by more than the Maximum Allowable Variation (MAV) specified for the package **labeled net quantity statement** are considered unreasonable **minus errors (UME)**. Unreasonable shortages are not generally permitted, even when averages in other packages in the *same* lot, shipment, or delivery

compensate for such shortages. **If during an official package inspection using “Category A” or Category B” sampling plan, the number of packages whose net values exceed the number of negative MAV’s permitted for the sample size, then the lot fails and testing may be considered complete for the purpose of removing the lot from sell in its current condition. Completion of the official package inspection sampling plan for each lot is needed for further enforcement actions. This handbook does not specify limits of overfilling (with the exception of textiles), which is usually controlled by the packer for economic, compliance, and other reasons.**

(Amended 2010 **and 20XX**)

Background/Discussion:

Current procedures in NIST Handbook 133 require inspectors to test all products in a sample before determining compliance of a lot; for example, Section 3.9. Peat Moss. If one follows the test procedure in Section 3.9.2.2. Test Procedure (“Open each package in turn, ...”), every package must be opened, and its error determined before the results can be evaluated. Section 3.9.3. Evaluation of Results, then refers the inspector to Section 2.3.7. where Unreasonable Minus Errors (UMEs) are considered. Every test procedure in the Handbook has the same requirement. If an inspector determines that many of packages errors exceed the UMEs allowed before completing testing of all the packages in the sample, there is no provision to allow the inspector to reject the lot. All the packages must be tested. The submitter has tested peat moss where the first two packages had UMEs. This exceeded the number allowed in the sample and would, in the final analysis, have resulted in the rejection of the lot. Yet following the requirement of Section 3.9.2.2. the rest of the sample had to be tested, for a product that should have been rejected after the test of the first two packages. Requiring testing of the whole sample before determining the number of packages errors exceeding the number of UME’s allowed is costly in time and resources. It would be far better to allow an inspector to reject a lot when, early in the testing, there are obvious multiple unreasonable minus errors that exceed the number allowed. This would shorten the overall testing time for products requiring extensive time to determine errors and still result in the same determination of compliance.

There are several products that require destructive testing and excessive testing times, sometimes 15 or 20 minutes for each sample (e.g., peat moss, mulch and soils, ice cream novelties, paint, compressed gas in cylinders). Requiring the testing of all packages in a sample for those products which require extensive and time consuming testing when it is apparent that the lot will fail because of an excess of UMEs, is an unnecessary waste of time and resources. Permitting rejection of a lot before all samples have been tested would eliminate an unnecessary and arduous procedure and provide an efficient resolution to the sampling of difficult to test products.

At the 2015 NCWM Annual Meeting during a discussion on the testing of peat moss, the NIST Technical Advisor stated the intent of the handbook was to allow the failure of a lot immediately on discovering excessive UMEs and this was taught in NIST Handbook 133 classes. Although this may be what the authors of NIST Handbook 133 intended, unless it is made clear through specific language, it is very possible that such action by an inspector could face a legal challenge.

It is realized that proposal option 1 affects many different sections of the Handbook 133 and, therefore, cannot address every specific section. If this proposal is supported by one or more of the regional weights and measures associations and forwarded to the L&R Committee, it will be up to the Committee and NIST Technical Advisors to identify and correct the language in each test procedure within the Handbook.

At the 2016 NCWM Interim Meeting, there was not a fully developed proposal for the Committee to consider. The Committee believes this item has merit and will return it to the submitter to develop a complete proposal. The Committee is recommending this as a Developing item.

Regional Association Comments:

At the WWMA Annual Meeting, a NIST Technical Advisor remarked that regulators can remove an inspection lot from sale for MAV non-compliance without completing the test as noted in NIST Handbook 133, Chapter 4; however, it is only listed under this one test procedure. The WWMA recommends Option 2, one “general” statement in Chapter 1, Sections 1.2.3. and/or 1.2.4. and/or Chapter 2, Section 2.3.7.1. making a statement about the “Individual Package Requirement” and “MAV.” No specific language was suggested to the NCWM L&R Committee. WWMA forwarded the item to NCWM, recommending it be a Voting item.

The submitter's original proposal is to amend NIST Handbook 133 as follows:

Option 1:

Amend each test procedure in NIST Handbook 133, indicated in 14 above, to make it permissive to allow the rejection of a lot if it is obvious that the number of UMEs exceeds the number allowed before all samples in the lot have been tested.

For each test procedure add the phrase "If an inspector, at any time during testing packages, determines the number of unreasonable minus errors exceeds the number allowed, the inspector may fail the lot without further testing and will not need to follow the requirements of Section 2.3.7. Evaluation for Compliance."

Option 2:

Make one "general" statement up front in Chapter 1, in Sections 1.2.3. and/or 1.2.4. and/or or Chapter 2, 2.3.7.1. where it addresses the Individual Package Requirement and MAV.

The general statement or explanation should say something along the lines that "nothing in NIST Handbook 133 or the test procedures are to be interpreted that an inspector must continue testing all samples when the number of MAVs allowed are exceeded. Once the MAVs allowed are exceeded, the lot fails and can be immediately rejected. It is not necessary (required) to continue testing the remainder of the packages in the sample. Reference to statements such as "every package must be opened and its error determined before the results can be evaluated" does not apply in cases where the number of allowed MAVs is exceeded".

At the 2015 CWMA Interim Meeting, a state regulator believed this item to be fully developed and ready for Voting status. Other state regulators agreed this is a commonsense protocol, which needs to be stated. A state regulator says he has already adopted this practice. The only issue to further consider is determining fines on MAVs where appropriate, but states will make that determination. CWMA forwarded the item to NCWM and recommended it be a Voting item.

At the 2015 NEWMA Annual Meeting, a retired state regulator remarked that this process has always been an option and the region does not believe this proposal is necessary. NEWMA did not forward it to NCWM.

At the 2015 SWMA Annual Meeting, it was noted that there was no specific proposed language. The SWMA believes this concept has merit but would like to see a specific proposal. The SWMA forwards this to the NCWM recommending this as a Developing item.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 100th National Conference on Weights and Measures" (SP 1210, 2015).

270 OTHER ITEMS

270-1 D Fuels and Lubricants Subcommittee

Source:

The Fuels and Lubricants Subcommittee (2007)

Purpose:

Update the Uniform Engine Fuels and Automotive Lubricants Regulation in NIST Handbook 130 including major revisions to fuel ethanol specifications. Another task will be to update the Basic Engine and Fuels, Petroleum Products, and Lubricants Laboratory Publication.

Item under Consideration:

This item is under development. All comments should be directed to Dr. Matthew Curran, FALS Chair at (850) 921-1570, Matthew.Curran@freshfromflorida.com, or Ms. Lisa Warfield, NIST Technical Advisor at (301) 975-3308, lisa.warfield@nist.gov.

Background/Discussion:

At the 2016 NCWM Interim Meeting, the Subcommittee met on Sunday, January 10, 2016, at the NCWM Interim Meeting, in San Diego, California, to review many significant issues related to fuel and motor vehicle fluid standards appearing before the L&R Committee. The meeting began with an update from an agenda review teleconference, which was held on Tuesday, December 15, 2015. There were six items on the L&R agenda with one additional related item in the Method of Sale Section that were discussed by FALS. The meeting also consisted of updates from the three informal focus groups (IFG) working within FALS. Summaries are detailed below. Finally, a fourth informal focus group was formed within FALS during the Sunday meeting to investigate L&R Item 237-5, Section 4.1. Water in Retail Engine Fuel Storage Tanks relating to minimum requirements for water in fuel storage tanks.

Handbook 130 Harmonization IFG: Ms. Marilyn Herman (President, Herman and Associates) delivered an update to the FALS membership. Ms. Herman noted that the IFG has held several teleconferences and met at the 2015 NCWM Annual Meeting as well as at the ASTM International Meeting in Austin, Texas, in December 2015 to gather input and suggestions. The IFG has developed several drafts and has posted them on the NCWM collaboration site for all to review and comment. She encouraged members to continue to review the document and provide comment. While significant progress has been made, she noted that the project is going to take time due to the magnitude of possible changes to the Handbook as well as how to address the recently released Federal Trade Commission final rule pertaining to labeling requirements for ethanol blended fuels.

Renewable Diesel Labeling and Definitions IFG: Ms. Rebecca Richardson (MARC-IV Consulting) delivered an update to the FALS membership. Ms. Richardson noted that they had held several teleconferences and exchanged emails and were still trying to determine what course of action, if any, should be recommended through FALS in regards to the FTC labeling requirements for renewable diesel fuels.

CNG/LNG Equivalent Values IFG: Mr. Jeff Clarke (Natural Gas Vehicles [NGV] for America) delivered an update to the FALS membership. He reported that the IFG had met several times via teleconference and has developed a draft document detailing the results of research on energy content values. Mr. Clarke gave a PowerPoint presentation highlighting the current proposed values and how they were derived; more recent data concerning natural gas energy content and data on diesel energy content as provided by the Auto Alliance. The IFG research document is still in draft form and needs to be finalized so that it can be submitted as a finalized document to FALS. As a result, the IFG did not have any recommendations to bring to FALS at this time.

Organometallic Task Group: There was no update provided by the task group to FALS at the January 2016 meeting, but a ballot is moving its way through ASTM International that, if passed, would set a limit of 25 mg/L Mn for certain vehicle markets. The ballot has already passed through Subcommittee A and will soon be brought to the D02 Main Committee for a Vote. At the 2016 NCWM FALS meeting, Mr. Randy Jennings (TG Chair) remarked that the TG will disband and is requesting that NCWM continue to post the work of the TG on their website.

Regional Association Comments:

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 100th National Conference on Weights and Measures" (SP 1210, 2015).

270-2 D Packaging and Labeling Subcommittee

Source:

Packaging and Labeling Subcommittee (2011)

Purpose:

Provide an update of the activities of this Subcommittee, which reports to the L&R Committee. The mission of PALS is to assist the L&R Committee in the development of agenda items related to packaging and labeling. The Subcommittee will also be called upon to provide important and much needed guidance to the regulatory and consumer packaging communities on difficult questions. PALS will report to NCWM L&R Committee. The Subcommittee is comprised of a Chairperson and eight voting members.

Item under Consideration:

This item is under development. All comments should be directed to Mr. Chris Guay, Packaging and Labeling Subcommittee Chair at (513) 983-0530, guay.cb@pg.com or Mr. David Sefcik, NIST Technical Advisor at (301) 975-4868, david.sefcik@nist.gov.

Background/Discussion:

The Package and Labeling Subcommittee (PALS) is comprised of four voting regulatory officials (one from each region) and four voting from industry (retailers and manufacturers) in addition to its Chair and NIST Technical Advisor. Mr. Guay, PALS Chair, reported that work is currently being held through monthly webinar meetings and at the NCWM meetings. Members of NCWM can participate in the PALS webinar meetings by contacting Mr. Guay. PALS members are responsible for providing updates at their Regional Meetings. Mr. Guay added that PALS will be developing proposals and providing guidance and recommendations on existing proposals as assigned by the NCWM L&R Committee. He also stressed the importance of having key federal agencies (FDA, FTC, and USDA) participating.

Mr. Guay reported the Subcommittee is working on a Recommended Practice Document for quantity expressions appearing on the principal display panel (PDP) in addition to the statement of net quantity and is also considering further development of the following items:

- **Additional Net Content Declarations on the Principal Display Panel** – Package net contents are most commonly determined by the product form, for example – solid products are labeled by weight and liquid products are labeled by volume. Semi-solid products such as pastes, creams, and viscous liquids are required to be labeled by weight in the United States and by volume in Canada.
- **Icons in Lieu of Words in Packaged labeled by Count** – Can a clear and non-misleading icon take the place of the word “count” or “item name” in a net content statement? While existing Federal regulation requires regulatory label information to be in “English,” the increasing presence of multilingual labels and the growing diversity of the U.S. population suggest more consumers are served with a clear and non-misleading icon.
- **Multilingual Labels**
- **Multipacks and Bundle Packages** – The net content statements for multipacks and bundled packages of individually labeled products can be different based on the approach used to calculate them. The difference is the result of the degree of rounding for dual inch-pound and metric declarations. Using two apparently valid but different methods can yield one net content statement result, which provide better accuracy between the metric and inch-pound declarations and a different net content result; which is consumer friendly.

At the 2015 NCWM Interim Meeting, Mr. Guay (PALS Chair) reported that PALS was making progress on a Recommended Practice Document for quantity-related statements appearing on the package net content statement outside of the required statement of net quantity. He noted that no guidance or regulation exists for these types of statements and, thus, every manufacturer creates their own approach. A Recommended Practice Document is expected to help bring uniformity and consistency by providing a reference for these types of label statements. This document will either be a stand-alone document on the NCWM website or included as part of another NCWM publication.

At the 2015 NCWM Annual Meeting Mr. Guay reported that FTC has recommended adoption of five amendments recommended by PALS into their final FPLA regulations. FTC also responded to each recommendation made by PALS. FTC did not propose adoption of amendments from any other source.

Mr. Guay and Angela Godwin (Ventura County, California) gave an abbreviated presentation providing details of the developing Recommended Practice Document to build awareness and to get broader input on this item. The Subcommittee's goal is to have the document drafted by early 2016, so that it can be refined and edited prior to the 2016 NCWM Annual Meeting. It is expected to be submitted for regional review in the fall of 2016.

At the 2016 NCWM Interim Meeting, Mr. Guay and Mr. Hal Prince (PALS SWMA representative) gave a presentation on the developing Recommended Practice Document. PALS noted this document is envisioned to be a stand-alone document on the NCWM website and that PALS is targeting to have the document drafted by April 2016 with the goal of getting broader review of NCWM membership prior to submission as a formal NCWM item.

At the 2016 NCWM Annual Meeting, Mr. Guay reported that the Subcommittee continues to address questions and issues surfacing as the Subcommittee works on the Recommend Practice Document.

Regional Association Comments:

WWMA received a presentation by Mr. Chris Guay (Procter & Gamble) and Ms. Angela Godwin (Ventura County, California) on the draft document on quantity related statements appearing on the principal display panel outside the required statement of net quantity. WWMA appreciates the PALS' work and recommended that this item remain as a Developing item.

SWMA recommended that this item remain as a Developing item.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 100th National Conference on Weights and Measures" (SP 1210, 2015).

270-3 D Moisture Allowance Task Group (MATG)

Source:

Moisture Allowance Task Group (2012)

Purpose:

This Task Group will provide additional guidance for making moisture allowances for products not listed in NIST Handbook 133.

Item under Consideration:

This item is under development. All comments should be directed to Mr. Kurt Floren, Moisture Allowance Task Group Chair at (626) 575-5451, kfloren@acwm.lacounty.gov or Ms. Lisa Warfield, NIST Technical Advisor at (301) 975-3308, lisa.warfield@nist.gov

Background/Discussion:

NCWM 2012 Interim Meeting: Ms. Cardin, Committee Chair, will be requesting that the NCWM Board of Directors form a new Task Group to review moisture allowance. The 2012 L&R Committee designated this item as a Developing item.

At the 2012 NCWM Annual Meeting, Mr. Floren (Los Angeles County, California) announced that he will Chair the Moisture Allowance Task Group.

At the 2013 NCWM Interim Meeting, Mr. Floren announced that he is seeking a representative from each region for the MATG. He would prefer a representative from each region. Currently, the following regions have provided a representative; NEWMA, Mr. Frank Greene (Connecticut) and WWMA, Mr. Brett Gurney (Utah). The following individuals have also expressed interest: Ms. Maile Hermida (Hogan Lovells US, LLP), Ms. Ann Boeckman (Kraft

Foods Group), and Mr. Chris Guay (Procter and Gamble Co.). Mr. Floren remarked that meetings will be held via web-meetings and at the NCWM Conferences.

At the 2014 NCWM Interim Meeting, the MATG discussed how to proceed forward on this item and reviewed history of prior work done. At the 2014 and 2015 NCWM Annual Meetings, Mr. Floren informed the Committee that there has been scheduling conflicts with other priorities this past year, and he has not had the opportunity to get a meeting scheduled. Mr. Floren would like to opportunity to continue chairing this group and will pursue this item.

At the 2016 NCWM Interim Meeting, Mr. Floren met briefly with the MATG to review some historical documents on the subject matter. Mr. Floren intends to hold teleconference meetings with the TG in order to proceed on this item.

At the 2016 NCWM Annual Meeting, Mr. Floren requested the Task Group be designated as an Informal Focus Group. There is extensive data and research that needs to be performed prior to the group making a recommendation to the Committee. The Committee agrees with Mr. Floren's request, and the L&R Chair will request a new designation for the MATG as an Informal Focus Group from the NCWM Chair.

Regional Association Comments:

WWMA heard no update on this item, but meetings are being planned for the near future. WWMA supports the MATG's planned work and recommended that this item remain as a Developing item.

SWMA recommended that this item remain as a Developing item.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 100th National Conference on Weights and Measures" (SP 1210, 2015).

-
- Mr. Richard Lewis, Georgia | Committee Chair
 - Mr. Louis Sakin, Towns of Hopkinton/Northbridge, Massachusetts | Member
 - Mr. John Albert, Missouri | Member
 - Ms. Ha Dang, San Diego County, California | Member
 - Mr. Ethan Bogren, Westchester County, New York | Member
 - Ms. Rebecca Richardson, Marc - IV Consulting| Associate Membership Representative
 - Mr. Lance Robertson, Measurement Canada | Canadian Technical Advisor
 - Ms. Lisa Warfield, NIST, OWM | NIST Technical Advisor
 - Mr. David Sefcik, NIST, OWM | NIST Technical Advisor

Laws and Regulations Committee

Appendix A

Items: 232-4 and 260-3: Handbooks 133 and 130

Proposed Amendments to NIST Handbook 133³, Section 3.14. “Firewood” and NIST Handbook 130⁴, Uniform Method of Sale of Commodities Regulation, Section 2.4. “Fireplace and Stove Wood”

Subject: The National Institute of Standards and Technology (NIST) Handbook 133, “Checking the Net Contents of Packaged Goods,” – Section 3.14. “Firewood (Volumetric Test Procedure for Packaged Firewood with a Labeled Volume of 113 L [4 ft³] or Less)” and Section 2.4. “Fireplace and Stove Wood” in the Method of Sale of Commodities Regulation in NIST Handbook 130 “Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality”).

History: The volumetric test procedures for firewood in NIST Handbook 133, Section 3.14. were adopted at the 83rd National Conference on Weights and Measures (NCWM) Annual Meeting in 1998. The historical record accompanying the proposal provides limited guidance on how the test procedures are to be applied in the field. “The Report of the 83rd National Conference on Weights and Measures” for the 1998 Annual Meeting is published in NIST Special Publication (SP) 932 (1998) on pages L&R 19 and in Appendix B on page L&R 31.

Proposals: Proposed revisions to Section 2.4. “Fireplace and Stove Wood” in the Method of Sale of Commodities Regulation (MOS) of NIST Handbook 130 are presented in Part 1 beginning on page 5. Proposed revisions to the firewood test procedures in NIST Handbook 133, Section 3.14. are presented in Part 2 beginning on page 7. Included in Appendix A, on page 27, is a draft revision of Section 3.14. for consideration by the Laws and Regulations Committee.

Executive Summary

Sales of firewood have increased in recent years.⁵ According to the National Firewood Association sales of firewood exceeds \$2 billion a year.⁶ Recent inspections of packaged firewood by weights and measures officials in different states and at least one court case recently uncovered a lack of uniformity in the procedures used to test packaged firewood. Section 3.14. of NIST Handbook 133 is written ambiguously such that if the same bundle of firewood were tested by different states, the test results would be substantially different. Any test procedure written as vaguely as Section 3.14. would likely be found to violate due process. The problems described below were uncovered through limited testing and research. However, after reviewing historic information and test data, it is apparent there is a need to clarify the procedures and improve the accuracy of the measurement procedures so the volume of wood in bags, bundles, and boxes are determined accurately and consistently. Improving the test procedures will help ensure consumers can make value comparisons and reduce unfair competition.

During this study, it was revealed that much of the packaged firewood sold in packages less than one cubic foot is labeled in fractions of a cubic foot instead of cubic inches as required in Section 2.4. in NIST Handbook 130, Method of Sale of Commodities Regulation. Additionally, some of the ambiguous wording in this regulation may conflict

³ NIST Handbook 133 “Checking the Net Contents of Packaged Goods” (2015) -www.nist.gov/pml/wmd/pubs/hb133.cfm

⁴ NIST Handbook 130 “Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality” (2015) – www.nist.gov/pml/wmd/pubs/hb130.cfm

⁵ www.eia.gov/todayinenergy/detail.cfm?id=15431#

⁶ nationalfirewoodassociation.org/nfa-press-release-mar-21-2013/

with the Uniform Packaging and Labeling Regulation (UPLR). Included below are proposals to revise the method of sale to recognize traditional industry labeling practice and eliminate language that appears to conflict with the requirements of the packaging and labeling regulation. Proposals to address these issues are included below. The following information and recommendations are based in part on comments and suggestions from weights and measures officials who participated in a “Training Summit” held at NIST in April 2015. During the meeting, participants evaluated the current NIST Handbook 133 firewood testing procedures. Participants developed several suggested improvements to the procedures for determining length and area. Recommendations were also received from several firewood packers. Because few states are testing packaged firewood, and those that do are finding shortages across the industry, increased oversight of this product is recommended.

Background: In NIST Handbook 130, in the “Uniform Method of Sale of Commodities Regulation (MOS)”⁷ a cord is defined in Section 2.4. “Fireplace and Stove Wood.” The MOS describes how a cord must be compactly stacked and includes other requirements regulating the sale of fire and stove wood. (See Appendix C [page 49].) States that adopt the method of sale for firewood use the procedures in NIST Handbook 133 to verify the declared volume of wood.

2.4.1. Definitions.

2.4.1.1. Fireplace and Stove Wood. – Any kindling, logs, boards, timbers, or other wood, natural or processed, split or not split, advertised, offered for sale, or sold for use as fuel.

2.4.1.2. Cord. – The amount of wood that is contained in a space of 128 ft³ when the wood is ranked and well stowed. For the purpose of this regulation, “ranked and well stowed” shall be construed to mean that pieces of wood are placed in a line or row, with individual pieces touching and parallel to each other, and stacked in a compact manner.

A cord includes in the total volume the wood, bark, and air between the pieces. The requirements that firewood be “ranked and well stowed” and “stacked in a compact manner” are intended to prevent deceptive sales practices used by unscrupulous wood sellers who use crisscross stacking or deceptive terms such as the “face-cord” or “green” cord (i.e., the volume of the wood before it is split). A cord of wood sold unsplit will have less volume once it is split. For this reason it is important that sellers and consumers understand the basis of the sale to avoid complaints. Under most state laws, the amount of wood delivered to the consumer, regardless of whether it is split or unsplit, with bark on or off, unseasoned or seasoned, must equal at least 128 ft³ when stacked as specified in Section 2.4.1.2. “Cord.” Under the MOS, Section 2.4.3. “Quantity,” item (a) “Packaged natural wood” packaged firewood in volumes less than 1/8 cord must be labeled in liters, cubic feet, or cubic inches (in packages under 1 ft³) and fractional parts of those units. There are variations in the laws and regulations of other states, but most state regulations are similar to the requirements presented in NIST Handbook 130.

Estimated Impact of Measurement Errors on Package Volume (see Notes a. and b. below)

In a limited study of firewood packages conducted at NIST, the current length measurement procedures, which require that length measurements be made along the centerline of the five pieces having the greatest girth, did not (for the samples collected from four packers) result in an average length that accurately represented the average length of all of the pieces in the package. Similarly, the current procedure for using one-inch square graph paper to determine the areas of the bundle ends resulted in large variations in the area of the ends (results for the same bundle area varied as much as 7 in² among different inspectors who carried out the measurements). Even small variations in measurement can result in significant errors in the volume of a package. Implementing new measurement procedures and equipment to improve the accuracy of the measurements taken in the wood test procedures will benefit consumers and packers alike.

For example:

⁷ NIST Handbook 133 does not define a Cord of wood. Instead, it provides test procedures used to enforce the packaging and labeling requirements in NIST Handbook 130, Uniform Packaging and Labeling Regulation, Section 12. “Variations to be Allowed.”

Appendix A – Items: 232-4 and 260-3: Proposed Amendments to NIST Handbook 133, Section 3.14. Firewood and NIST Handbook 130, Section 2.4. Fireplace and Stove Wood

A one-inch error made in the average length determination of the wood pieces in a package will result in an error of about 75 in³ in volume (or about 19 in³ for each ¼ in).

A 5 in² error in the average area determination of the bundle ends will result in a volume error of about 80 in³ (about 16 in³ for each 1 in² and 4 in³ for a ¼ in²).

Notes:

- a. The volume formula for bundled firewood in NIST Handbook 133, Section 3.14.c. Bundles and Bags of Firewood is similar to the Smalian Cubic Volume Rule published in the National Forest Log Scaling Handbook (FSH 2409.11a) on Cubic Scaling. The scaling handbook is published by the USDA Forest Service at www.fs.fed.us/fmnc/measure/handbooks/index.shtml. The Smalian Cubic Volume Rule uses the formula for finding the volume of the frustum (e.g., a cone like shape with the tip removed) and was developed to determine the cubic foot volume of a single log. A simple version of the formula is shown as $V = (A + a) \div 2 \times L$, which is similar to the NIST Handbook 133 formula. This is where: V = Volume in Cubic Feet; A = Large-End Cross-Section Area (ft²); a = Small-End Cross Section Area (ft²); and L = Length of pieces in the bundle.
- b. The estimated errors mentioned above were calculated using the NIST Handbook 133 modified version of the Smalian rule (using inches instead of feet) to develop the following tables:

Bundle Volume Calculations – Impact of Length Variations on Volume		
Average Area of Ends (in²)	Average Length of Pieces (inch)	Volume in³
75	16.00	1200
75	16.25	1219
75	16.50	1238
75	16.75	1256
75	17.00	1275

Bundle Volume Calculations – Impact of Area Variations on Volume		
Average Area of Ends (in²)	Average Length of Pieces (inch)	Volume in³
75	16.00	1200
76	16.00	1216
77	16.00	1232
78	16.00	1248
79	16.00	1264
80	16.00	1280

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Recommendations for Consideration by the NCWM Laws and Regulations Committee

Part 1. NIST Handbook 130 – Uniform Methods of Sale of Commodities - Section 2.4. Fireplace and Stove Wood

The following recommendations attempt to clarify the method of sale for firewood in Section 2.4. Fireplace and Stove Wood.

A. Determine how “Cooking Woods,” “BBQ Wood” and Flavoring “Chunks” are to be sold.

There is a sector of the firewood industry which sells chunks and split firewood from many types of trees for use in restaurants and homes for smoking and flavoring foods. Currently Section 2.4.3.(c) Quantity, requires “stove wood pellets or chips” no larger than 15 cm (6 in) to be sold by net weight, but the wording specifically excludes flavoring chips. (See Figures 1a and 1b.)

- (c) **Stove wood pellets or chips.** – Pellets or chips not greater than 15 cm (6 in) in any dimension shall be sold by weight. This requirement does not apply to flavoring chips.

(Amended 1976 and 1991)

The types of “chunk” wood may include apple, cherry, mesquite, pecan, oak, chunks of “BBQ wood” and used whisky barrels. Some online sellers offer packages of these varied products for sale by net weight and “approximate” net weight but others sell by volume. Some sites also offer split logs by volume and “wood chunks” by net weight. The variations in the sizes and shapes of the wood being sold for flavoring and cooking are significant (in some advertisements the chunk sizes range from 2 in to 4.5 in) so that may be why some sellers have switched to net weight, perhaps believing they fall under Section 2.4.3.(c). It must be determined if, under Section 2.4. Fireplace and Stove Wood, “cooking wood” and “chunks” are included under the terms “flavoring chips” and if the method of sale for those products, which, according to Section 2.4.3.(d) must be sold by volume is appropriate, or if they fall under Section 2.4.3.(c) which permits sales by net weight. If the latter is preferred, then the subsection should be amended to allow flavoring “chunks” to be sold by net weight.



Figure 1a. Chunks Sold by Volume in Bags

(Photo provided by Cooking Woods of Seattle, Washington.)

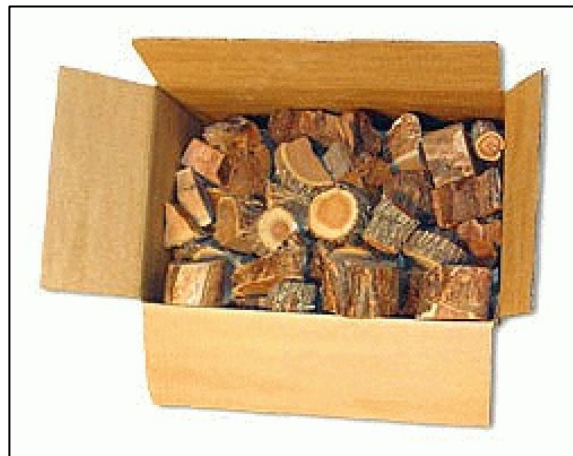


Figure 1b. Chunks Sold by Weight

(Photo provided by Firewood.Com of Minnesota.)

URLs for sites selling “Cooking Wood”

- www.cookingwoods.com
- firewood.com
- www.wileyscookingwoods.com

B. Amend Current Method of Sale for Packaged Firewood.

Amend the current method of sale to recognize the traditional practice of offering packaged firewood for sale in quantities less than 1 cubic foot by fractions of the cubic foot instead of by cubic inches as required in Section 2.4.3.(a)(2). Harmonize the packaging requirements of the Uniform Packaging and Labeling Regulation (UPLR) with the Method of Sale for Packaged Firewood to reduce the possibility of confusion.

Based on information from several industry sources and weights and measures officials, the current labeling on packaged firewood has the quantity declared in fractions of a cubic foot (e.g., 0.6 ft³, 0.7 ft³ and 0.75 ft³) and by cubic decimeters (dm³). The use of these units on these package sizes does not comply with the method of sale requirements in Section 2.4.3. “Quantity.”

1. Customary Units

Currently Section 2.4.3. “Quantity,” requires that packages of firewood and flavoring chips less than 1 ft³ to be sold by cubic inches and liters. Sale of packaged natural wood by the cubic foot instead of the required cubic inches appears to be a nationwide, traditional sales practice. The labeling by the cubic foot appears to provide consumers with quantity information in a unit of measure they understand, and they can use in making value comparisons against firewood offered for sale by the cord or fractions of a cord. The Office of Weights and Measures (OWM) recommends that the method of sale be revised to require natural wood to be sold by the cubic foot or fractions thereof in order to recognize traditional industry sales practice. No change to the method of sale for flavoring chips and kindling is proposed at this time except to request the interpretation regarding cooking wood and flavoring chunks discussed above.

2. Metric Units

In 1994 the requirement that packages subject to the UPLR include metric units in their quantity declarations was adopted. At that time, the consensus of the NCWM working group, which developed the metric revisions to the UPLR, was due to consumers being familiar with the term liter (l or L) rather than the term cubic decimeter (dm³) even though the quantities are exactly the same. At that time, the methods of sale for peat moss, pine bark mulch, and other products were revised to require the use of the liter instead of cubic decimeter to facilitate consumer understanding of metric units and quantities by requiring a more familiar metric unit to appear on a wide range of packages and quantities. Today, 21 years after the mandatory use of the liter was first implemented, consumer acceptance and understanding of what a liter is and the amount of product it represents is greater than it was in 1994, so the requirement that metric volumes must appear on labels in terms of the liter should not be changed.

Packages subject solely to the UPLR (i.e., they are not subject to the federal Fair Packaging and Labeling Act) may be offered for sale only in metric units (customary units may also appear on the principal display panel at the option of the packer). As currently written in the Method of Sale, Section 2.4.3., subsections (a)(1) and (d)(1) require packages be labeled in “liters, to include fractions of liters; or” which may confuse readers by making it appear that liters are only one option for how quantities must be shown. That wording is inconsistent with the declaration of quantity requirement in the UPLR, Section 6.1. “General” that requires all packages to bear a declaration of quantity in both metric and customary units (an exemption in Section 11.33. of the UPLR makes customary units optional). An editorial change must be made to Section 2.4.3. for both natural wood and flavoring chips to clarify that a packer must provide a declaration of quantity in metric units in terms of the liter and that customary units may appear on the package, but they are optional.

3. Implementation Period

If adopted, the amendment to allow sales of packaged natural firewood by the cubic foot will go into effect on January 1 of the year following NCWM adoption. However, since it will take time for packers to learn of the changes and to add metric units to their packaging or change cubic decimeter to liters, a period of three years from the effective date of the revised regulation should be allowed for the changeover.

4. Proposed Revision

2.4.3. Quantity. – Fireplace and stove wood shall be advertised, offered for sale, and sold only by measure using the term “cord” and fractional parts of a cord or the cubic meter, except that:

(a) **Packaged natural wood.** – Natural wood offered for sale in packaged form in quantities less than 0.45 m³ (1/8 cord or 16 ft³) shall display the quantity in terms of:

- (1) liters, to include fractions of liters; and may also include a declaration of quantity in terms of: ~~or~~
- (2) ~~cubic inches, if less than one cubic foot; or~~
- (3) i. cubic foot, feet, if one cubic foot or greater, to include fractions of a cubic foot; or
ii. cubic feet to include fractions of a cubic foot.

Note: Implementation for the requirement for use of the liter in (1): packages may continue to show the dm³ instead of the liter (L) for three years after the effective date of this regulation to allow for the use of current packaging inventories.

Note: The amended language regarding the liter in (1) must also be added to (d) Flavoring chips.

Part 2. NIST Handbook 133, Checking the Net Contents of Packaged Goods, Section 3.14. Firewood

The following recommendations attempt to clarify the test procedures in Section 3.14. Firewood. Refer to Appendix A for a complete version of the proposed test procedures.

A. Adopt a Maximum Allowable Variation (MAV) for Packaged Firewood.

A limit on negative errors is not currently applied to inspections of packaged firewood. Adding a MAV requirement for packaged firewood would protect consumers in cases where plus errors in some packages results in the sample passing the average requirement but one or more packages are found to have large minus errors.

For example:

In an inspection of a lot of 83 – 0.75 ft³ firewood bundles, an inspector finds 10 packages in a 12 package sample have errors that fall within + 51 to + 86 in³. Then two packages are found to have minus errors of – 345 in³ and – 380 in³. After calculating the average error, the sample passes and all 12 packages remain on sale but at least two customers may purchase packages that are under filled by more than 25 %.

According to NIST Handbook 133, Appendix A., Table 2-10 “Exceptions to the Maximum Allowable Variations (MAV),” no limit is placed on negative errors in packages of firewood (e.g., several bundles, bags, or boxes in the sample could be nearly empty and no action would be taken on the sample except on the basis of the Average Requirement). There is no information in the adoption history for this item to indicate why the individual package (MAV) requirement is not applied. The MAV requirement provides important protection for consumers and helps ensure fair competition. Applying an MAV is reasonable since measurements are generally rounded in

favor of the packer and because other difficult to measure products, such as mayonnaise (which is also tested with a headspace procedure), mulch, and animal bedding are required to meet an MAV requirement. A specific MAV also guides packers in their packaging and quantity control programs in setting control limits to ensure that the lot, shipment, or delivery meets the labeled quantity, and it meets the Average Requirement. From the consumers’ perspective, it is reasonable to expect to receive a package that has at least 75 % or more of its declared contents (most packages covered by NIST Handbook 133 MAVs are required to contain at least 98 % or more of the product). Based on a review of limited test data having no limit on minus errors does not appear to be reasonable. It is recommended that a 25 % MAV value be adopted for the limit on minus errors pending further study unless packers provide an alternative value based on current quantity control data. This value could be modified by the NCWM in the future if test data collected by weights and measures officials and packers using the proposed test procedures indicates that a different MAV value is justified.

Recommendation: Eliminate the exemption for packaged firewood labeled by volume from the individual package requirement. Adopt a MAV (e.g., 25 %) to prevent excessively under filled packages from being offered for sale. Most packaged firewood has a labeled volume of 21.2 L [0.75 ft³] (1296 in³) so the 25 % MAV would equal 5.3 L or 324 in³. (See excerpt from Table 2-10 below.)

Table 2-10. Exceptions to the Maximum Allowable Variations for Textiles, Polyethylene Sheeting and Film, Mulch and Soil Labeled by Volume, Packaged Firewood and Stove Wood Labeled by Volume, and Packages Labeled by Count with 50 Items or Fewer, and Specific Agricultural Seeds Labeled by Count.	
	Maximum Allowable Variations (MAVs)
Packaged Firewood and Stove Wood Labeled by Volume	<p><u>25 % of labeled quantity</u></p> <p><u>Note: Use Table 2-5. “Maximum Allowable Variations for Packages Labeled by Weight” for packaged artificial and compressed fireplace logs and stove wood pellets and chips labeled by weight.</u></p>

B. Current Exemption to MAV Applies Only to Packages Labeled by Volume:

In the original 1998 proposal to the NCWM, an exemption from the MAV for packaged wood sold by volume in boxes, bags, bundles, and stacks was included. As a result, there is no limit on negative errors in packages and stacks of firewood sold by the cord or subdivisions (i.e., a box or bag could be 75 % empty and no action could be taken based on individual package errors). Accordingly, NIST Handbook 133, Appendix A, Table 2-10 “Exceptions to the Maximum Allowable Variations (MAV)” was revised to include an exemption for “Packaged Firewood” but wording to limit the restriction to packages or stacks sold by volume was inadvertently omitted. Because wood pellets and some cooking wood and flavoring chips are sold by weight, it is possible that an inspector might apply the exemption to packages sold by weight, when it was originally intended only to apply to packages labeled by volume. To correct this oversight, NIST will editorially revise NIST Handbook 133, Appendix A, Table 2-10 in the next edition of Handbook 133 to indicate that the exemption only applies to packages sold by volume as shown above. (See firewood.com/index.cfm/pageid/21 and hjnfirewood.com/#!/shop-now/ckj2).

Recommendation: Editorially revise NIST Handbook 133, Appendix A., Table 2-10. to read “Packaged Firewood and Stove Wood labeled in Terms of Volume” and add the following note to Table 2-10:

Note: Use Table 2-5 “Maximum Allowable Variations for Packages Labeled by Weight” for packaged artificial and compressed fireplace logs and stove wood pellets and chips labeled by weight.

C. Clarify Section 3.14.1 Test Equipment, Improve Accuracy, and Reduce Rounding Errors

1. The words “Linear Measure” should not be part of the title. This is a printing error and will be corrected in the next edition.

2. The instruction to “round up” measurements is not clear about which values are to be rounded and also conflicts with the guidance to “Round measurements down to the nearest ...” in the headspace test method used in Section 3.14.2.a. Boxed Firewood procedure.

Recommendation: Amend this sentence by adding the phrase “Measurements shall be read to the smallest graduation on the ruler or tape. Round any value that falls between two graduations up to the higher value except when making headspace depth measurements where a value falling between two graduations is rounded down to the lower value.” This wording will clarify when rounding is to take place and will also eliminate the conflicting instruction.

When this procedure was added to NIST Handbook 133, the specifications of the maximum graduation sizes for the measurements were converted and rounded to a rational metric size, which may confuse users. First, the maximum ruler increments 0.5 cm ($\frac{3}{16}$ in or 0.1875 in) are not equivalent (0.5 cm = 0.1968 in). Second, while there are rulers and tapes available graduated in 0.5 cm and $\frac{1}{16}$ in there are none with $\frac{3}{16}$ in graduations. The current approach for specifying measurement units is confusing but can be corrected by providing separate maximum graduations for measuring instruments in metric units and inches.

In the volume calculations for firewood bundles a change of $\frac{3}{16}$ in (0.1875 in) in the average length will result in a 14 in³ change in the volume of the package. To improve measurement accuracy and reduce rounding errors, it is recommended that a ruler or tape with $\frac{1}{16}$ in graduation be used to make measurements. The current recommend 0.5 cm graduation should be reduced because a 2 mm difference in the measurement will result in a 6 in³ change in package volume. For metric units, a ruler or tape with 1 mm graduations is recommended. These changes are recommended to increase the accuracy of linear measurements and reduce measurement uncertainty. This is significant because several measurements are taken in verifying a single package of wood and many readings will fall between graduations and must then be rounded.

Proposed Revision:

3.14.1. Test Equipment

Linear Measurement: The maximum value of graduations on a ruler or tape shall be equal to or less than:

For SI Units – 1 millimeter (1 mm)

For U.S. Customary Units – $\frac{1}{16}$ inch ($\frac{1}{16}$ in)

Measurements shall be read to the smallest graduation on the ruler or tape. Round any value that falls between two graduations up to the higher value except when making headspace depth measurements where a value falling between two graduations is rounded down to the lower value.

D. Address Conflicting Instructions in Section 3.14.2. Test Procedures for Boxed Firewood

1. **Conflicting Instructions in Height and Width Measurement Procedures:** The instructions in the first and last part of Step 2 describe the procedure for determining the height of the stack of wood in the box through a headspace procedure. That is, the depth of the headspace is deducted from the inside height of the package. The instructions in Step 2 intentionally exclude the package height from being used to calculate the height of the wood. This differs from the procedure for measuring width described in Step 4 below.

This is the current wording in Step 2:

2. *“Open the box to determine the average height of wood within the box; measure the internal height of the box. Take three measurements (record as “d₁, d₂. . .etc.”) along each end of the stack. Measure from the bottom of a straightedge placed across the top of the box to the highest point on the two outermost top pieces of wood and the center-most top piece of wood.”*

This is the current wording in Step 4:

- 4 Determine the average width of the stack of wood in the box by taking measurements at three places along the top of the stack. Measure the inside distance from one side of the box to the other on both ends and in the middle of the box. Calculate the average width.

$$\text{Average Width} = (W_1 + W_2 + W_3) \div 3$$

In Step 4, the first sentence reads “determine the average width of the stack of wood,” but the measurement instruction reads “measure the inside distance from one side of the box to the other.” This instruction can be read to mean that the measurement is of the width of the box and not the wood it contains. Also, there is no deduction for the gap between the wood and sidewall of the box as in the headspace procedure in Step 2. This instruction appears to differ from other dimensional test procedures in NIST Handbook 133 (e.g., the thickness of the wrapper is deducted from dimensions of a package of peat moss) and does not follow common legal metrology measurement practice. As Step 4 is now written, the volume formula for boxed firewood is:

$$\text{Volume of Wood} = \text{Height of Wood} \times \text{Interior Width of Package}$$

Recommendation: Revise Step 4 to require that the width of the wood be used in volume determinations. Currently a minimum of three measurements is required. Because the shape of firewood varies, using this small sample will result in the average value having greater variability than in the case where five or more measurements are taken. The average width of the wood should be determined using direct measurement of the stack at five or more points along the length of the stack which are then averaged. If the recommended amendments are made, the formula for firewood would be:

$$\text{Volume of Wood} = \text{Average Height of Wood Stack} \times \text{Average Width of Wood Stack}$$

Example:

4. Width of Wood Stack

- a. Open the box and measure the width of the wood stack. Take at least five measurements at intervals spaced along the length of the stack. Average these values to obtain an Average Width of Wood Stack.

$$\text{Average Width of Wood Stack} = (W_1 + W_2 + W_3 + W_4 + W_5) \div 5$$

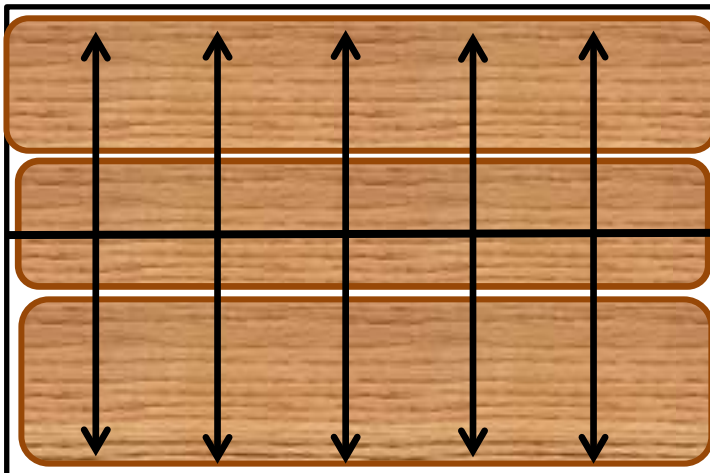


Figure 3. Determining the average width of wood stack.

Appendix A – Items: 232-4 and 260-3: Proposed Amendments to NIST Handbook 133, Section 3.14. Firewood and NIST Handbook 130, Section 2.4. Fireplace and Stove Wood

- 2. Rounding Clarifications:** It is currently recommended to round measurements up in favor of the packer. This is incompatible with a headspace procedure where the depth measurements must be rounded down to favor the wood packer. See **proposed revision** for Section 3.14.1. “Test Equipment” above for language clarification to eliminate the conflict. For added clarification, all directions regarding rounding should include a statement “or less” to indicate that rulers with increments less than those specified may be used. For example, a ruler with 1 mm graduations may also be used.

This is the current wording in Step 2:

Round measurements down to the nearest 0.5 cm (1/8 in).

Recommendation: Amend the guidance to read:

*Round measurements down to the nearest 1 mm (1/16 in) **or less.***

- 3. Improving the Accuracy of Height Measurements:** The height of the stack of wood varies from box to box. This is due to the cutting or trimming of the wood that takes place in order for it to fit into the box and natural variations in the shape of the wood. Sometimes gaps large enough to hold an extra piece of wood are found in boxes, which are later found to contain the declared volume. According to inspectors experienced in using the current procedure, an optional step, based on the judgement of the inspector, allows the inspector to make additional measurements if he or she “suspects” that a piece of wood was inadvertently left out of the box or that it fell out during shipment. Since this language is vague and subject to individual judgement, it does not add to the accuracy of the test. The NCWM should consider removing this language from the procedure and instead require a minimum of five measurements be taken at as many points across the top of the firewood in every test. Taking additional measurements always reduces the variability in the average and increases accuracy. Thus, increasing the minimum number of measurements and number of points across the top of the box will improve the height determination in every test rather than for just those tests where the inspector suspects a piece is missing.

This is the current wording in Step 2:

If pieces are obviously missing from the top layer of wood, take additional height measurements at the highest point of the uppermost pieces of wood located at the midpoints between the three measurements on each end of the stack. Calculate the average height of the stack by averaging these measurements and subtracting from the internal height of the box according to the following formula.

Recommendation: Revise Step 2 to delete optional step beginning “if pieces are obviously...” and require additional measurements at a minimum of five locations to reduce variability in the average height:

- a. open the box to determine the average height of the stack of wood;
- b. measure the internal height of the box; and
- c. take at least five measurements spaced at intervals along each end and center of the wood stack (record as “d₁, d₂, . . .etc.; take at least 15 measurements.”). (See Figure 3 for an illustration of where the measurements may be taken.) Measure from the bottom of a straightedge placed across the top of the box to the highest point on the wood (round the measurements down to the nearest 0.5 cm [1/8 in] or less). Calculate the average height of the stack by averaging these measurements and subtracting the result from the internal height of the box using the following formula:

$$\text{Average Height of Wood Stack} = (\text{Internal Height of Box}) - (\text{Sum of Depth Measurements}) \div (\text{Number of Measurements})$$

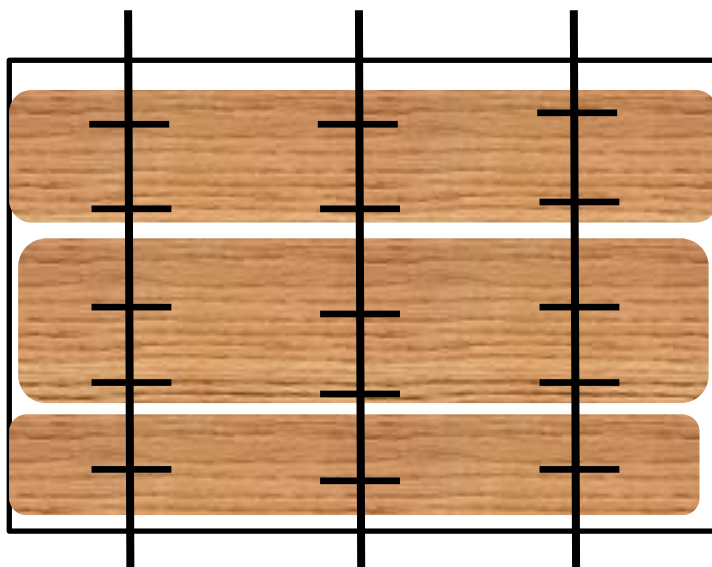


Figure 3. Top View of Box – Measurements taken at cross bars.

- 4. Modify procedures in NIST Handbook 133, Section 3.14. for Measuring the Average Length:** All three procedures in NIST Handbook 133, Section 3.14. provide instruction to measure the length of the five pieces of wood with the “greatest girth.” There is no explanation in the adoption history to explain this requirement. Since there is no direct relationship between girth and length, it is likely only a way to provide guidance in picking which pieces to measure. Most boxes and bundles of firewood include from 5 to 12 pieces while bags and boxes of smaller pieces can include dozens. Some stacks of firewood can include a hundred or more pieces depending on the diameter of the wood or shape. Typically, for both packaged and stacked firewood, the pieces are cut to specific lengths (e.g., 406 mm [16 in] or 457 mm [18 in] or longer) so they fit most fireplaces and are easily handled.

The way to improve an “average” value is to increase the number of measurements. It is likely, a sample of only five pieces of wood from most packages or stacks does not result in the determination of an average length that represents the actual average length of all of the pieces in the package or stack from which it is taken. To improve measurement accuracy, it is recommended that a larger number of samples be measured to reduce the variability in the average piece length used in the volume determination. Increasing the sample size can be done without imposing tedious and often time consuming random sampling procedures if the assumption is made that the length of any piece selected for measuring is generally (but not exactly) representative of the other pieces that the packer cut or selected for inclusion in the package under inspection. Even though this recommendation increases the number of measurements the inspector is required to take, the trade-off is improved measurement accuracy and more reliable test results. In addition, the proposed change would eliminate reference to the girth of the wood.

Recommendation: Remove the instruction to “select the five pieces with the greatest girth” and instead specify a minimum number of pieces must be selected and measured, which increases with the volume of the wood measured. This table is based on, but is not identical to, the firewood test procedures of the California Division of Measurement Standards.

Table A.		
Volume		Minimum Sample of Pieces to be Measured for Length*
1.	Packaged Firewood 453 L (16 ft³ [1/8 cord]) or less	
a.	For packages with 12 pieces or less	All
b.	For packages with 13 to 50 pieces	At least 12 pieces
c.	For packages with more than 50 pieces	At least 24 pieces
2.	Stacked Wood	At least 12 pieces for each ½ Cord or fraction thereof

*Note: While the packages of firewood to be included in the sample must be selected using the random sampling techniques described in HB 133, Section 2.3.4. “Random Sample Selection” those techniques are not used in selecting the individual pieces for measurement for length. Since the packages were selected at random, the assumption is made that the length of any piece selected for measuring is generally representative of the other pieces that the packer cut or selected for inclusion in the package under inspection. When selecting pieces of wood for measurement, take them from different locations in the package or stack so that they are representative of the other pieces available for measurement.

- a. **How to Measure the Length of a Piece of Wood:** There are different instructions on the method to be used to determine the length of the wood pieces in the boxed, crosshatched and bundled firewood procedures.

The boxed firewood procedure reads as follows:

“To determine the average length of the pieces of wood, remove the wood from the box and select the five pieces with the greatest girth. Measure the length of each of the five pieces from center to center. Calculate the average length of the five pieces.”

$$\text{Average Length} = (L_1 + L_2 + L_3 + L_4 + L_5) \div 5$$

The procedures in Handbook 133, Section 3.14.2.b. “Crosshatched Firewood” and c. “Bundles and Bags of Firewood” do not include the instruction to measure “center to center.”

“Average length of the pieces of wood – select the five pieces with the greatest girth and measure the length of the pieces. Calculate the average length of the pieces of wood”

Background: The instructions to measure the length of the pieces of wood from “center to center” conflicts with other length measurement procedures in NIST Handbook 133 and good measurement practice in general. While with firewood, the pieces are typically cut and split to predetermined approximate lengths (e.g., 406 mm [16 in] or 457 mm [18 in] or longer), the angles of the end cuts, shapes of the pieces, and actual lengths vary significantly (e.g., up to 50 mm [2 in] in samples tested at NIST) within the same package. Variations in the lengths of individual pieces can also be significant depending where (i.e., point to point) the measurements of the piece length are taken. Figure 4 shows six pieces of wood from the same bundle with irregular lengths and Figure 5 shows a bundle with pieces with substantial variations in length.

Figure 4. Irregular Lengths from a Bundle.



Figure 5. Other Examples of Irregular Lengths



Appendix A – Items: 232-4 and 260-3: Proposed Amendments to NIST Handbook 133, Section 3.14. Firewood and NIST Handbook 130, Section 2.4. Fireplace and Stove Wood

The “length” of a piece of wood is affected by its shape and the angle or irregularity of the cuts of its ends. Some interpret the instruction to measure “center to center” as meaning the measurements are to be taken along the centerline of the piece of wood (see Figure 6). Others read it as meaning the centerline between the two most distant points on the piece of wood. As Figure 6 shows, this could result in a significant difference in the length of a piece. One plausible explanation for the adoption of the “center-to-center” instruction is that it was one quick way to obtain the “average” length on pieces with the ends cut at sharp angle but there is no historical explanation.

Figure 6. “Center-to-Center” Measurement.






At a recent training event nine experienced inspectors measured six pieces of wood according to the “center-to-center” measurement instructions using a rigid ruler with 1 mm graduations. The range of measurement results are shown in Table 1. “Variations in the Measurement of Six Pieces of Wood from a Bundle ‘Center to Center’ in Millimeters” below. The variations in the length measurements for the same pieces (i.e., A and B) were from 4 mm (0.15 in) to 14 mm (0.55 in). It is probable that no two pieces of firewood are identical in shape, end cut or length. In practical terms then, this small exercise shows that the current instruction does not provide sufficient guidance on measuring irregular pieces of wood so that their “length” can be accurately determined for use in a volume calculation.

Wood Piece	Inspector									Range in mm	Range in inches
	1	2	3	4	5	6	7	8	9		
A	502.0	497.0	511.0	502.5	504.5	509.0	502.0	502.0	505.0	14.0	0.55
B	527.0	*	528.0	529.0	525.5	527.0	526.0	527.0	525.0	4.0	0.15
C	*	*	551.0	*	549.5	551.0	543.0	548.0	550.0	8.0	0.30
D	348.0	344.0	345.0	341.5	344.0	345.5	345.0	340.0	350.0	10.0	0.39
E	445.0	449.0	445.0	445.5	445.0	442.5	450.0	442.0	438.0	12.0	0.47
F	360.0	360.0	359.0	358.0	365.5	358.0	363.0	362.0	361.9	7.5	0.29

*measurement omitted.

The taking of just one measurement on an irregularly shaped piece of wood to determine its length contrasts sharply with the test procedures for other products such as polyethylene sheeting and paper towels sold by length, width, and thickness. For these products, NIST Handbook 133 requires at least three measurements along each dimension. The significant difference between the products is that in polyethylene sheeting and paper products, the variations are industrially controlled to be within a few micrometers or mils (0.001 in).

Recommendation: The length of a uniformly cut piece of wood can be determined with just one measurement along the centerline of its longitudinal axis. Examples of the recommended procedure for determining the length of a uniformly shaped piece of wood are shown in Table 2a. “Determining Piece Length – Uniform Shapes.” This table will be included in Appendix A. “Proposed Revisions to the Firewood Test Procedures in Section 3.14.”

Table 2a. Determining Piece Length – Uniform Shapes	
Uniform Shapes Errors in the length measurement can result in a significant volume errors especially with the small quantities typical of packaged wood. When the pieces are generally cut in a uniform manner a single measurement along the centerline of the longitudinal axis is used to determine piece length. Take the measurement along a straight line between two points over solid wood.	
(i) Most wood pieces are cut perpendicular to their longitudinal axis so one measurement taken from the face of one end to the face of the other end will provide an accurate length determination.	
(ii) On pieces of wood with “reverse bias” and “bias” end cuts estimate where the centerline of the piece is and then measure to these points as shown below. The intent of this measurement is to determine an “average” length that is assumed to fall along the centerline of the piece. The top piece is an example of a “reverse” bias cut.	 <p>The bottom piece is an example of a bias cut</p> 

For pieces of wood with irregular ends or shapes, determine the length of the wood using an averaging procedure based on at least three point-to-point measurements. The three measurements may be taken along one or more surfaces of the piece of wood (e.g., split pieces may have multiple sides) between two points that visually cross solid wood at the (1) shortest, (2) the longest, and (3) along the centerline of the piece. Additional measurements may be taken at other positions along the same axis as the original measurements to obtain values that are representative of the variations in the length of the piece.

Examples of the recommended procedure for determining the length of an irregularly shaped piece of wood are shown in Table 2b. “Determining Piece Length – Irregular Shapes.” This table will be included in Appendix A. “Proposed Revisions to the Firewood Test Procedures in Section 3.14.”

Table 2b. Determining Piece Length – Irregular Shapes	
<p>Irregular Shapes</p> <p>When the pieces have irregular shapes, cuts, or shattered ends, it is necessary to take at least three measurements and average the results to obtain the length of the piece. Take the measurements along a straight line between two points that cover solid wood and appear to be the shortest and longest dimensions and a third measurement at or near the centerline of the piece.</p>	
<p>(i) This piece has a bias cut end on the left and an irregular end on the right. The measurements are taken at the longest and shortest points where the line crosses over solid wood. The lowest measurement (dotted line over the air space) is not used because it does not cross wood. Only the three upper measurements are used to calculate the average length for this piece unless additional measurements across solid wood are taken.</p>	
<p>(ii) This is a piece with a bias cut on the left and an irregular end on the right. Note how the measurements are taken at the longest and shortest points where the line crosses over solid wood. The lowest measurement (the dotted line) would not be used because it does not cross over wood.</p>	
<p>(iii) This piece of wood has a “shattered end.” Shattering occurs when wood is stressed beyond its breaking point and the end is not trimmed. The inspector should take additional measurements to account for the shortest point of the voids and longest points at the extensions. In this example, five measurements were taken and averaged to account for the voids and extensions.</p>	

To calculate the volume of the package, an Average Piece Length (APL) representing all of the pieces in the package is determined. To obtain the APL, the individual pieces are measured, and their average lengths are determined using the average of three measurements as illustrated below. Those average values are summed and divided by the number of pieces in the package.

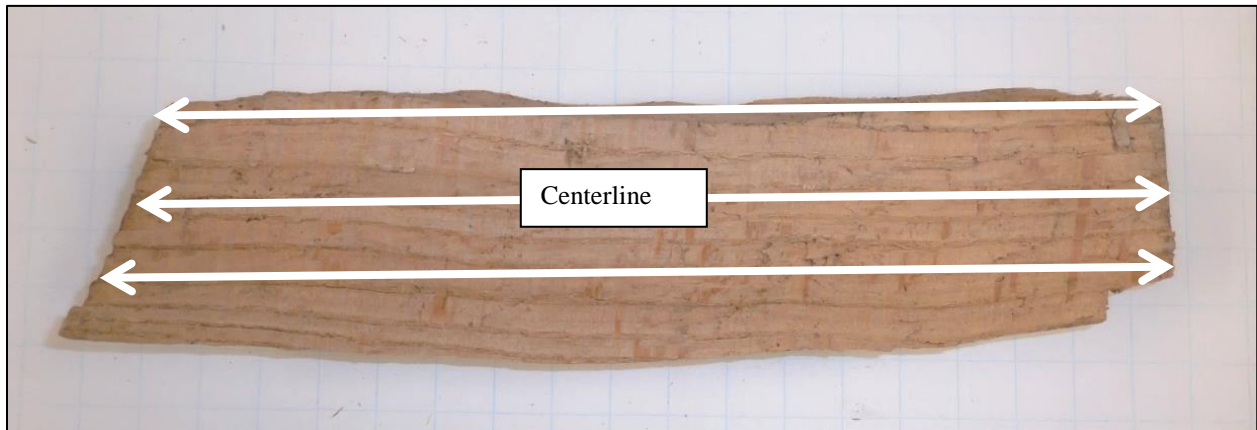
The first step in determining the Average Piece Length is to determine the Individual Piece Length:

7. **Individual Piece Length.** – Remove the wood from the package and measure the length of each piece of wood (see Table A on page 13 for the number of pieces to measure.) Determine the length of a piece of wood by taking at least three point-to-point measurements. Take at least three measurements along a straight line between two points crossing solid wood that appear to be the shortest and longest dimensions and a third at or near the centerline of the piece. Calculate the average of the measurements to obtain the Average Individual Piece Length.

$$\text{Average Individual Piece Length (AIPL)} = (L_1 + L_2 + L_3) \div 3$$

The arrows in Figure 7. “Three Point Measurement” illustrate where the measurements were taken on the pictured piece. The actual dimensions of the piece are shown in the table shown below the figure in Table 2b. “Determining Piece Length – Irregular Shape.”

Figure 7. "Three-Point" Measurement.



Piece	L ₁	L ₂	L ₃	Average Individual Piece Length
Figure 7	350 mm	378 mm	395 mm	374.3 mm

The next step is to measure the remaining pieces of wood, sum the results, and then divide by the number of pieces in the sample.

2. **Average Piece Length.** – After the Average Individual Piece Lengths are determined, sum the values, and divide by the number of pieces measured to obtain the Average Piece Length for the package.

$$\text{Average Piece Length} = (\text{AIPL}_1 + \text{AIPL}_2 + \text{AIPL}_3) \div 3$$

If the recommended changes in Table A are adopted, all of the pieces of wood in a box or bundle will typically be measured; providing increased accuracy over the current procedure.

Example: The three pieces of firewood in Figure 8. “Three Pieces Measured from One Bundle” represent those recently found in a package of firewood sold locally. Each piece is measured using the Individual Piece Procedure in Step 1. “Individual Piece Length.” Those lengths are then summed and divided by three to obtain the Average Piece Length for use in determining the volume of wood in the package.

Note: L_2 would be the length used under the current measurement method.

Figure 8. Three Pieces Measured from One Bundle.



Piece	L_1	L_2	L_3	Average Individual Piece Length
A	410 mm	450 mm	458 mm	439
B	350 mm	378 mm	395 mm	374
C	542 mm	547 mm	550 mm	546
		Total Piece Length		1359
		Average Piece Length		453 mm

3. **Clarify Area Measurements for Bundles and Bags** – The current procedure in Section D. “Address Conflicting Instructions in Height and Width Measurement Procedures” for determining the volume of the firewood in bundles and bags is shown below with comments:

1. **Average Area of Ends.** – Secure a strap around each end of the bundle or bag of wood to prevent movement during testing and to provide a definite perimeter. Use two or more straps to secure the wood.

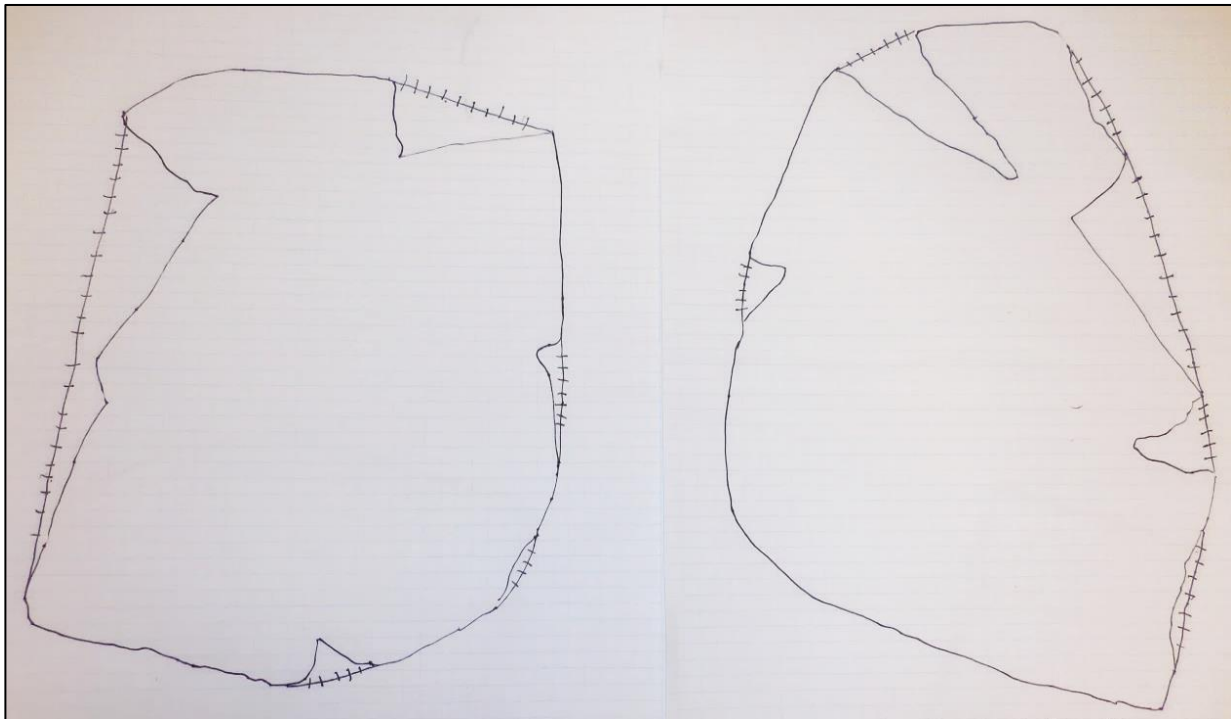
Comment: The first sentence has been misinterpreted and two completely different approaches to measuring the area of the ends of the bundle of wood have been used. At least one court case has taken place where its meaning has been extensively argued.

One interpretation of the first sentence is that a “definite” perimeter around the wood is created by securing the strap around the bundle to hold the pieces firmly in place. Using this interpretation, the area of each end is determined by tracing the outline created by the wood onto graph paper (e.g., 1 in squares) and this tracing excludes accessible air gaps between the pieces. The area of each end of the bundle within the perimeter line is then determined by counting the whole squares and rounding the partial squares to the nearest $\frac{1}{4}$ in². Those two values are averaged and multiplied times the average length of the five biggest pieces to calculate the volume of

wood in the package. At least three states, which actively test firewood, report they apply this interpretation in their testing.

The second interpretation of the first sentence is that the “definite” perimeter of the bundle is defined by tracing the outside of the straps which are to be placed at the extreme end of the bundle so that the accessible air gaps are included in the area. The graphic in Figure 9 show the areas of a bundle traced on quarter-inch graph paper using both interpretations. The cross-lines (+) indicate the air gaps as defined by drawing the line around the outside perimeter of the strapping. For this example, the strapping used was fiber packing tape with a thickness of 0.006 inch.

Figure 9. Illustration of the Areas of the Ends of a Bundle of Firewood Using Both Methods.



A – End of Bundle

B – End of Bundle

Defining the Perimeter

Straps for Securing the Wood and Defining Perimeter

The original submitter of the proposal for the firewood procedures, currently in NIST Handbook 133, recently confirmed that they use the perimeter of the bundle defined by tracing a line around the outside perimeter of the strap (the second interpretation) to verify the volume of wood in a bundle, and that was the original intent of the proposal submitted to the NCWM.

One cause of these conflicting interpretations appears to be that the test procedure lacks detailed instructions and background information, which would explain the purpose of the straps and provide specific instructions on where they are to be placed on the bundle. In reading the test procedure, the purpose of using the straps appears to be solely to hold the wood securely in place so its shape can be traced. There is nothing to indicate that their outside perimeter is to be used. The



graphic accompanying the current text, where the strapping is towards the center of the bundles, further confuses the reader.

Bags

In verifying the volume contained in bags, it is difficult to obtain the accurate area measurements of the ends of the packaging or piece length because of the interference of the bag. (See Figure 10.) For these reasons, the proposed test procedure requires bagged firewood be removed from the packaging and formed into a bundle for testing.

Figure 10. Bagged Firewood 0.75 ft³ (21 L).



Strap Thickness

If the outside perimeter of the strap is used to define area, the thickness of the straps increases the area measurement. If it is determined the outside perimeter of the strap is to be used for the determination of the area of the end of a bundle, a thickness specification must be added to the procedure to ensure that packers use the same strap thickness as inspectors to avoid disputes.

Here are some examples to illustrate potential measurement error introduced by the use of the straps, (assuming the bundle has a 10 in diameter)⁸. If the perimeter is drawn around the outside of a 1/16 in thick strap, it will add 1.9 in³ to the package volume. A 1/4 in strap would add up to 7.8 in³ to the package volume. The error increases if the method to secure the strap requires overlapping along some length of the perimeter.

Some limited testing was done using very thin Velcro strapping and duct tape. The problem with the Velcro strapping is that it typically must be doubled over to secure it resulting in expanding the perimeter artificially, thus, increasing the measured area. Duct tape deformed too easily over the air gaps and would not hold the wood securely. The substitute used in this testing was fiber reinforced packing tape (thickness 0.006 in). It performed better than duct tape in securing the wood; it did not deflect when the tracing was done over the air gaps. No deduction was made for the volume error due to the thickness of the fiber tape, which was calculated to be about 0.18 in³.⁶

⁸ The volume of a strap is determined using the formula: $Volume = L \times W \times Thickness$. The circumference is determined using the formula: $Circumference = 2 \times \pi \times r$. Assuming a bundle has the diameter of 10 in, its radius will be 5 in. Using the formula $2 \times 3.1415 \times 5$ the circumference of the bundle is 31.4 in. Assume the width of the strap is 1 in. For instance, if the thickness is 0.006 in then $31.4 \times 1 \times 0.006 = 0.18$ in. If the thickness is 1/16 in, then $31.4 \times 1 \times 0.0625 = 1.9$ in³. If thickness is 1/8 in, then $31.4 \times 1 \times 0.125 = 3.9$ in³. If the strap thickness is 1/4 in, then $31.4 \times 1 \times 0.25 = 7.8$ in³.

Using Shrink Wrap Packaging to Define the Perimeter is Unreliable

Another suggested approach for defining the perimeter of firewood, has been to use the perimeter as defined by the shrink wrapping on the packages. This packaging, which sometimes wraps around the ends of bundles, was on the bundles tested in this study; the least accurate method for defining the perimeter. On most of the bundles tested in this study, the wrapping is too loose to hold a distinct shape or the heating process melted the plastic and created thick masses that would increase the perimeter measurement artificially. All bundles of firewood should be subject to the same test procedure, and their perimeters should be defined consistently so one type of packaging does not give the packer an advantage over another.

Variations in Area Determinations

The difference in the average area obtained between the two interpretations results in substantive differences in the calculated volume of the wood.

In limited testing with four bundles (see Figure 11) of wood, each from a different packer, it was found that using the outside perimeter defined by the strap (here the 0.006 in fiber tape was used to trace this perimeter), by including the air gaps, increased the area of a bundle from 4 in² to 7 in² over the perimeter defined by the wood.

Figure 11. Test Bundles.



An alternative method of area determination using the circumference of the bundle to obtain the area of the bundle ends was submitted by a firewood packer (see Appendix D. “Industry Proposal” on page 51) as a possible alternative to using graph paper in determining the area of the bundle ends (the proposal is called the circumference method).⁹

Limited testing found the circumference method overestimated the area of the bundle ends up to 18 in² over the area determined using the perimeter defined by the wood, and overestimated the area up to 10 in² over the area determined using the perimeter defined by the outside of the strap.

For comparison purposes, three approaches were used to determine the volume of each of the bundles. Minor changes in the test procedure were made to carry out these tests. The first approach was to use graph paper with quarter-inch squares instead of one-inch squares. This reduced rounding errors and provided a more precise determination of area. The second approach was to use fiber reinforced packing tape as strapping to define the perimeter using that method.

⁹ Circumference Method. – Measure the circumference of both ends of the firewood bundle and average the result. The area is calculated using the formula $Area = \pi R^2$ where $R = C/2\pi$ and $\pi = 3.1415$ and $C = Average\ Circumference$. The volume of the bundle is determined by multiplying *Area* by the average length of the pieces of wood in the package. Here, to control variations caused by length deviations all comparisons were done using a uniform piece length of 16 in.

Table 1. Area Determinations			
Bundle	Average Area Perimeter Around Wood	Average Area Perimeter Around Outside of Strap	Average Area Circumference
1	71.87 in ²	79.21 in ²	89.3 in ²
2	65.56 in ²	69.03 in ²	80.9 in ²
3	61.49 in ²	68.56 in ²	78.4 in ²
4	55.81 in ²	61.75 in ²	72.2 in ²

The cause of the differences in area between the two perimeter determination methods is obvious since most of the air gaps are excluded when the perimeter is defined by the wood; whereas, when the perimeter is defined by the outside of the strapping, they are not. The significant increase in area found using the circumference method is also understandable. The overestimation of the areas by the circumference method is that Pi is used in calculating the area. Pi, by definition, means the exact ratio of the circumference of a circle to its diameter. Most of the bundles of firewood tested had irregularly shaped ends loosely closer to resembling polygons or rectangles than circles so the ratio between circumference and diameter is not exact. Because the formula used in the circumference method is accurate only when the circumference of the bundle is a true geometric shape (i.e., circle), it should not be accepted as a replacement for the original test procedure (see Figure 12 for examples).

Could it be used as a Field Auditing Tool?

Even though the circumference method is not a suitable replacement for the current test method, it could serve as a screening procedure (the circumference procedure takes only a few minutes to complete for each bundle and the calculations are easy to complete), which could be used in the field to screen lots of packaged firewood to identify potentially short measure packages. Information on the potential difference between the two methods would have to be collected, but it appears that it could be a worthwhile endeavor. It would require the collection of test data comparing the results of the two methods. If developed and used in the field, an inspector could identify a lot and collect a random sample and use the circumference method to estimate their volume. Based on those tentative results, he or she could decide to treat the check as an audit or go on to perform a full test on the sample using the reference test method. An “audit” test based on dimensional testing and calculation is described in NIST Handbook 133, Section 3.7. “Volumetric Procedure for Paint...” for use in auditing containers of paint to determine if they should be tested volumetrically. The compliance test procedure for paint, like packaged firewood, is also destructive and time consuming. In the proposed revision of the test procedure presented in Appendix A, the circumference method for area determination is included for use as an auditing tool to save inspection resources. Before it is used extensively, additional comparisons against the reference method for volume must be made.

Reference Test Procedure

The current test procedure using graph paper to determine area, though time consuming, provides accurate and repeatable results. It should be considered as the reference procedure once it is determined how the perimeter of the bundle is to be defined.

Figure 12. Circles Show Calculated Areas are larger than Actual Areas because Calculations are Based on Pi.



Variations in Volume Determinations

To ensure the volumes were not affected by the variation in lengths of the pieces, all volume calculations were made with the fixed length of 16 in using the average area determined for each bundle. This isolated the area determination procedure for comparison purposes.

Comparison of Volume Test Results

The primary reason for this review was to develop information to assist with the interpretation of the procedure used in NIST Handbook 133, Section 3.14.2.c. Bundles and Bags of Firewood, and specifically to determine the average area of the ends of a package under test. When the area is determined using the perimeter of the wood to define the area, a lower volume is obtained than when the strap is used to define the perimeter. However, as the data shows, the difference between the two methods of determining perimeter ranges from 69 in³ to 121 in³. The circumference method consistently overestimated the volume of both of the perimeter methods by 150 in³ to 250 in³ or more. The recommendation from NIST is that the NCWM Laws and Regulations Committee utilize this limited test data along with a display of firewood bundles showing how the two perimeter methods are used to determine the areas so an informed decision is made about which approach should be adopted for use in NIST Handbook 133.

Volumes in Cubic Inches							
Bundle	Labeled Volume	A. Volume Wood Area	B. Volume Strap Area	B – A =	C. Volume Circumference Area	C – A =	C – B =
In Cubic Inches – (1728 in ³ = 1 ft ³ or 0.75 ft ³ = 1296 in ³ or 0.7 ft ³ = 1209.6 ft ³)							
1	0.70 cu ft	1140	1261	121	1434	294	173
2	0.75 cu ft	1037	1106	69	1296	259	190
3	0.75 cu ft	985	1089	104	1261	276	172
4	0.75 cu ft	881	985	104	1158	277	173

The results obtained using all three test procedures are shown in the table below:

Volumes in Cubic Feet				
Bundle	Labeled Volume	Volume Wood Area	Volume Strap Area	Volume Circumference Area
1	0.7 cu ft	0.66 cu ft	0.73 cu ft	0.83 cu ft
2	0.75 cu ft	0.60 cu ft	0.64 cu ft	0.75 cu ft
3	0.75 cu ft	0.57 cu ft	0.63 cu ft	0.73 cu ft
4	0.75 cu ft	0.51 cu ft	0.57 cu ft	u ft

E. Stacked “Cross hatched” Firewood

The current test procedure in NIST Handbook 133, Section 3.14.2.b. for “crosshatched wood” (the term “stacked firewood” would provide a more accurate description) includes the minimum amount of guidance on how to determine the volume of stacked firewood. The California Division of Measurement Standards test procedures include explanatory graphics and additional instructions that, if added to NIST Handbook 133, would improve the accuracy and repeatability of the procedure.

The only significant technical change needed is in the procedure for determining the width of the stack where it calls on the inspector to select just five pieces with the “greatest girth” to be measured for length. Most inspectors who test firewood deliveries report that they usually measure 20 or more pieces in a stack to obtain a representative sample of length.

Additional steps and other recommendations to improve the “stacked” wood test procedure are presented in Appendix A.

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Appendix A.

Proposed Changes to NIST Handbook 133 (2015), Section 3.14. Firewood

Strikethroughs and underlining are not used because the procedures have been extensively revised. This proposal should be read in its entirety and considered as a possible replacement for the current text in NIST Handbook 133, “Check the Net Contents of Packaged Goods.”

3.14. Firewood – Volumetric Test Procedure for Packaged Firewood with a Labeled Volume of 113 L [4 ft³] or Less and Stacked Firewood sold by the Cord or Fractions of a Cord.

Unless otherwise indicated, take all measurements without rearranging the wood or removing it from the package. However, if the layers of wood are crosshatched or not ranked in discrete sections in the package, remove the wood from the package, re-stack, and measure according to the procedures described in this section. For boxed firewood, it is the volume of the wood in the box that is determined and not the volume of the box.

3.14.1. Test Equipment

- Linear Measurement: The maximum value of graduations on a ruler or tape shall be equal to or less than:
- For testing packaged firewood: SI Units - 1 mm or for U.S. Customary Units – $\frac{1}{16}$ in (0.0625 in)
- For testing stacked firewood: SI Units – 0.5 cm or for U.S. Customary Units – $\frac{1}{8}$ in (0.125 in)

Other Equipment:

Except where a long tape measure is needed for measuring stacks of wood and unless otherwise noted below, a precision tempered steel ruler should be used for linear measurements. Current calibration certificates issued by a NIST recognized or accredited laboratory should be available for all measuring devices.

- To test boxes of firewood, use a straightedge and a 150 mm (6 in) tempered steel pocket ruler to measure the box headspace. A rigid 610 mm (24 in) tempered steel ruler is required to measure piece length and the dimensions of the box.
- To test bundles of firewood, use a rigid 610 mm (24 in) tempered steel ruler to measure typical piece length. If the circumference based auditing method is to be conducted, a precision 610 mm (24 in) diameter (π) tape or flexible steel tape with 1 mm ($\frac{1}{16}$ in) graduations may be used to approximate the package volume for screening and audit purposes.

For testing stacks of firewood, a precision tape or long tape measure are used. For testing bundles and bags of firewood, the following equipment and materials are used in addition to the linear measures listed above:

- Binding Straps – Straps with ratchet type closures are easily tightened to secure the wood tightly. The binding straps are used to hold wood bundles together if the bundles need to be removed from the package/wrapping material.
- Graph Paper – 279.4 mm \times 431.8 mm (11 in \times 17 in) with 0.5 centimeter or $\frac{1}{4}$ inch squares and a 300 mm (12 in) ruler. This paper is used for tracing and calculating the areas of the ends of a bundle of firewood. Prior to using any graph paper use a calibrated ruler to verify the dimensions of squares at several random points across the page.
- Ruler – 300 mm (12 in) with 0.5 cm ($\frac{1}{4}$ in). This ruler is used with the graph paper to calculate the area of the bundle ends.

- If the strapping method is adopted to define the perimeter of a bundle, the following item must be included in the equipment list.
 - Fiber reinforced packing tape or equivalent (typical dimensions: width – 25.4 mm [1 in]; thickness 152 μm [0.006 in]; length 54.8 m [60 yd]). This tape is wrapped around each end of a bundle of firewood for use in defining the perimeter of the bundle. It is securely tightened around the wood and a line is traced along the outside of the tape. Thicker tape should not be used as it will increase the area that is outlined around the bundle unless the volume of the strap or tape (see note) is calculated and deducted from the volume of the bundle.

Note: The volume of a strap or length of tape is calculated using the formula from Section 4.5 “Polyethylene Sheeting.” That section which also provides information on the equipment and test procedure for determining thickness using deadweight dial micrometer if the thickness of the strap is unknown:

$$Volume = (Length \times Width \times Thickness)$$

3.14.2. Test Procedures

General Instructions

1. When testing packaged firewood follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.
2. Measurements shall be read to the smallest graduation on the ruler or tape. Round any value that falls between two graduations up to the higher value except when making headspace depth measurements in the test procedure for boxes where a value falling between two graduations is rounded down.
3. Samples for Length – Use Table 3-5. “Minimum Number of Pieces to be Measured for Length” to determine the minimum number of pieces to measure to determine the average length of the firewood pieces in a package or stack.

Table 3-5. Minimum Number of Pieces to be Measured for Length		
	Volume	Minimum Number of Pieces to be Measured for Length*
1.	Packaged Firewood 453 L (16 cu ft) [1/8 Cord] or less	
a.	For packages with 12 pieces or less	All
b.	For packages with 13 to 50 pieces	At least 12 pieces
c.	For packages with more than 50 pieces	At least 24 pieces
2.	Stacked Wood	At least 12 pieces for each ½ Cord or fraction thereof
<p>*Note: While the packages of firewood to be included in the sample must be selected using the random sampling techniques described in NIST Handbook 133, Section 2.3.4. “Random Sample Selection” those techniques are not used in selecting the individual pieces for measurement of length. Since the packages were selected at random the assumption is made that the length of any piece selected for measuring is generally representative of the other pieces that the packer cut or selected for inclusion in the package under inspection. When selecting pieces of wood for measurement, take them from different locations in the package or stack so they are representative of the total amount of wood under test.</p>		

4. Measuring Procedures for Length. – Use the instructions and graphics in Table 3-6a. “Determining Piece

Length Uniform Shapes” and Table 3-6b. “Determining Piece Length Irregular Shapes” when measuring the length of pieces to determine the average length of a piece of firewood based on its shape in a package or stack. If a piece of wood does not appear to fall within the examples shown, measure it as if it were an irregular shape, take three or more measurements, and average them.

**Table 3-6a.
Determining Piece Length – Uniform Shapes**

Uniform Shapes

Errors in the length measurement can result in a significant volume errors especially with the small quantities typical of packaged wood. When the pieces are generally cut in a uniform manner a single measurement along the centerline of the longitudinal axis is used to determine piece length. Take the measurement along a straight line between two points over solid wood.

- (i) Most wood pieces are cut perpendicular to their longitudinal axis so one measurement taken from the face of one end to the face of the other end will provide an accurate length determination.



- (ii) On pieces of wood with “reverse bias” and “bias” end cuts estimate where the centerline of the piece is and then measure to these points as shown below. The intent of this measurement is determine an “average” length that is assumed to fall along the centerline of the piece. The top piece is an example of a “reverse” bias cut.



The bottom piece is an example of a bias cut

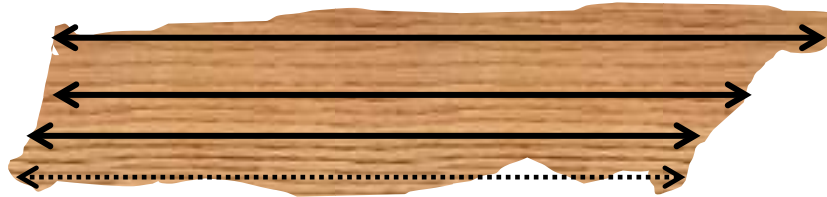


Table 3-6b.
Determining Piece Length – Irregular Shapes

Irregular Shapes

When the pieces have irregular shapes, cuts or shattered ends it is necessary to take at least three measurements and average the results to obtain the length of the piece. Take the measurements along a straight line between two points that cover solid wood and appear to be the shortest and longest dimensions and a third measurement at or near the centerline of the piece.

- (i) This piece has a bias cut end on the left and an irregular end on the right. The measurements are taken at the longest and shortest points where the line crosses over solid wood. The lowest measurement (dotted line over the air space) is not used because it does not cross wood. Only the three upper measurements are used to calculate the average length for this piece unless additional measurements across solid wood are taken.



- (ii) This is a piece with a bias cut on the left and irregular end on the right. Note how the measurements are taken at the longest and shortest points where the line crosses over solid wood. The lowest measurement (the dotted line) would not be used because it does not crossover wood.



- (iii) This piece of wood has a “shattered end.” Shattering occurs when wood is stressed beyond its breaking point and the end is not trimmed. The inspector will take additional measurements to account at the shortest point of the voids and longest points at the extensions. In this example, five measurements were taken and averaged to account for the voids and extensions.



a. Boxed Firewood

Note: A packer may place wrapped bundles of firewood in boxes for ease of handling as well as for display on retail store shelves. When a box contains a bundle of wrapped firewood the volume of the bundle is verified using the test procedure in c. for bundles and bags.

1. Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.
2. Open the box to determine the average height of the stack of wood.
3. Measure the internal height of the box.



Figure 1. Measuring the Inside Height of Box.

- Take at least five measurements spaced at intervals along each end and center of the wood stack (record as “d₁, d₂ . .etc. Take at least 15 measurements). (See Figure 1. “Measuring the Inside Height of Box” for an illustration as to where the measurements may be taken.) Measure from the bottom of a straightedge placed across the top of the box to the highest point on the wood (round the measurements down to the nearest 0.5 cm [¹/₈ in] or less). Calculate the average height of the stack by averaging these measurements and subtracting the result from the internal height of the box using the following formula:

Average Height of Wood Stack =

(Internal Height of Box) – (Sum of Depth Measurements ÷ Number of Measurements)

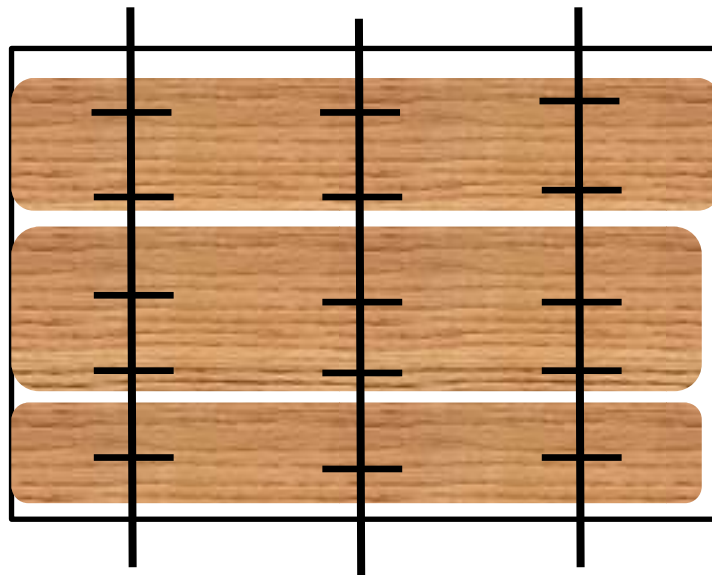
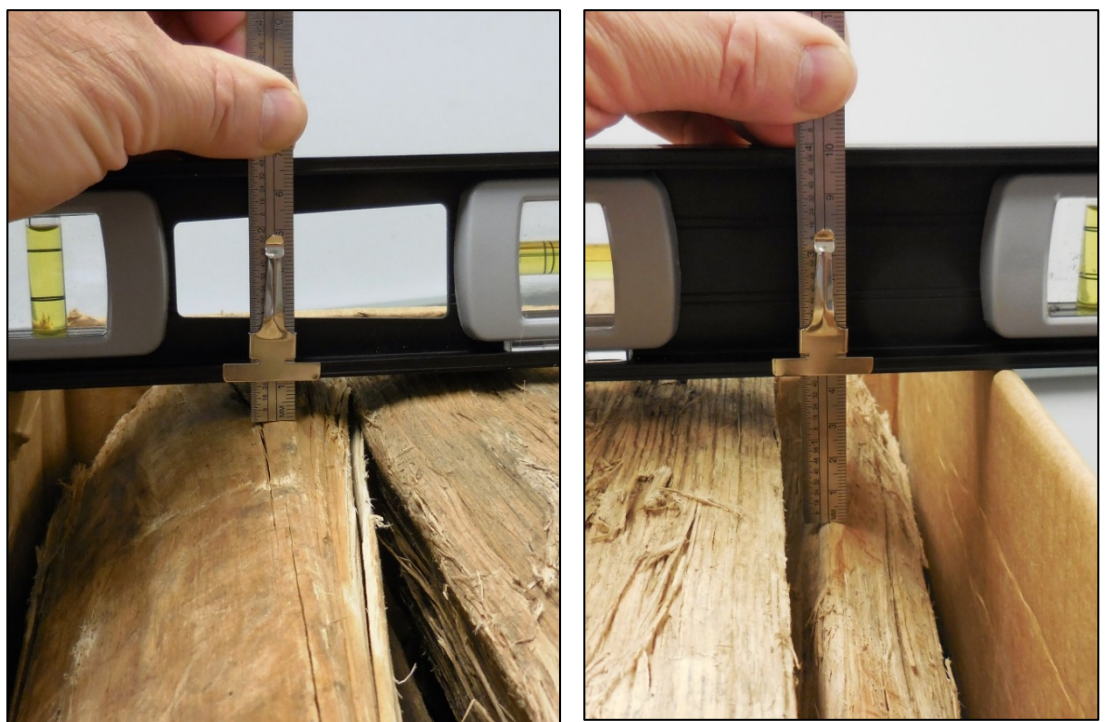


Figure 2a. Top View of Box – Measure at cross bars.

Figure 2b. Examples of the Headspace Measurement.



4. Width of Wood Stack. – Open the box and measure the width of the wood stack. Take at least five measurements at intervals spaced along the length of the stack. Average these values to obtain an Average Width of the Wood Stack.

$$\text{Average Width of Wood Stack} = (W_1 + W_2 + W_3 + W_4 + W_5) \div 5$$

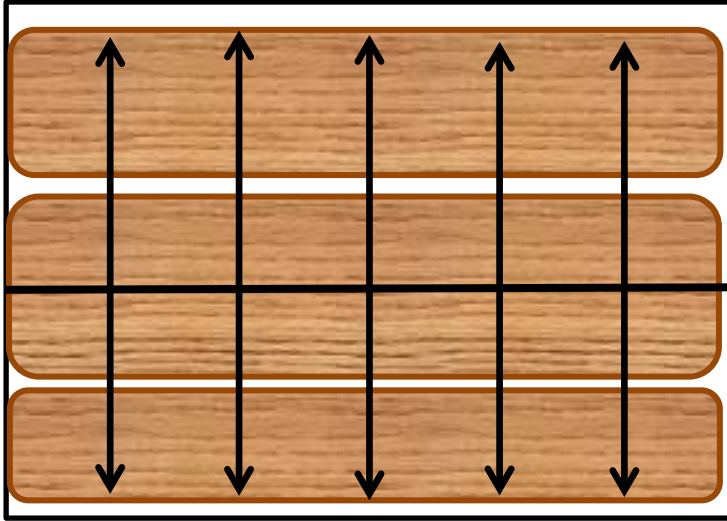


Figure 3a. Top View of Box – Measure at Crosslines.



Figure 3b. Measuring the Width of the Firewood in a Box.

5. Individual Piece Length. – Remove the wood from the package and measure the length of each piece of wood. (See Table 3-5. “Minimum Number of Pieces to be Measured for Length.”) If the piece of wood is uniform in shape, take at least one point-to-point measurement along the centerline of the longitudinal axis (see Table 2. “Determining Piece Length – (a) Uniform Shapes” for examples) and record the value.

If the wood is irregularly shaped (see Table 3-6b. “Determining Piece Length – Irregular Shapes”), for examples, take at least three measurements along a straight line between two points crossing solid wood that appear to be the shortest and longest dimensions, and a third at or near the centerline of the piece. Calculate the average of the measurements to obtain the Average Individual Piece Length and record the length of the piece.

To determine Average Individual Piece Length (AIPL) of irregularly shaped pieces:

$$AIPL = (L_1 + L_2 + L_3) \div 3$$

After all pieces are measured, total the lengths and divide that total by the number of samples to obtain the Average Piece Length for the package.

To determine Average Piece Length (APL) for the package:

$$APL = (L_1 + L_2 + L_3 + \dots L_n) \div (\text{Number of Pieces in Sample})$$

6. Use the average values for height, width, and length to calculate the volume of wood in the box.

$$\text{Volume in liters} = (\text{height in mm} \times \text{width in mm} \times \text{length in mm}) \div 1,000,000$$

$$\text{Volume in cubic feet} = (\text{height in inches} \times \text{width in inches} \times \text{length in inches}) \div 1728$$

7. For boxes of wood that are packed with the wood ranked in two discrete sections perpendicular to each other, calculate the volume of wood in the box as follows: (1) determine the average height, width, and length as in Steps 1, 2, and 3 above for each discrete section, compute the total volume, and (2) total the calculated volumes of the two sections. Take the width measurement for Volume₂ (V₂) from the inside edge of the box adjacent to V₂ to the plane separating V₁ and V₂. Compute total volume by adding V₁ and V₂ according to the following formula.

$$\text{Total Volume} = V_1 + V_2$$

Note: 1 Cubic Foot = 1728 Cubic Inches

b. Stacked Firewood

Bulk deliveries of firewood are typically required by law or regulation to be on the basis of cord measurement. The “cord” is defined as the amount of wood contained in a space of 128 ft³ when the wood is ranked and well stowed. The standard dimensions for a cord of wood are 4 ft × 4 ft × 8 ft but wood may be stacked and measured any configuration. See Figure 4. for an illustration of how a cord may be stacked.

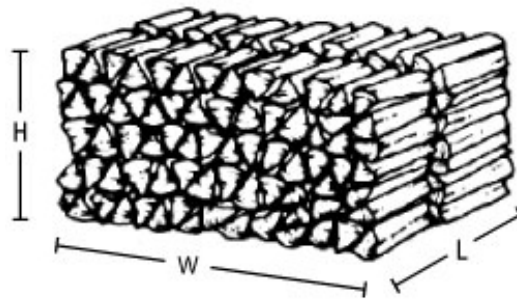


Figure 4. A Cord is 4 ft (Height) × 4 ft (Width) × 8 ft (Length).

- Wood delivered to a consumer: if a delivery ticket or sales receipt is available (these are often required by state regulation) review the delivery ticket or sales receipt and determine the quantity delivered. Identify the wood to be measured and verify that the wood delivered was not mixed with wood that was already present at the location. Also, determine if the delivery was partial or complete (i.e., no additional deliveries are expected) and if any of the delivered wood has been used.
- If necessary stack the firewood in a ranked and well-stowed geometrical shape that facilitates volume calculations (i.e., rectangular). Any voids that will accommodate a piece of wood in the stack shall be deducted from the measured volume.

Note: The length measurements of the individual pieces may be made during the stacking process.

- Determine the average measurements of the stack: the number of measurements for each dimension given below is the minimum that should be taken.

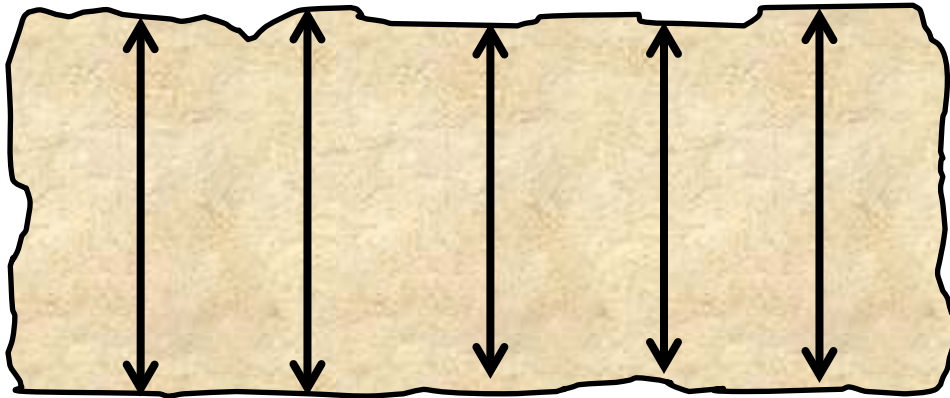
1. **Height of Stack:** A height measurement is the vertical distance between the top edge of a piece of wood in the top row and the bottom edge of a piece of wood on the bottom row. Start at one end of the front of the stack; measure the height of the stack at five equally spaced intervals (e.g., approximately 18 in to 24 in) along the length of stack. If the length of the stack is over 10 ft, take additional height measurements at equally spaced intervals along its length. If the height of the stack varies significantly (e.g., the pieces are stacked in peaks along the length of the stack) take additional height measurements. Calculate and record the average height for the front of the stack. Repeat the same height measurement procedure along the back of the stack and then calculate and record the average height for the back of the stack. Calculate the average height of the stack by averaging the two results. If the wood to be measured is stacked on a slope, take the height measurements at right angles to the slope.

$$\text{Average Height}_{\text{Front}} = (h_1 + h_2 + h_3 + h_4 + h_5) \div 5$$

$$\text{Average Height}_{\text{Back}} = (h_1 + h_2 + h_3 + h_4 + h_5) \div 5$$

$$\text{Average Height of Stack} = \text{Average Height}_{\text{Front}} + \text{Average Height}_{\text{Back}} \div 2$$

Figure 5. Average Height Measurement (front and back).



2. **Length of Stack:** A length measurement is the horizontal distance between the left edge of a piece of wood on the left side of the stack and the right edge of a piece of wood on the opposite side of the stack. Start at either side of the stack; Measure the length of the stack in five equal intervals. Calculate and record the average length. If the length of the stack varies significantly (e.g., the ends of the stack bulge out along the height of the stack), take additional measurements.

Figure 6. Average Length Measurement (front and back).



Calculate and record the average length for the front of the stack. Repeat the length measurement procedure along the back of the stack and then calculate and record the average length for the stack.

$$\text{Average Stack Length}_{\text{Front}} = (l_1 + l_2 + l_3 + l_4 + l_5) \div 5$$

$$\text{Average Stack Length}_{\text{Back}} = (l_1 + l_2 + l_3 + l_4 + l_5) \div 5$$

$$\text{Average Stack Length} = (\text{Average Length}_{\text{Front}} + \text{Average Length}_{\text{Back}}) \div 2$$

3. Stack Width is Equal to the Average Length of Pieces that Make up the Width of the Stack. Refer to Table 1. “Minimum Number of Pieces to be Measured for Length” to determine how many pieces are to be measured. This dimension is calculated by averaging the length of individual pieces of wood in the stack. The wood can be stacked in a single or multiple rows. If the wood is stacked in several rows deep select a representative random sample from each row. If the wood needs to be stacked, measure the pieces prior to stacking. If the wood is already stacked, select the pieces at random by moving up and down and across the stack. If it is necessary to remove the wood from a stack to measure the individual piece lengths, always complete the height and length measurements before disturbing the stacked wood.

- **Individual Piece Length:** Table 3-5. “Minimum Number of Pieces to be Measured for Length” requires that at least 12 pieces of wood be measured for every half cord estimated to be in the stack.
 - If the wood is uniform in shape, take at least one point-to-point measurement along the centerline of the longitudinal axis. (See Table 3-6a. “Determining Piece Length – Uniform Shape” for examples) and record the value.)
 - If the wood is irregularly shaped, take at least three measurements along a straight line between two points crossing solid wood that appear to be the shortest and longest dimensions, and a third at or near the centerline of the piece. (See Table 3-6b. “Determining Piece Length – Irregular Shape” for examples.) Calculate the average of the measurements to determine Average Individual Piece Length (AIPL) of irregularly shaped pieces:

$$\text{AIPL} = (L_1 + L_2 + L_3) \div 3$$

After all pieces are measured total the lengths and divide the total by the number of samples to obtain the Average Piece Length for the stack. To determine Average Piece Length (APL) for the package:

$$\text{APL} = (L_1 + L_2 + L_3 + L_n) \div (\text{Number of Pieces in Sample})$$

4. Calculate Volume:

$$\text{Volume in liters} = (\text{Avg. Height [cm]} \times \text{Avg. Width [cm]} \times \text{Average Piece Length [cm]}) \div 1000$$

$$\text{Volume in cubic feet} = (\text{Avg. Height [in]} \times \text{Avg. Width [in]} \times \text{Average Piece Length [in]}) \div 1728$$

5. Supplemental Information on the Measurement of Stacked Wood.

- Volume of a Triangular Stack of Wood – To calculate the volume of a triangular stack take at least two measurements (one each side) of the height and length, and five measurements of the width of the stack and average each result. Use this formula to calculate the volume. (See Figure 7. “Triangular Stack.”)

$$\text{Volume of Triangular Stack} = (\text{Avg. Height} \times \text{Avg. Length of Base} \times \text{Avg. Width}) \div 2$$

- The volume of the triangular stack may be added to the volume of other stacks.

Figure 7. Triangular Stack.



c. Bundles and Bags

1. Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.

Figure 8. Firewood Bundle and Bag.



Test Note: To test a bag of firewood remove the wood from the bag and form a compact bundle and strap it as shown in Figure 9. “Bundle with Straps Placed 10 cm (4 in)” and follow the procedures for measuring a bundle.

2. Average Area of Bundle Ends: Place a cargo strap around each end of the bundle (or bag of wood) to prevent movement of the pieces during test. Place the straps approximately 10 cm (4 in) from the ends (See Figure 9. Bundle with Straps Placed 10 cm (4 in)” and tighten them securely.



Figure 9. Bundle with Straps Placed 10 m (4 in).

NOTICE: The NCWM must choose one of the following approaches for use in defining the perimeter of a bundle for area determinations.

Approach 1. Tape Defines the Perimeter

Notice: Do not use shrink wrap or packaging to define the perimeter because it can result in inaccurate measurements. If necessary trim the shrink wrap back from the ends to allow for the application of the tape which will be used to define the perimeter.

3. Affix packing tape (i.e., fiber reinforced) or other suitable strap around the perimeter of bundle at the extreme of each end (making sure that it is tautly stretched over all air spaces and that there is minimal deflection.) so that the tape or straps define the perimeters.

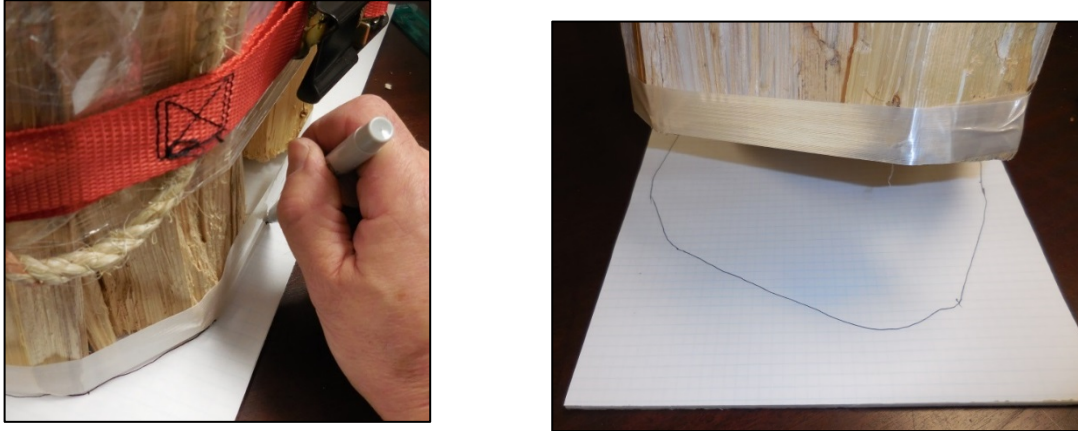


Figure 10. Bundles with Fiber Reinforced Packing Tape around the Perimeter of the Ends.



4. Set one end of the bundle or bag on graph paper large enough to cover the end completely. Draw a line around the outside of the perimeter of the tape on the graph paper using a sharp point marking pen. (See Figure 11.)

Figure 11. Tracing Perimeter of Bundle Outside the Tape.



Approach 2. Wood Defines the Perimeter

NOTICE: Do not use shrink wrap or packaging to define the perimeter because it can result in inaccurate measurements. If necessary, trim the shrink wrap back from the ends to allow for the bundle to sit flat on the graph paper.

3. Set one end of the bundle or bag on graph paper large enough to cover the end completely. Draw a line around the outside of the wood perimeter on the graph paper using a sharp point marking pen (See Figure 12).

Figure 12. Tracing Perimeter of the Wood.



4. Set one end of the bundle or bag on graph paper large enough to cover the end completely. Draw a line around the outside of the wood perimeter on the graph paper using a sharp point marking pen.

For either proposal, follow the remaining steps to determine compliance.

- Count the number of square centimeters or square inches that are enclosed within the perimeter line. Estimate portions of square centimeters or square inches not completely within the perimeter line to the nearest one-quarter square inch. Repeat this process on the opposite end of the bundle or bag.

Examples:

- Using $\frac{1}{4}$ in² graph paper and a ruler with $\frac{1}{4}$ in graduations, large blocks of the area within the perimeter are quickly measured. This is done by using the ruler to determine the length and then width of the area that are each multiplied by 0.25 in ($\frac{1}{4}$ in) to obtain the number of blocks in that dimension. The two values are multiplied to obtain the total number of blocks enclosed in the area. The areas in the partially covered blocks are rounded up or down to the nearest $\frac{1}{4}$ in by enclosing the whole square and placing an x in the partial spaces which are included in the blocks where the area has been rounded up. One reason for squaring the blocks is to simplify the counting.

Use a ruler to count blocks: The rulers in Figure 13. “Perimeter of a Bundle Defined by the Wood” indicate the dimensions of the square are $7\frac{1}{4}$ in \times $7\frac{3}{4}$ in. To obtain the number of blocks divide 7.25 by 0.25 to obtain the number of blocks along the left-hand line ($7.25 \div 0.25 = 29$). The bottom line measures $7\frac{3}{4}$ in so $7.75 \div 0.25 = 31$. Multiply the two values to obtain the total number of squares within the area which is $29 \times 31 = 899$. To obtain square inches divide 899 by 16 (the number of $\frac{1}{4}$ inch blocks in a square inch) or $899 \div 16 =$ for area of 56.19 in² for this area of the bundle.

Continue to divide the area into blocks to make counting easier and then count the blocks in the remaining areas and sum these values to obtain the total. See the example in Figure 13. The total number of blocks was calculated by adding:

$$46 + 145 + 899 + 25 + 8 + 54 = 1177 \text{ squares} \div 16 = 73.56 \text{ in}^2 \text{ for this end of the bundle.}$$

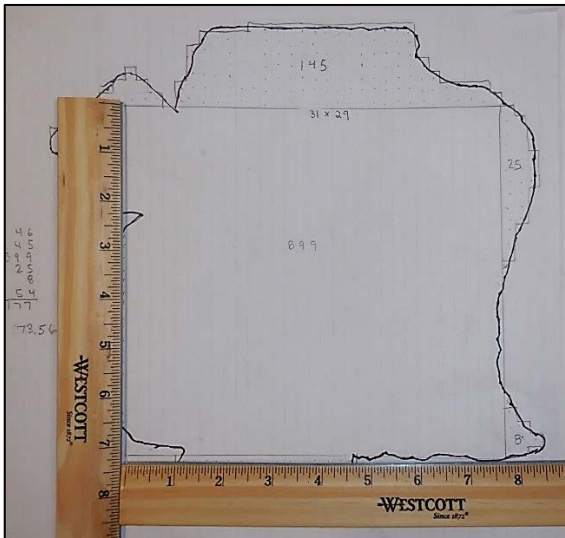
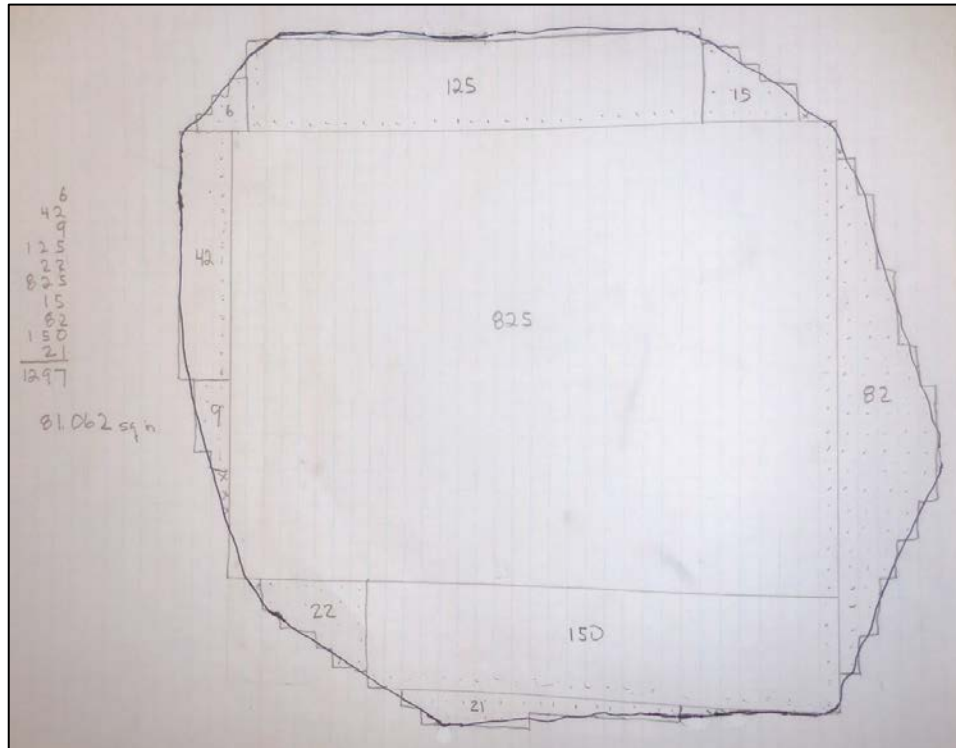


Figure 13. Perimeter of a Bundle Defined by the Wood.

- Figure 14, “Perimeter of a Bundle Defined by Tape or a Strap” provides another example of how determining the area can be simplified by “blocking” the areas out and calculating the number of blocks. For the example, in Figure 14 the total number of blocks was calculated by adding:

$$6 + 42 + 9 + 125 + 22 + 825 + 15 + 82 + 150 + 21 = 1297 \text{ squares} \div 16 = 81.06 \text{ in}^2 \text{ for this end of the bundle.}$$

Calculate the Average Area: $\text{Average Area} = (\text{Area}_1 + \text{Area}_2) \div 2$

Figure 14. Perimeter of a Bundle Defined by Tape or a Strap.

6. Average length of the pieces of wood: Individual Piece Length – Remove the wood from the package and measure the length of each piece of wood. (See Table 3-5. “Minimum Number of Pieces to be Measured for Length” for the number of pieces to be measured.) If the piece of wood is uniform in shape, take at least one point-to-point measurement along the centerline of the longitudinal axis. (See Table 2a. “Determining Piece Length — Uniform Shapes” for examples.) and record the value.

If the wood is irregularly shaped, take at least three measurements along a straight line between two points crossing solid wood that appear to be the shortest and longest dimensions, and a third measurement on or near the centerline of the piece. (See Table 2b. “Determining Piece Length – Irregular Shapes” for examples) Calculate the average of the measurements to obtain the Average Individual Piece Length and record the length of the piece.

To determine Average Individual Piece Length (AIPL) of irregularly shaped pieces:

$$AIPL = (L_1 + L_2 + L_3) \div 3$$

Note: If length measurements are made in millimeters divide the total by 10 to obtain centimeters.

After all pieces are measured, total the lengths and divide that total by the number of samples to obtain the Average Piece Length for the package.

To determine Average Piece Length (APL) for the package:

$$APL = (L_1 + L_2 + L_3 + \dots L_n) \div (\text{Number of Pieces in Sample})$$

7. Use the average values for height, width, and length to calculate the volume of wood in the bundle or bag.

- Calculate Volume:

$$\text{Volume in liters} = (\text{Average Area [cm}^2\text{]} \times \text{Average Length [cm]}) \div 1000$$

$$\text{Volume in cubic feet} = (\text{Average Area [in}^2\text{]} \times \text{Average Length [in]}) \div 1728$$

Note: 1 ft³ = 1728 in³

3.14.3. Evaluation of Results

Follow Section 2.3.7. “Evaluate for Compliance” to determine lot conformance.

Note: Specified in Appendix A, Table 2-10. “Exceptions to the Maximum Allowable Variations for Textiles, Polyethylene Sheeting and Film, Mulch and Soil Labeled by Volume, Packaged Firewood and Stove Wood labeled by Volume, and Packages Labeled by Count with 50 Items or Fewer.”

Table 2-10. Exceptions to the Maximum Allowable Variations for Textiles, Polyethylene Sheeting and Film, Mulch and Soil Labeled by Volume, Packaged Firewood and Stove Wood Labeled by Volume, and Packages Labeled by Count with 50 Items or Fewer, and Specific Agricultural Seeds Labeled by Count.	
Maximum Allowable Variations (MAVs)	
<u>Packaged Firewood and Stove Wood Labeled by Volume</u>	<p><u>25 % of labeled quantity</u></p> <p><u>Note: Use Table 2-5 “Maximum Allowable Variations for Packages Labeled by Weight” for packaged artificial and compressed fireplace logs and stove wood pellets and chips labeled by weight.</u></p>

Field Audit Procedure

A circumference method can be used for quickly identifying potentially short measure bundles. The procedure is based on measuring the circumference of the package ends and calculating the areas without using graph paper. While the circumference method is a quick way to determine the areas, it is also less accurate than the graph paper method so it should not be used for official inspections. If this method is adopted, data will be collected for use in developing additional guidance on the use of this procedure for auditing purposes. The data collected will, among other factors, compare test results obtained using the reference procedure versus this auditing method.

Circumference Test Method

1. After the bundle or bag is secured, use a flexible measuring tape to measure the circumference around each end of the bundle or bag of firewood. Using one movement, extend the measuring tape around the end of the bundle or bag to obtain its circumference. The tape must be pulled tight. If the wood at the ends of a bag or bundle is not accessible due to plastic wrapping, the wrapping should be moved away from the ends so the measuring tape can be placed tightly around the bundle so circumference measurements can be taken.

Figure 15. Strapping the End of a Bundle.

At the Point of the Arrow the Circumference of the Bundle is 2 ft 10 in (34 in)

Note: The tape used has a blank end so the “0” line is visible immediately under the 10 in mark.

2. Calculate the Average Circumference:

$$\text{Average Circumference} = (\text{circumference}_1 + \text{circumference}_2) \div 2$$

For example: If Circumference_1 is 34 in and Circumference_2 is 33.75 in, then:

$$\text{Average Circumference: } 34 + 33.75 \div 2 = 33.875 \text{ in}$$

3. Calculate the radius:

$$\text{radius} = \text{Average Circumference} \div 2\pi$$

$$\text{Where: } \pi = 3.1415$$

Example:

$$\text{radius} = 33.875 \div (2 \times \pi \text{ or } 6.283) = 5.39 \text{ in}$$

4. Calculate the Average Area:

$$\text{Average Area} = \pi r^2$$

Example:

$$\text{Average Area} = 3.1415 \times 5.39^2 \text{ (or } 29.06) = 91.3 \text{ in}^2$$

5. Calculate the Average Length of the Pieces:

Average length of the pieces of wood - Measure the length of several pieces of wood in the bundle or bag. Measurements are to be taken from center to center at the end of each piece.

Then calculate the average:

$$\text{Average length} = \text{sum of the length of all pieces} \div \text{number of pieces}$$

6. Calculate Volume:

$$\text{Volume in liters} = (\text{Average area [cm}^2\text{]} \times \text{Average Length [cm]}) \div 1000$$

$$\text{Volume in cubic feet} = (\text{Average Area [in}^2\text{]} \times \text{Average Length [in]}) \div 1728$$

Example:

Assume the average length of the pieces is 16 in and Average Area is 91.3 in²

$$\text{Bundle Volume} = 91.3 \times 16 = 1460 \text{ in}^3 \text{ or } 0.84 \text{ ft}^3$$

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If results indicate that the sample fails conduct further testing using the reference test procedure for bundles and bags. Do not take any legal action based solely on this audit procedure.

Appendix B.

NIST Handbook 133 (2015) Current Firewood Test Procedures

3.14. Firewood – Volumetric Test Procedure for Packaged Firewood with a Labeled Volume of 113 L [4 ft³ or Less)

Unless otherwise indicated, take all measurements without rearranging the wood or removing it from the package. If the layers of wood are crosshatched or not ranked in discrete sections in the package, remove the wood from the package, re-stack, and measure accordingly.

3.14.1. Test Equipment

- Linear Measure. Take all measurements in increments of 0.5 cm (³/₁₆ in) or less and round up.
- Binding Straps. Binding straps are used to hold wood bundles together if the bundles need to be removed from the package/wrapping material.
- Tracing paper
- Graduated template in square centimeters or square inches

3.14.2. Test Procedures

d. Boxed Firewood

1. Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.
2. Open the box to determine the average height of wood within the box; measure the internal height of the box. Take three measurements (record as “d₁, d₂, . . etc.”) along each end of the stack. Measure from the bottom of a straightedge placed across the top of the box to the highest point on the two outermost top pieces of wood and the center-most top piece of wood. Round measurements down to the nearest 0.5 cm (¹/₈ in). If pieces are obviously missing from the top layer of wood, take additional height measurements at the highest point of the uppermost pieces of wood located at the midpoints between the three measurements on each end of the stack. Calculate the average height of the stack by averaging these measurements and subtracting from the internal height of the box according to the following formula.

$$\text{Average Height of Stack} = (\text{Internal Height of Box}) - (\text{sum of measurements}) \div (\text{number of measurements})$$

3. Determine the average width of the stack of wood in the box by taking measurements at three places along the top of the stack. Measure the inside distance from one side of the box to the other on both ends and in the middle of the box. Calculate the average width.

$$\text{Average Width} = (W_1 + W_2 + W_3) \div (3)$$

4. To determine the average length of the pieces of wood, remove the wood from the box and select the five pieces with the greatest girth. Measure the length of each of the five pieces from center-to-center. Calculate the average length of the five pieces.

$$\text{Average Length} = (L_1 + L_2 + L_3 + L_4 + L_5) \div (5)$$

- Calculate the volume of the wood within the box. Use dimensions for height, width, and length.

$$\text{Volume in liters} = (\text{height in cm} \times \text{width in cm} \times \text{length in cm}) \div (1000)$$

$$\text{Volume in cubic feet} = (\text{height in inches} \times \text{width in inches} \times \text{length in inches}) \div (1728)$$

- For boxes of wood that are packed with the wood ranked in two discrete sections perpendicular to each other, calculate the volume of wood in the box as follows: (1) determine the average height, width, and length as in 1, 2 and 3 above for each discrete section, compute total volume, and (2) total the calculated volumes of the two sections. Take the width measurement for Volume 2 (V_2) from the inside edge of the box adjacent to V_2 to the plane separating V_1 and V_2 . Compute total volume by adding Volume 1 (V_1) and V_2 according to the following formula.

$$\text{Total Volume} = V_1 + V_2$$

e. Crosshatched Firewood.

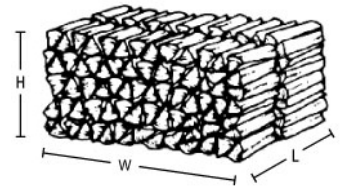


Figure 3-3. Stacked Firewood

- Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.
- Stack the firewood in a ranked and well-stowed geometrical shape that facilitates volume calculations (i.e., rectangular).
- Determine the average measurements of the stack:

Note: The number of measurements for each dimension given below is the minimum that should be taken.

- **Height:** Start at one end of the stack; measure the height of the stack on both sides at four equal intervals. Calculate and record the average height.
- **Length:** Start at the base of the stack; Measure the length of the stack in four equal intervals. Calculate and record the average length.
- **Width:** Select the five pieces with the greatest girth. Measure the length of the pieces, calculate and record the average piece length.

- Calculate Volume:

$$\text{Volume in liters} = (\text{Avg. Height [cm]} \times \text{Avg. Width [cm]} \times \text{Avg. Length [cm]}) \div 1000$$

$$\text{Volume in cubic feet} = (\text{Avg. Height [in]} \times \text{Avg. Width [in]} \times \text{Avg. Length [in]}) \div 1728$$

f. Bundles and Bags of Firewood**Figure 3-4. Bundle of Firewood**

- Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.
- Average area of ends: secure a strap around each end of the bundle or bag of wood to prevent movement during testing and to provide a definite perimeter. Use two or more straps to secure the wood.
- Set one end of the bundle or bag on tracing paper large enough to cover the end completely. Draw a line around the perimeter of the bundle or bag on the tracing paper.
- Transfer the tracing paper to a template graduated in square centimeters or square inches. Count the number of square centimeters or square inches that are enclosed within the perimeter line. Estimate portions of square centimeters or square inches not completely within the perimeter line to the nearest one-quarter square inch.
- Repeat this process on the opposite end of the bundle or bag.
- Calculate the Average Area:

$$\text{Average Area} = (\text{Area 1} + \text{Area 2}) \div 2$$

- Average length of the pieces of wood – select the five pieces with the greatest girth and measure the length of the pieces. Calculate the average length of the pieces of wood:

$$\text{Average Length} = (L_1 + L_2 + L_3 + L_4 + L_5) \div 5$$

- Calculate Volume:

$$\text{Volume in liters} = (\text{Average Area [cm}^2\text{]} \times \text{Average Length [cm]}) \div 1000$$

$$\text{Volume in cubic feet} = (\text{Average Area [in}^2\text{]} \times \text{Average Length [in]}) \div 1728$$

1.14.3. Evaluation of Results.

Follow Section 2.3.7. “Evaluate for Compliance” to determine lot conformance.

Note: Specified in Appendix A, Table 2-10. “Exceptions to the Maximum Allowable Variations for Textiles, Polyethylene Sheeting and Film, Mulch and Soil Labeled by Volume, Packaged Firewood, and Packages Labeled by Count with 50 Items or Fewer.” – Maximum allowable variations for individual packages are not applied to packages of firewood.

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Appendix C.
Current NIST Handbook 130 (2015) Uniform Method of Sale of
Commodities Regulation
Section 2.4. Fireplace and Stove Wood.

2.4. Fireplace and Stove Wood. – For the purpose of this regulation, this section shall apply to the sale of all wood, natural and processed, for use as fuel or flavoring.

(Amended 1999)

2.4.1. Definitions.

2.4.1.1. Fireplace and Stove Wood. – Any kindling, logs, boards, timbers, or other wood, natural or processed, split or not split, advertised, offered for sale, or sold for use as fuel.

(Amended 1991)

2.4.1.2. Cord. – The amount of wood that is contained in a space of 128 ft³ when the wood is ranked and well stowed. For the purpose of this regulation, “ranked and well stowed” shall be construed to mean that pieces of wood are placed in a line or row, with individual pieces touching and parallel to each other, and stacked in a compact manner.

2.4.1.3. Representation. – This shall be construed to mean any advertisement, offering, invoice, or the like that pertains to the sale of fireplace or stove wood.

2.4.1.4. Flavoring Chips. – Any kindling, logs boards, timbers, or other natural or processed, split or unsplit wood that is advertised, offered for sale, or sold for flavoring smoked or barbecued foods.

(Added 1999)

2.4.2. Identity. – A representation may include a declaration of identity that indicates the species group (for example, 50 % hickory, 50 % miscellaneous softwood). Such a representation shall indicate, within 10 % accuracy, the percentages of each group.

2.4.3. Quantity. – Fireplace and stove wood shall be advertised, offered for sale, and sold only by measure, using the term “cord” and fractional parts of a cord or the cubic meter, except that:

(a) **Packaged natural wood.** – Natural wood offered for sale in packaged form in quantities less than 0.45 m³ (1/8 cord or 16 ft³) shall display the quantity in terms of:

- (1) liters, to include fractions of liters; or
- (2) cubic inches, if less than one cubic foot; or
- (3) cubic feet, if one cubic foot or greater, to include fractions of a cubic foot.

(Amended 2010)

(b) **Artificial compressed or processed logs.** – A single fireplace log shall be sold by weight, and packages of such individual logs shall be sold by weight plus count.

(c) **Stove wood pellets or chips.** – Pellets or chips not greater than 15 cm (6 in) in any dimension shall be sold by weight. This requirement does not apply to flavoring chips.

(Amended 1976 and 1991)

(d) **Flavoring chips.** – Flavoring chips offered for sale in packaged form in quantities less than 0.45 m³ (1/8 cord or 16 ft³) shall display the quantity in terms of:

- (1) liters, to include fractions of liters; or
- (2) cubic inches, if less than one cubic foot; or
- (3) cubic feet, if one cubic foot or greater, to include fractions of a cubic foot.

(Added 1998) (Amended 2010)

Note: In determining the appropriate Method of Sale, a clear distinction must be made as to whether the wood is being sold primarily as fuel (some wood is sold as fuel but flavoring is a byproduct) or strictly as a wood flavoring.

(Added 2010)

2.4.4. Prohibition of Terms. – The terms “face cord,” “rack,” “pile,” “truckload,” or terms of similar import shall not be used when advertising offering for sale, or selling wood for use as fuel.

2.4.5. Delivery Ticket or Sales Invoice. – A delivery ticket or sales invoice shall be presented by the seller to the purchaser whenever any non-packaged fireplace or stove wood is sold. The delivery ticket or sales invoice shall contain at least the following information:

- (a) the name and address of the vendor;
- (b) the name and address of the purchaser;
- (c) the date delivered;
- (d) the quantity delivered and the quantity upon which the price is based, if this differs from the delivered quantity;
- (e) the price of the amount delivered; and
- (f) the identity, in the most descriptive terms commercially practicable, including any quality representation made in connection with the sale.

(Added 1975)

Appendix D.

Proposed Test Procedure Submitted to NIST by California Hot Wood Inc.

For more information contact: Mark Anaforian
California Hotwood, Inc.
Corporate Office
5920 E. Live Oak Road
Lodi, CA 95240
mark@hotwood.com
(209) 333-5480

3.14. Firewood – Volumetric Test Procedure for Packaged Firewood with a Labeled Volume of 113 L [4 ft³] or Less)

Unless otherwise indicated, take all measurements without rearranging the wood or removing it from the package. If the layers of wood are crosshatched or not ranked in discrete sections in the package, remove the wood from the package, re-stack, and measure accordingly.

3.14.1. Test Equipment:

a. Boxed Firewood

- Straight Edge
- Linear Tape Measure

b. Crosshatched Firewood

- Measuring Tape

c. Bundles and Bags of Firewood

- Binding Straps – Two binding straps, 1 in to 2 in wide with connecting buckles and long enough to easily encircle the Bundle or Bag to secure the wood during testing.
- Flexible Measuring Tape

Test Equipment Linear Measure. Take all measurements in increments of 0.5 cm (³/₁₆ in) or less and round up.

- ~~Binding Straps. Binding straps are used to hold wood bundles together if the bundles need to be removed from the package/wrapping material.~~
- ~~Tracing paper~~
- ~~Graduated template in square centimeters or square inches~~

3.14.2. Test Procedures

g. Boxed Firewood

8. Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.

Open the box and if the box contains a bundle or bag of firewood remove the bundle or bag and calculate the volume in accordance with Section C (Bundles and Bags of Firewood).

9. Open the box to determine the average height of wood within the box; measure the internal height of the box. Take three measurements (record as “d₁, d₂, . . . etc.”) along each end of the stack. Measure from the bottom of a straightedge placed across the top of the box to the highest point on the two outermost top pieces of wood and the center-most top piece of wood. Round measurements down to the nearest 0.5 cm (1/8 in). If pieces are obviously missing from the top layer of wood, take additional height measurements at the highest point of the uppermost pieces of wood located at the midpoints between the three measurements on each end of the stack. Calculate the average height of the stack by averaging these measurements and subtracting from the internal height of the box according to the following formula.

$$\text{Average Height of Stack} = (\text{Internal Height of Box}) - (\text{sum of measurements}) \div (\text{number of measurements})$$

10. Determine the average width of the stack of wood in the box by taking measurements at three places along the top of the stack. Measure the inside distance from one side of the box to the other on both ends and in the middle of the box. Calculate the average width.

$$\text{Average Width} = (W_1 + W_2 + W_3) \div 3$$

11. To determine the average length of the pieces of wood, remove the wood from the box and select the five pieces with the greatest girth. Measure the length of each of the five pieces from center to center. Calculate the average length of the five pieces.

$$\text{Average Length} = (L_1 + L_2 + L_3 + L_4 + L_5) \div 5$$

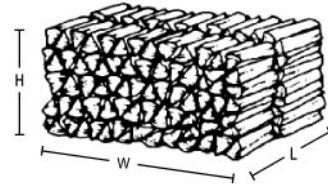
12. Calculate the volume of the wood within the box. Use dimensions for height, width, and length.

$$\text{Volume in liters} = (\text{height in cm} \times \text{width in cm} \times \text{length in cm}) \div 1000$$

$$\text{Volume in cubic feet} = (\text{height in inches} \times \text{width in inches} \times \text{length in inches}) \div 1728$$

13. For boxes of wood that are packed with the wood ranked in two discrete sections perpendicular to each other, calculate the volume of wood in the box as follows: (1) determine the average height, width, and length as in 1, 2 and 3 above for each discrete section, compute total volume, and (2) total the calculated volumes of the two sections. Take the width measurement for Volume 2 (V₂) from the inside edge of the box adjacent to V₂ to the plane separating VR₁ and V₂. Compute total volume by adding Volume 1 (V₁) and V₂ according to the following formula.

$$\text{Total Volume} = V_1 + V_2$$

h. Crosshatched Firewood**Figure 3-3. Stacked Firewood**

1. Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.
2. Stack the firewood in a ranked and well-stowed geometrical shape that facilitates volume calculations (i.e., rectangular).
3. Determine the average measurements of the stack:

Note: The number of measurements for each dimension given below is the minimum that should be taken.

- **Height:** Start at one end of the stack; measure the height of the stack on both sides at four equal intervals. Calculate and record the average height.
 - **Length:** Start at the base of the stack; Measure the length of the stack in four equal intervals. Calculate and record the average length.
 - **Width:** Select the five pieces with the greatest girth. Measure the length of the pieces, calculate and record the average piece length.
4. Calculate Volume:

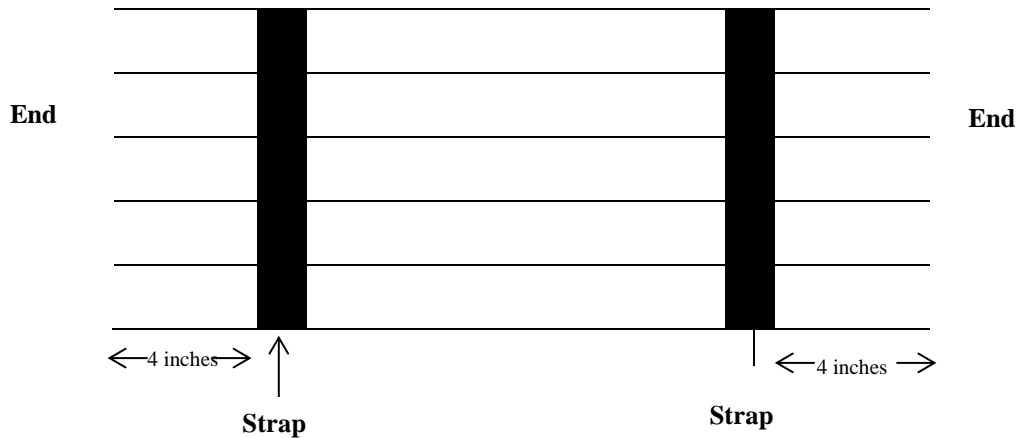
$$\text{Volume in liters} = (\text{Avg. Height [cm]} \times \text{Avg. Width [cm]} \times \text{Avg. Length in [cm]}) \div 1000$$

$$\text{Volume in cubic feet} = (\text{Avg. Height [in]} \times \text{Avg. Width [in]} \times \text{Avg. Length [in]}) \div 1728$$

i. Bundles and Bags of Firewood**Figure 3-4. Bundle of Firewood**

- Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; and select a random sample.

- Average area of ends: secure a strap around each end of the bundle or bag of wood to prevent movement during testing. Each strap is to be placed approximately 4 inches from each end of the Bundle or Bag. See Diagram.



and to provide a definite perimeter. Use two or more straps to secure the wood.

- ~~Set one end of the bundle or bag on tracing paper large enough to cover the end completely. Draw a line around the perimeter of the bundle or bag on the tracing paper.~~
- ~~Transfer the tracing paper to a template graduated in square centimeters or square inches. Count the number of square centimeters or square inches that are enclosed within the perimeter line. Estimate portions of square centimeters or square inches not completely within the perimeter line to the nearest one quarter square inch.~~
- ~~Repeat this process on the opposite end of the bundle or bag.~~
- ~~Calculate the Average Area:~~

$$\text{Average Area} = (\text{Area 1} + \text{Area 2}) \div 2$$

- ~~Average length of the pieces of wood—select the five pieces with the greatest girth and measure the length of the pieces. Calculate the average length of the pieces of wood:~~

$$\text{Average Length} = (L_1 + L_2 + L_3 + L_4 + L_5) \div 5$$

- ~~Calculate Volume:~~

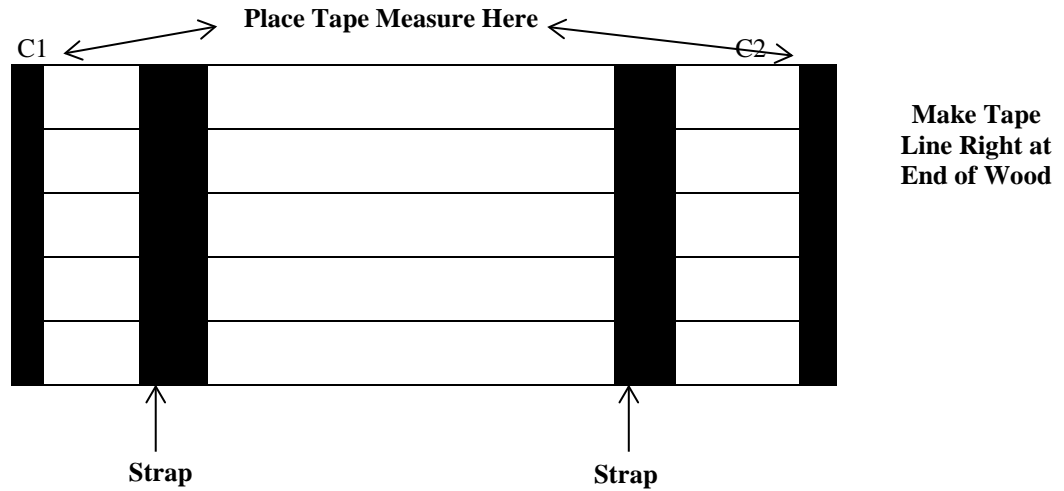
$$\text{Volume in liters} = (\text{Average Area [cm}^2\text{]} \times \text{Average Length [cm]}) \div 1000$$

$$\text{Volume in cubic feet} = (\text{Average Area [in}^2\text{]} \times \text{Average Length [in]}) \div 1728$$

3.14.3. Evaluation of Results

~~Follow Section 2.3.7. “Evaluate for Compliance to determine lot conformance.”~~

After the Bundle or Bag is secured and utilizing a flexible measuring tape, measure around each end of the bundle or bag of firewood with one movement by extending the measuring tape around the entire end of the bundle or bag in order to obtain a circumference. If the wood at the ends of a bag or bundle is not accessible due to plastic wrapping, then the flexible measuring tape is placed tightly around the outside of the plastic wrapping and circumference measurements are taken. See Diagram:



Calculate the average Circumference

$$\text{Average Circumference} = (\text{circumference 1} + \text{circumference 2}) / 2$$

Calculate the Average Area using the average circumference (from above)

$$\text{AREA} = \pi R^2$$

$$R = C/2\pi$$

$$\pi = 3.1415$$

Calculate the Average Length

Average length of the pieces of wood - Measure the length of each piece of wood in the bundle or bag

Measurements are to be taken from center to center at the end of each piece. Then calculate their average:

$$\text{Average length} = \text{sum of all pieces} / \text{number of pieces.}$$

Calculate Volume:

$$\text{Volume in liters} = (\text{Average area [cm}^2\text{]} \times \text{Average Length [cm]}) / 1000$$

$$\text{Volume in cubic feet} = (\text{Average Area [in}^2\text{]} \times \text{Average Length}) / 1728$$

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Appendix E. Resources on Wood Measurement

All Resources Accessed Online during April – July 2015

1. “A Guide to Buying and Measuring Firewood”
www.novascotia.ca/natr/publications/energy/buyfirewood.pdf
2. “A Cord of Wood” California News Station with Weights and Measures Officials
www.bing.com/videos/search?q=measuring+a+cord+of+firewood&FORM=VIRE4#view=detail&mid=B406FD46F5EE762A5ECFB406FD46F5EE762A5ECF
3. National Forest Log Scaling Handbook
www.fs.fed.us/fmnc/measure/handbooks/index.shtml
4. Firewood Test Procedures of the California Division of Measurement Standards:
www.cdfa.ca.gov/dms/programs/qc/QCFirewoodRegs.pdf
5. Figuring Firewood by the Cord, Anyway You Stack It
www.lakebarcroft.org/association/newsletters-reports/firewood-1
www.lakebarcroft.org/association/newsletters-reports/firewood-2
www.lakebarcroft.org/association/newsletters-reports/firewood-3
6. Criss-Cross Stacking
pinnaclefirewood.com/crissx.php
7. Maine Firewood Fact Sheet
www.maine.gov/tools/whatsnew/index.php?topic=Agriculture+News&id=4554&v=Article
8. Minnesota Statute Defining a Cord
www.revisor.mn.gov/statutes/?id=239.33
9. Minnesota – Buying Firewood
mn.gov/commerce/weights-and-measures/images/BuyingFirewood.pdf
10. National Firewood Association
nationalfirewoodassociation.org/
11. Oklahoma Cooperative Extension Service NREM-9440 – Firewood: How to Obtain, Measure, Season, and Burn
pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-2507/NREM-9440web.pdf
12. Idaho Log Scaling Manual
[www.ibsp.idaho.gov/IdahoLogScalingManual-2008%20Edition%20\(print\).pdf](http://www.ibsp.idaho.gov/IdahoLogScalingManual-2008%20Edition%20(print).pdf)
13. Nova Scotia Log Scaling Manual
novascotia.ca/natr/forestry/scaling/pdf/ScalingManual.pdf
14. British Columbia Log Scaling Manual – SI
www.for.gov.bc.ca/hva/manuals/scaling.htm

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15. WoodHeat.org

www.woodheat.org/index.php