Report of the Professional Development Committee (PDC)[1]

Agatha Shields, Chairman
Franklin County Weights and Measures
Columbus, Ohio

Reference
Key Number

400 INTRODUCTION

This is the report of the Professional Development Committee (hereinafter referred to as the "Committee" or PDC) for the 92nd Annual Meeting of the National Conference on Weights & Measures (NCWM). This report is based on the Interim Report offered in NCWM Publication 16, testimony heard at public hearings, comments received from the 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 informational items presented below were adopted as presented when the Committee's report was approved.

Table A identifies the agenda items in the Report by Reference Key Number, Item Title, and Page Number. Item numbers are those assigned in the Interim Meeting Agenda. A voting item is indicated with a "**V**" after the item number. An item marked with an "**I**" after the reference key number is an information item. An item marked with a "**D**" after the reference key number is a developing item. The developing designation indicates an item has merit; however, the item was returned to the submitter for further development before any action can be taken at the national level. Table B lists the Appendix to the Agenda.

Table A
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[1] Note: Report content is published as received with the exception of minor editorial and format changes.

Table C
Voting Results

Reference Key Number	*House of State Representatives*		*House of Delegates*		*Results*
	Yeas	*Nays*	*Yeas*	*Nays*	
402-2	41	0	41	0	Passed

Details of All Items
(In Order by Reference Key Number)

401 EDUCATION

401-1 I National Training Program (NTP)

Source: The Committee (2003)

Background: The Board of Directors established the Committee at the 2003 NCWM Annual Meeting in Sparks, Nevada. The first critical charge given to the Committee was to develop a National Weights and Measures Professional Development Program in cooperation with its partners including:

- State and local weights and measures departments;
- Private industry at all levels; and
- Technical advisors from NIST Weights and Measures Division and Measurement Canada

The NTP will address the following tasks in order of priority:

(a) The education and professional development of weights and measures officials and the promotion of uniformity and consistency in the application of weights and measures laws and regulations;
(b) The education of industry personnel with regard to weights and measures laws and regulations, including all areas from device manufacturer to service technician;
(c) Quality standards for weights and measures activities and programs;
(d) Safety awareness for weights and measures-related activities; and
(e) Development of a firm partnership with the state and local weights and measures departments, private industry, and the NCWM. It is critical that NIST Weights and Measures Division (NIST WMD) partner with the Committee, and, where appropriate, provide technical advice. Measurement Canada is also encouraged to participate in Committee activities.

The Committee began developing the concept of a National Certification Program for weights and measures officials during the 2004 NCWM Annual Meeting. The Committee's continued work on this issue is reported in Item 401-4 of this report.

The Committee's overall strategic direction is summarized in Appendix A.

Discussion: The regions continue to support the proposed direction of the NTP. In addition, the Western Weights and Measures Association (WWMA) suggested that the PDC establish an action plan and timeline to identify those tasks which must be completed for the establishment of the NTP. The regions have submitted curricula for several topic areas, and the PDC is in the process of developing curriculum guidelines and certification models for review by the jurisdictions.

The Committee reviewed the WWMA's suggestion to establish an action plan and timeline. The Committee agreed that timelines need to be established; however, the Committee believes it is premature to establish timelines for the tasks until the curricula for the core areas are completed.

401-2 I Create a Curriculum Plan

Source: The Committee (2003)

Background: The Committee agreed the following steps must be addressed for the NTP to be viable:

(a) Develop and maintain a curriculum plan in cooperation with our partners that establishes uniform and consistent training objectives for weights and measures professionals in all fields and at all levels.
(b) Develop objectives of the curriculum plan representative of a consensus of our partners and organize those objectives by scope, sequence, and level of complexity to assist those developing the curriculum materials.

The development of a training program should follow the steps below:

(a) Study training programs of state and local weights and measures jurisdictions and outside agencies.
(b) Establish knowledge goals for weights and measures officials and administrators.
(c) Develop curriculum based upon the findings and results of steps (a) and (b) above.
    (1) Coordinate the development of curriculum materials to be used in the delivery of training (i.e., lesson plans, digital presentations, slide shows, testing guides, etc.) using a variety of formats (e.g., self-study, traditional instruction).
    (2) Consider creating a network of interested parties to establish priorities, share training resources, foster cooperation to reduce redundancy, and promote uniformity and consistency.
(d) Develop examinations, quizzes, or tests based on the content of the materials developed under step (c)(1).
(e) Gather and share information from trainers on highly effective training techniques, visual aids, and other materials that have been used to facilitate learning. Use as many of these resources as available.

The Committee reviewed the notes from the NIST-sponsored administrators' workshops held in Denver, Colorado, and Baltimore, Maryland, and plans to explore many of these ideas.

During the 2004 Annual Meeting, the Committee discussed the idea of using work groups to develop courses that could be used for self-study or for traditional classroom settings. The Committee agreed that the initial priority should be high profile devices (e.g., motor-fuel dispensers and retail computing scales). The Committee studied the survey results to focus on the memberships' needs and desires.

There were several recommendations submitted by the regional associations. The CWMA commented that the Committee should draw upon other sources, both external and internal, for establishment of curricula. The WWMA recommended the Committee review current training courses on the NIST website at http://www.nist.gov/owm to establish and identify various levels of training. The WWMA also suggested the Committee review and update all existing NIST training courses, and recommended that WMD post them on the NIST website. The Northeast Weights and Measures Association (NEWMA) recommended the Committee set standards for education that include provisions for field tests.

During the 2005 Interim Meeting, recommendations were made to develop course curriculum with specific learning objectives and development of tests to determine mastery of the learning objectives. Training responsibility to meet the objectives would rest with the jurisdictions. It was recommended that the Committee oversee development of the tests to be administered for each course. Upon successful testing, certificates would be issued. Protocol for preserving the integrity of the tests and the testing system would need to be developed.

Following the 2006 Annual Meeting, the PDC forwarded to the regional associations a small-scale example format developed in 2002 by the prior Administration and Public Affairs Committee (A&P) and the documents provided by New York as example formats. These documents were also posted to the PDC page on the NCWM website. The regional associations began work on their designated curriculum plans. The regional committee responsible for developing the curriculum segment was reminded to focus on a level of competency expected of the entry-level inspector. As the regions developed the curriculum, they were encouraged to begin development of the written certification questions needed to verify that the curriculum goals were met.

Discussion: The Committee thanks the following regions for submitting curricula for consideration: the Southern Weights and Measures Association (SWMA), Class III and III L scales; WWMA, Retail Motor-fuel Dispensers; the NEWMA, Small Scales; and CWMA, Package Checking. Based on comments from several of the regions and its own assessment, the Committee decided that it is essential to have a standardized format to ensure the end product is uniform. Based on a collective review of samples received, the Committee is working to create a sample template and example for regions to use in developing other curricula. The Committee also supports the general approach used in the "California Core Competency Model for the First Course in Accounting," which provides a model for improving the quality of education in a select discipline. The Committee plans to include this information as a general guideline for the regions to use as they develop other curriculum topics. In addition, the Committee will ask those jurisdictions that have already submitted curricula to make revisions based on the Committee's recommendations for formatting.

The Committee prioritized those subjects of interest based on survey results collected in 2004. The four main topics of interest are: Retail Motor-fuel Dispensers, Small-capacity Scales, Handbook 44, and Safety. The Committee is pleased that the work in progress covers the first three of these main areas of interest. Regional workgroups are encouraged to work with the PDC on the next highest prioritized subjects. The Committee is also pursuing efforts in conjunction with Item 402-1 of its agenda to respond to the interest expressed in safety training. Since the needs of weights and measures officials and service companies change over time, the Committee also encourages continued input from these groups to ensure that changing priorities are addressed as the Committee's work proceeds.

The Committee is working on a curriculum package to send to the regions, which will include the following:

- Cover Memorandum (guide to curriculum development);
- California Accounting Core Competency Guide Model (emphasis on the Introduction and the three Appendices);
- NCWM Curriculum Template (curriculum guideline);
- NCWM Sample Curriculum (examples of desired format);
- Guide to Writing Test Questions (including examples);
- National Training Curriculum Outline (updated from 2004 version); and
- NCWM Curriculum Work Plan (2007)

The Cover Memorandum, California Accounting Core Competency Guide Model, and Guide to Writing Test Questions are included in Appendix B.

The Committee is working to agree upon and refine the model template and examples which will be posted to the PDC page of the NCWM website as soon as they are complete.

After the Committee reviews the revised curricula, they will be forwarded to the State Certification Coordinators (SCC) and selected organizations, industry, or individuals for review and comment.

At the NCWM Annual Meeting, the Committee revisited the original "National Training Curriculum Outline" from its 2004 NCWM final report. The Committee prepared an accompanying "NCWM Curriculum Work Plan," which is intended to assist in the management of curriculum development. The original outline and the new accompanying Work Plan are included in Appendices C and D. The Committee is making revisions to the original curriculum outline to match the Work Plan and will include the revised version in the Curriculum Package. The Committee will agree upon a final format for the curriculum and will distribute the template along with the complete package to the development team in each region following the 2007 Annual Meeting.

401-3 D Instructor Improvement

Source: The Committee (2003)

Background: One Committee goal is to work with all interested parties to improve the competence of instructors and the uniformity of curriculum delivery.

The Committee concluded there are two parts to the instructor improvement strategy. The first part is educating trainers in effective methods of instruction. A variety of courses and training methods are available from state, federal, and private sources to develop instructional skills and techniques. Jurisdictions are encouraged to seek out and send selected staff to participate in this type of training.

The second area of instructor improvement is to provide trainers with the knowledge of the technical aspects of all types of devices. The Committee believes that NIST WMD continued leadership and participation is a valuable asset in this area and recommends that WMD continue to provide the technical training for instructors. The Committee invites and looks forward to working with WMD as a resource to consult with trainers and to work with the Committee to keep the curricula current as changes to the handbooks occur, new technologies are developed, and emerging issues evolve.

Industry has continued to support and sponsor training on their new technology for weighing and measuring devices. NIST has assured the committee they will continue their work towards providing technical training for the trainers.

Discussion: The Committee, while recognizing the importance of this item, is maintaining it as a "Developing" item on its agenda until progress is made in other areas of the NTP plan.

401-4 D Certification

Source: The Committee (2003)

Background: In December 2004 several Committee members met in Harrisburg, Pennsylvania, to further develop the concept of a National Certification Program. The participants agreed the NTP should take the following directions:

(a) Responsibility of training remains with the state and local jurisdictions;
(b) Administrator training must be added to the curriculum; and
(c) Training and structure used by agencies outside the NCWM should be explored and used as models.

The participants also acknowledged that: (1) the CWMA offered to assist the Committee in determining what knowledge and prerequisites are required for beginning and advanced inspectors; and (2) the WWMA recommended course outlines for shorter training courses.

The Committee believes an NCWM certification program should be developed based on a curriculum plan with measurable levels of competency. The Committee agrees that weights and measures officials must pass written examinations to receive certification. Certificates could be presented at the Annual Meeting to administrators and weights and measures officials who complete training classes and pass the course examination. In 2004, then Chairman Dennis Ehrhart indicated the Board of Directors would consider requests to fund training.

The WWMA and CWMA submitted extensive comments and recommendations regarding this item prior to the 2004 NCWM Annual Meeting. The 2005 NCWM Certification Proposal was redrafted to reflect the NCWM's role in issuance of the certificates and was posted on the PDC page on the NCWM website.

Subsequent to the 2006 NCWM Annual Meeting, all states not previously contacted were sent a letter requesting the name of their State Certification Coordinator (SCC). The state director will be deemed the default SCC in the absence of a designated contact. The list of SCC contacts is posted on the PDC page of the NCWM website.

Discussion:

The Committee continues to hear support from the regions concerning the establishment of a certification program. In addition to expressing support for this effort, the WWMA stated its support for having the states meet the requirements established by the NCWM. The WWMA commented that after demonstrating competency, the NCWM would be the appropriate entity to issue the certificate.

By exposing weights and measures inspectors to standardized training methodology, this certification process will lead to uniformity. However, the Committee believes it is time to begin the process of building the infrastructure of the program. We must determine what the program will look like and establish the roles of the states and the NCWM. It is unrealistic for the NCWM to fund a complete certification program. It is critical that the states take an active role in the process if the program is to be successful. The WWMA also recommends that the certification program not be limited to weights and measures personnel. NCWM certification could be offered for a fee to manufacturers, service companies, or individuals providing they meet the criteria set forth by the PDC.

The Committee will be contacting the SCC of each state to gather information on its current training and certification programs. The Committee will develop model certification programs that will be presented to the jurisdictions to determine workability. The Committee appreciates comments received from the regions and will consider these as it develops possible models.

The Committee will include a guide for writing test questions in the curriculum package referenced in Item 401-2. Test questions subsequently generated by the regional volunteers should provide a bank of questions, which can be used in a certification program and in training activities. NEWMA has provided an example of a draft statute, based on the Massachusetts statute, to establish a certification program. The Committee will study the sample with the possibility that it might ultimately be used to establish model criteria for a certification program.

The Committee agreed to maintain this issue as a Developing item on its agenda as it continues work on this issue.

401-5 D Recommended Topics for Conference Training

Source: The Committee (2003)

Background: The Board has charged the Committee with responsibility for selecting appropriate topics for the technical sessions at future Annual Meetings. The Board asked that the Committee review and prioritize possible presentations and submit those to the chairman. The chairman would then work with NCWM staff to make the arrangements and schedule the sessions.

The Committee continues to carry the following list and recommends these topics for possible training seminars, roundtables, or symposia for presentation at the NCWM meetings:

(a) Risk-based Inspections (Robert Williams, Tennessee, volunteered to present his state's RMFD testing program);
(b) Marketplace Surveys;
(c) Auditing the Performance of Field Staff (Will Wotthlie, Maryland, volunteered to lead the session);
(d) Alternative Fuels (including motor-fuel trends and technology updates);
(e) Device Inspections Using a Sampling Model; and
(f) Emerging Issues.

Discussion: The Committee received the following additional suggestions (listed in no particular order) for educational topics at the 2007 Annual Meeting:

(a) Nebraska 52-week Dispenser Field Study (offered by presenters Steve Malone, Nebraska, and Henry Oppermann, Weights and Measures Consulting, LLC);
(b) Temperature Compensation Report (presenter Ross Andersen, New York);
(c) Training session on BioDiesel Issues (offered by presenter Paul Hoar, AgriFuels LLC)
(d) Proper Lifting Techniques (recommended by Ken Deitzer, Pennsylvania);
(e) Overview of OIML and its Relationship to Standards Development (recommended by Julie Quinn, Minnesota);
(f) Back and Stress Techniques (recommended by Don Onwiler);
(g) Public Relations, specifically dealing with aggressive/angry people (recommended by the SWMA);
(h) Inspector Investigative Procedures (recommended by the SWMA),
(i) General Safety Issues (recommended by the WWMA);
(j) Defensive Driving (recommended by the WWMA);

(k) Administrative Civil Penalty Process (recommended by the WWMA);
(l) Price Verification (recommended by the WWMA); and
(m) Customer Service (recommended by the WWMA).

The Committee also received comments from the CWMA that high fuel prices make cheating on quantity a lucrative business for unscrupulous station owners. Some jurisdictions have uncovered retail motor-fuel fraud schemes that operate at nonstandard hours or that employ difficult-to-detect technology. The CWMA is recommending that industry and knowledgeable jurisdictions conduct a technical/information session at the Annual Meeting to apprise everyone of all the known retail motor-fuel fraud schemes. All jurisdictions would then have the knowledge to determine the best approach for fraud detection and deterrence.

The Committee acknowledged the value and anticipated interest by NCWM members of the many topic ideas submitted. For the 2007 NCWM Annual Meeting Technical Education Sessions, the Committee recommended using Steve Malone and Henry Oppermann's results from the Nebraska 52-week Dispenser Field Study, and Ross Andersen's Temperature Compensation Report. The Committee was pleased that both of these sessions were selected for presentation at the 2007 Annual Meeting. At the January 2008 NCWM Interim Meeting, the Committee will discuss ideas for educational sessions to be presented the July 2008 NCWM Annual Meeting and encourages people to submit ideas for the sessions to the Committee Chair, c/o NCWM Headquarters, before the Interim Meeting.

402 PROGRAM MANAGEMENT

402-1 I Safety Awareness

Source: The Committee (2003)

Background: In the past, the Committee's responsibility extended to the identification of safety issues in the weights and measures field and included efforts to increase safety awareness.

At the 2005 Annual Meeting, Past-Chairman Dennis Ehrhart recommended the committee make training its highest priority. The Voluntary Quality Assurance Assessment program, NCWM Associate Membership Scholarships, and safety awareness efforts were carryover items from the Committee on Administration and Public Affairs (A&P) and not PDC items.

Jurisdictions should send their safety reports and issues to their regional safety liaison, who in turn will forward them to Charles Gardner, the NCWM Safety Coordinator. Charles recommends the reports or report summaries be published in the NCWM newsletter. At the 2005 Interim Meeting, a CD-ROM on safety produced for the U.S. Environmental Protection Agency was made available for review. The Committee believes safety awareness should be a part of every aspect of training for NCWM stakeholders.

Discussion: The Committee reiterated the importance of safety awareness and education in weights and measures inspection and service activities. In an effort to continue emphasizing this issue, the Committee will reach out to the regional safety liaisons to ask that they write newsletter articles designed to raise safety awareness within and provide safety tips to the weights and measures community. These articles will also be archived on the PDC page of the NCWM website. The NCWM newsletter is published three times a year and all articles should be e-mailed to the NCWM headquarters office, at ncwm@mgmtsol.com, by the deadline dates listed below. The Committee has suggested the following schedule:

Association	Issue	Article Deadline
CWMA	2007, Issue 2	March 15, 2007
NEWMA	2007, Issue 3	July 15, 2007
SWMA	2008, Issue 1	November 15, 2007
WWMA	2008, Issue 2	March 14, 2008

The Committee is pleased to report that the CWMA submitted an article for Issue 2 of the 2007 NCWM newsletter, and has been advised that NEWMA will be submitting an article for Issue 3.

402-2 V Standard Categories of Weighing and Measuring Devices

(This item was adopted)

Source: Western Weights and Measures Association (WWMA) (2005)

Recommendation: The Committee recommends the following standardized category codes be adopted for use in NCWM studies and other data collection efforts.

NCWM DEVICE CATEGORY CODES

DEVICE CODE	CATEGORY	CAPACITY	EXAMPLES
SP	Scale, Precision	< 5 g scale division	jewelry, prescription scales
SS	Scale, Small	< 300 lb	retail computing scales
SM	Scale, Medium	301 to 5 000 lb	dormant, platform scales
SL	Scale, Large	> 5 001 lb	livestock, recycler scales, hopper scales, belt conveyor
SV	Scale, Vehicle	> 40 000 lb	vehicle, railway track scales
MS	Meter, Small	< 30 gpm[1]	retail motor-fuel dispensers
MM	Meter, Medium	30 to 200 gpm	vehicle-tank meters
ML	Meter, Large	> 200 gpm	agri-chemical meters, bulk oil meters, loading rack meters
MF	Meter, Mass Flow	All	heated tanks of corn syrup (soft drinks)
MW	Meter, Water	All	water sub-meters for mobile homes & apartments
MG	Meter, LPG	All	propane sales
MT	Meter, Taxi	All	taximeters
DT	Device, Timing	All	clocks in parking garages
DL	Device, Length Measuring	All	cordage meters
GM	Grain Moisture Meter	All	
GA	Grain Analyzer	All	
MD	Multiple Dimension Measuring Device	All	
MC	Meter, Cryogenic	All	

[1] Retail motor-fuel dispenser counts are based on meters.

Background: The WWMA A&P Committee recommended that standard categories of weighing and measuring devices be adopted to facilitate development of technical standards, inspector training, data collection, and program management.

The final report of the *Survey of Inspection Statistics Collected by State Weights and Measures Programs (2003),* conducted during mid-2002, observed the absence of standard categories for weighing and measuring devices was a serious obstacle to data collection. For example, the way weights and measures programs categorize scales by type, use, or capacity often varies considerably. Retail motor-fuel dispensers are currently being counted either by dispenser, grade, or number of hoses or meters. The need for reliable weights and measures statistics is summarized in the final report conclusion as follows:

> Accurate statistics would be helpful in many ways at both the state and national level. For instance, performance measures are difficult to develop without statistics. Also, work plans

require accurate and detailed statistics. In addition, budget, staffing, and other elements of each state program demand statistics on inspection workloads. Finally, neither individual states nor the NCWM will be able to estimate and advertise the value of the nation's weights and measures programs unless reliable statistics are available.

To correct this problem, the WWMA developed *Standard Categories for Weighing and Measuring Devices*, and recommends that standard categories for weighing and measuring devices be adopted to facilitate the development of technical standards, inspector training, inspection data collection, and weights and measures program management.

At the 2005 Interim Meeting, the Committee agreed this item should remain Informational to allow for additional input on standardized categories of weighing and measuring devices.

Discussion: During its deliberations at the 2007 NCWM Interim Meeting, the Committee agreed that interested parties have had adequate time to review and comment on the proposed device category codes. Consequently, the Committee agreed to propose the category codes for a vote at the 2007 NCWM Annual Meeting. The Committee heard some confusion about how the codes would affect the recordkeeping procedures currently in use in individual weights and measures jurisdictions. The purpose of agreeing on and adopting standardized codes is to facilitate the collection and comparison of data across weights and measures jurisdictions. Thus, jurisdictions participating in NCWM studies and other data collection efforts would need to submit data to the NCWM using the standardized codes. While the Committee encourages jurisdictions to consider using these codes in their own jurisdiction's recordkeeping procedures, jurisdictions are under no obligation to use these codes.

402-3 D PDC Publication

Source: The Committee (2005)

Many of the PDC items will continue to be carryover items from year to year as the broad scope of the Committee's work progresses. To help NCWM members follow the history and work of the PDC, the Committee has created a PDC document archive. The NCWM will maintain the archive. To eliminate the cost of reprinting the more lengthy items in their entirety and to preserve the important aspects of the PDC work, a legacy document was developed. Following the 2006 Annual Meeting, the documents listed below were archived on the PDC page of the NCWM website for easy access and downloading as needed.

- History of the PDC
- Formal Scope of the PDC
- NCWM Board of Directors Charge to the PDC
- The PDC's Role in the NCWM Strategic Plan
- The PDC's Strategic Plan
- National Training Curriculum Outline
- Suggested Topics for the NCWM Annual Conference
- Standard Categories of Weighing and Measuring Devices
- Safety Liaison Contact Information
- List of State Certification Coordinators and Contacts
- NCWM Issued Certification Program
- Voluntary Quality Assurance Assessment Program

When completed, the Committee's revised "Curriculum Package (Guideline for Creating a Basic Inspector Curriculum)" will also be posted to the PDC page of the NCWM website. The PDC page will continue to be utilized and updated.

Agatha Shields, Chair, Franklin County, Ohio
Kenneth Deitzler, Pennsylvania
Ross Andersen, New York
John Sullivan, Mississippi
Stacy Carlsen, Marin County, California
Tina Butcher, NIST Weights and Measures Division
C. Gardner, New York, Safety Liaison
Linda Bernetich, NCWM Staff Liaison

Professional Development Committee

Appendix A

Strategic Direction for the Professional Development Committee

The Committee developed their strategic direction to define its roles and responsibilities to the NCWM and the weights and measures community. The Committee members wrote principles to guide them in their deliberations and defined four main areas to focus their efforts. The Committee recognizes that its direction and responsibilities may be changed by the Board of Directors.

The guiding principles of the group were:

- Keep things simple;
- Develop programs that are realistic and achievable;
- Minimize redundancy and administrative tasks;
- Recognize that no one size fits all; and
- Meet the needs of weights and measures officials, service companies, industry, and manufacturers.

The four main areas for focusing their efforts were:

National Training Program – The focus of the National Training Program (NTP) would be to increase technical knowledge, strengthen credibility, and improve the professionalism of the individual weights and measures official. A strong NTP would work to promote uniformity across the nation.

National Certification System – A national certification system would be developed to recognize or accredit weights and measures programs as competent or capable. The program would include requirements around individual training, proper test standards, use of national handbooks, and a data gathering system.

Conference Training Topics – The Committee would be the focal point for gathering and recommending workshops or symposia on leadership, management, and emerging issues to be presented during the annual conference. These topics would provide a forum for the exchange of ideas and discussion of changes in the marketplace.

Uniformity of Data – The Committee would work to develop standard categories for devices and inspection areas so that such things as the number of devices, compliance rates, frequency of inspection and other areas could be compiled and compared at the national level. These statistics could be used to benchmark organizations and to communicate the value of weights and measures to the public and to decision makers (see Item 402-4).

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Appendix B

Curriculum Package

National Conference on Weights and Measures

"United by common purpose we can and shall prevail in all that we do."

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February 2007

To: Curriculum Development Volunteers
From: NCWM Professional Development Committee (PDC)
Re: Guideline for Creating a Basic Inspector Curriculum

Thank you for volunteering to work on the curriculum for a Basic Level Inspector. We define "basic" as the competency level required for the inspector to operate without direct supervision. In this work, we are moving to an outcome-based approach for setting educational standards and away from a textbook approach. The outcome approach is widely used in primary and secondary education and in the training of many professionals. Under this model, we focus on the outcomes and use these to describe the organization and coverage of the training course. The course materials become a means to an end rather than the end itself. The approach encourages innovation and creativity because it does not limit the trainer to a specific textbook or course presentation. The outcomes and milestones in the curriculum also will directly drive the certification program that we envision as the logical next step in the process.

The curriculum lists the outcomes in terms of the specific knowledge and skills we expect the basic inspector to possess at the end of the training. Each outcome will be further defined by a set of milestones, or competencies, that specify the activities and tasks that will be used to measure the student's mastery of the knowledge and skills, i.e., outcomes. The milestones must specify a single, clear objective, stating what the student will be able to do after the training. Milestones must be measurable and should lead to obvious test questions. Your task is to create the curriculum for a small segment of our profession.

Since many groups will be working on selected pieces of the overall curriculum, the Committee has selected a format for the curriculum materials based on work of the California Society of Certified Public Accountants (CACPA). In their publication, The California Core Competency Model for the First Course in Accounting, they provide a model accounting curriculum, a discussion of their methodology, and the rationale for using that methodology. Before beginning your work, we strongly recommend you read the short introduction to that publication and the Appendices. This common format will ensure that the pieces that get developed mesh together without extensive reformatting and editing.

The Committee is also asking that you review the three curriculum segments leading to small capacity retail scales prepared by New York State. These serve as a W&M example of the format we want to use and were prepared using the CACPA model. These segments also demonstrate the level of detail we want to see in the final product. As in the CACPA model document, our goal is to set standards rather than create a "lesson plan."

Please note the layered approach used in the small scale materials and how this limits redundancy in the curriculum. The first segment on general device inspection should be considered a prerequisite for the second segment on basic scales. Both are prerequisites for the segment on small capacity scales. The first segment is also a prerequisite for

any other measuring device area. For some devices, like timing devices, only one layer below this first layer is necessary. For liquid measuring devices, we would expect there to be two layers, a general layer that applies to all dynamic volume measuring and then a number of specific disciplines below that. Above all of these is a much broader segment that will include state and local laws and regulations, administrative procedures, enforcement policies, etc. that need not be included with each specific device segment. Please refer to Appendix A from the Profession Development Committee Final Report for the 2004 NCWM for a complete outline of the curriculum plan.

Your task will be to identify the outcomes and the milestones that are pertinent to the area of Weights and Measures you chose to work on.

We suggest a process that involves the following steps:

1. **Brainstorm**. Create a bullet list of knowledge and skills expected. Ask simple questions. What should the inspector know? What should the inspector understand? What should the inspector be able to do?

2. **Group the bullets to define a broad outcome.** For a device segment, consider groupings like technology and terminology, classification and performance standards, markings and operational controls, technical requirements, user requirements, and test procedures. As a guideline, you should aim to have three to eight milestones under each outcome.

3. **Create a concise outcome statement for each outcome.** See Appendix B in the CACPA document and the New York samples for explanation and examples.

4. **Group similar milestones to the extent practical into a broader category**. For example, instead of listing expectations for use of zero, tare, units buttons, state a single expectation regarding typical controls on the device and consider listing specific controls parenthetically.

5. **Create a milestone statement, i.e. competency, using a verb from the list based on the levels of cognitive learning in Bloom's Taxonomy in Appendix C of the CACPA document**. For the basic inspector we recommend you limit your milestones primarily to the first three levels, i.e., knowledge, understanding, and application. The higher levels of learning in Bloom's Taxonomy, analysis, synthesis, and evaluation, typically require practical experience not expected in the basic inspector.

In Bloom's Taxonomy:

- Knowledge refers to the ability to recall facts, terms, and basic concepts.
- Understanding refers to the ability to interpret or explain concepts using your own words.
- Application refers to the ability to put knowledge/understanding to practical use and demonstrate skills required actually to perform specific acts.

As part of the process of developing curriculum segments, the Committee is asking work groups to draft sample test questions that evaluate whether the milestones in the segment have been met. The Committee has prepared a guide to developing test questions to aid in that process and will circulate that to the work groups and become part of the curriculum development package. The test questions will be used both as instructional tools in training but also for future certification programs.

As a curriculum segment draft is completed, the Committee will do a quick review and suggest editing for uniformity of format. When it is ready, we will circulate the draft for review and comment. The critical questions we will ask are: What is missing from this curriculum segment and what should be removed or moved to another segment in another level? With this review process, we hope to build a consensus of agreement on the standards being set. The same would apply to sample questions.

The Committee greatly appreciates your willingness to contribute to this project. Please send your comments or questions on the project to the current chair of the PDC committee with a carbon copy to Linda Bernetich at NCWM

Inc, lbernetich@mgmtsol.com. Ross Andersen has agreed to help with questions about the format and the CACPA model. Please contact him at ross.andersen@agmkt.

Curriculum Package

THE CALIFORNIA CORE COMPETENCY MODEL FOR THE FIRST COURSE IN ACCOUNTING

California Society of CPAs Committee on Accounting Education

July 1995

This document may be copied without restriction.

The California Society of CPAs Committee on Accounting Education is proud to present this White Paper entitled *The California Core Competency Model for the First Course in Accounting.*

The idea for this model began with a grassroots movement of accounting educators who wanted to reverse a deteriorating articulation process for the first course in accounting. This movement gained significant momentum when Bob Knox of the California Society of CPAs formed the Task Force on the First Course in Accounting in December of 1993. This Task Force's efforts were successfully completed when the California Society of CPAs Committee on Accounting Education formally approved the model on Apri1 24, 1995. During this two-year period, Paul Solomon of San Jose State University led the effort to improve articulation, develop the competencies, and secure their adoption.

The model presented here is the result of the tireless efforts of Task Force members and extensive input from the Committee on Accounting Education, as well as the input of several hundred accounting educators, accounting and business professionals, and non-accounting business educators. This input was collected from a combination of nearly 30 presentations, workshops, panels, and receptions throughout the state over a period of two years.

The hundreds of hours of time volunteered for this project is an impressive example of professional volunteerism at its best. Even more impressive is the fact that when conflicts arose, educators searched for creative solutions that would meet the needs of more than one point of view. Clearly, accounting educators consistently subordinated their individual views of the course to the greater good-the long-run improvement of accounting education.

If you are an accounting educator in California, you are urged to share this model with your faculty and help improve accounting education state-wide by working for the model's endorsement. If you are an accounting educator outside California, we hope that this model will help you to facilitate the types of changes encouraged by the Accounting Education Change Commission in its Position Statement No.2 entitled *The First Course in Accounting*.

THE CALIFORNIA CORE COMPETENCY MODEL FOR THE FIRST COURSE IN ACCOUNTING

BACKGROUND

The first course in accounting offered at California's institutions of higher education represents a sizable expenditure of money for the State. It has been conservatively estimated that the instructional costs of this course - taught at 107 community colleges, 20 California State Universities (CSU), and a majority of the 9 universities within the California University system (UC) - are over $50 million! Additional costs for this course are incurred at a significant number of private universities.

The first course in accounting has several major stakeholders. For example, one major stakeholder is non-accounting faculty who rely on the first course to provide part of the foundation knowledge required of all business students by the American Assembly of Collegiate Schools of Business. Since over 80% of all students enrolled in the first course are non-accounting majors, it is reasonable that these non-accounting faculty have input into the design of this course. Another major stakeholder is the accounting community, in other words, accountants in industry, government, and public accounting.

The California Society of CPAs (CSCPA), with approximately 29,000 members, has strongly urged accounting educators to deliver better prepared students to the accounting profession. The CSCPA believes that if students' first exposure to accounting is positive, then more high quality students are likely to choose accounting as their major. Because of the interest of these stakeholders, the CSCPA, through its Committee on Accounting Education, established the Task Force on the First Course in Accounting.

THE MISSION OF THE TASK FORCE ON THE FIRST COURSE IN ACCOUNTING

The mission of this task force is to improve the quality of education in the first accounting course by helping faculty implement the changes recommended in the AECC's Position Statement Number Two entitled *The First Course in Accounting.* Like the AECC, our task force defines the first course in accounting to mean the full introductory accounting sequence commonly taught over two semesters or three quarters.

Since the California community colleges are such an integral part of the accounting education system-teaching as many as 90 % of the students who take introductory accounting in California and over 50 % of the students who enroll in the California State University system-our mission includes facilitating first course articulation among two-year and four-year accounting programs.

Although our focus is on accounting education in California, we hope that our approach will also help accounting programs outside of California.

ACCOMPLISHING OUR MISSION

We have accomplished our mission by identifying expected student outcomes and core competencies as a basis for articulation agreements. The diversity of emerging instructional models for the first course in accounting has made the process of articulation very difficult for the great majority of California's institutions of higher learning. To reduce the severity of this problem requires a dramatic change in how course equivalencies between institutions are measured. It is, therefore, proposed that the basis for articulation agreements shift from the current textbook/topic approach to one that focuses on identifying desirable outcomes students should achieve and core competencies that measure their achievement. The current version of these outcomes and core competencies-referred to as the "California Core Competency Model" or CCCM-is included in this *White Paper.* Milestones for accomplishing this part of our mission as well as definitions of "outcome" and "competency" are included in Appendices A and B.

THE TASK FORCE MEMBERS

The members of the Task Force on the First Course in Accounting were:

Curtis DeBerg	California State University - Chico [Co-Chair]
Roger Gee	San Diego Mesa College
Ken Harper	De Anza Community College

Bob Hurt	Cal-Poly Pomona
Patrick Kelly	Price Waterhouse LLP
Bob Knox	California Society of CPAs (CSCPA), Director, Relations with Educators
Joe Mori	San Jose State University CSCPA Chair, Committee on Accounting Education
Jim Peters	Ernst & Young LLP
Bonnie Slager	Rancho Santiago College (Orange)
Paul Solomon	San Jose State University [Co-Chair]

GENERAL PHILOSOPHY ABOUT HOW TO USE THIS MODEL

Identifying outcomes and core competencies is an important step in the process of improving accounting education. How accounting educators help students master these outcomes and competencies and how they simultaneously measure student mastery are equally important tasks. Thus, our next task will be to publish a *Guide to Competency Implementation and Assessment.* The *Guide* will be based on input collected from hundreds of educators and business professionals at numerous CSCPA-sponsored workshops conducted throughout the state in 1994 and 1995 and will be presented at the 1996 California Colloquium on Accounting Education.

Our intention is *not* to develop a "statewide lesson plan" for the first course in accounting. Instead, we want individual faculty to be creative in implementing the common set of outcomes and core competencies described in this *White Paper.* Moreover, as Appendix B explains, we hope each accounting program will develop a set of outcomes and special competencies that will reflect the unique perspective of its faculty and the special needs of its students. Thus, our philosophy encourages diversity. Although we want students to attain the educational objectives of the Accounting Education Change Commission, we do not expect them to attain these objectives in a prescribed manner.

SOME SPECIFIC NOTES ABOUT THE CALIFORNIA CORE COMPETENCY MODEL

- The outcomes and core competencies you see are derived from the Accounting Education Change Commission's Position Statement Number Two entitled *The First Course in Accounting.* We strongly recommend that you study this document as background preparation before you view our model.
- Like the AECC, our task force defines the first course in accounting to mean the full introductory accounting sequence commonly taught over two semesters or three quarters.
- Do not interpret the user *orientation* of our financial accounting outcomes and competencies to mean that students should no longer prepare statements. Although we do not include the traditional detailed treatment of debits and credits in the core competencies, we do want students to develop the skills needed to intelligently use such financial reports as are found in an annual report. Accordingly, students must be able to prepare simple financial statements.
- Our model contains twelve outcomes divided into three categories of competencies: financial accounting (31 competencies), managerial accounting (29 competencies), and active learning (9 competencies). The active learning skills are intended to facilitate accounting content. That is, whenever possible, instructors should require their students to use active learning skills to master both financial and managerial outcomes. For example, a student should be able to identify the assumptions and possible positions underlying an ethical issue for any of the financial and managerial outcomes. Also, these active learning competencies are not designed to be mutually exclusive. That is, when a student analyzes a case study in a group setting, the assignment may also involve one or more communication skills and problem solving skills.
- Each competency in the model contains a concrete verb that denotes action. An inventory of such concrete verbs is included in Appendix C.
- The model is a "living document." It will be re-evaluated annually to consider the evolving content and pedagogy of the first course in accounting. Thus, if you wish to comment on any aspect of the model, please contact Paul Solomon at:

  Phone Number: (408) 924-3487
  Fax Number: (408) 252-6882

E-mail Address: psolomon@sjsuvm1.sjsu.edu
Mailing Address: 1210 Stafford Drive, Cupertino, CA 95014

THE CALIFORNIA CORE COMPETENCY MODEL

The primary objective of this course is to help students learn how accounting meets the information needs of various users by developing and communicating information that is useful for decision-making. This objective will be achieved by requiring the following outcomes and core competencies.

Financial Accounting Outcomes with Core Competencies

[1] Accounting's Role in Society

Part A: How does accounting meet the information needs of investors and creditors?

- identify the types of decisions investors and creditors make and describe what information in the financial statements and/ or related disclosures meets the information needs of each group. [lA-I]
- discuss what role ethics plays in the preparation of financial statements. [1A-2]
- identify and discuss examples of how U.S. accounting measurement techniques and financial statements differ from the measurement techniques and financial statements of other countries. [1A-3]

Part B: How does accounting meet the information needs of regulatory agencies and taxing authorities?

- describe how information sources other than the annual report (e.g., SEC Form 10-K) can be used to learn more about the nature of an entity's business. [1B-1]
- identify some of the differences between the objectives of tax accounting and financial accounting and at least one difference between taxable income and financial accounting income. [lB-2]
- explain how a tax return is actually a special version of the income statement. [1B-3]

[2] Fundamental Business Concepts: How do businesses operate and how does accounting serve them?

- explain the meanings of key business terms (e.g., assets, budget, collateral, financing, limited liability, and lease). [2-1]
- distinguish among profit, governmental and other nonprofit entities by identifying their respective goals and by looking at the content of their financial reports. [2-2]
- identify the characteristics of the corporate, partnership, and sole proprietorship forms of entity and discuss the advantages and disadvantages of each form. [2-3]
- classify business transactions into operating, investing, and financing activities. [2-4]
- describe the key differences in the financial statements of merchandisers, manufacturers, non-financial service companies (e.g. United Air Lines), and financial service companies; and explain how these differences reflect the operating, investing, and financing activities of each type of entity. [2-5]

[3] Fundamental Accounting Concepts Underlying Financial Statements: What are the elements of, the relationships among, and the accounting concepts underlying the primary financial statements?

- discuss what information is typically found in the balance sheet, income statement, statement of owners' equity, and statement of cash flows. [3-1]
- apply the fundamental accounting equation (A = L + OE) to:
  - (a) analyze the effects of accounting transactions on the elements of the balance sheet. [3-2a]
  - (b) prepare a balance sheet that reports the financial condition of any entity (e.g., a person, sole proprietorship, partnership, corporation, etc.). [3-2b]
- apply the income statement equation (R - E = NI) to:

(a) discuss the criteria used to determine when revenue is recognized, and apply these criteria to a specific entity to determine when its revenue should be recognized. [3-3a]

(b) discuss the process used to recognize expense. [3-3b] prepare an income statement that reports the results of operations for any entity. [3-3c]

(c) prepare an income statement that reports the results of operations for any entity. [3-3c]

- distinguish between the accrual and the cash basis of income measurement by preparing both an accrual basis and a cash basis income statement from the same set of business transactions. [3-4]
- differentiate the balance sheet from the income statement by being able to classify account titles into asset, liability, owners' equity, and non-balance sheet accounts. [3-5]
- describe how the amounts reported on the income statement and balance sheet are determined by:

(a) distinguishing among the following valuation methods: historical cost, current cost, current market value, and the present value of cash flows. [3-6a]

(b) identifying the generally accepted valuation method for each of the major asset and liability accounts. [3-6b]

(c) describing how the balance in each major asset, liability, owners' equity, revenue, and expense account is calculated (e.g., accounts receivable and depreciation expense). [3-6c]

- link the following related financial statements-balance sheet, income statement, statement of cash flows, and statement of owners' equity. [3-7]
- classify cash receipt and cash payment transactions as well as significant non-cash transactions into the appropriate statement of cash flow activity. [3-8]

[4] Uses and Limitations of Financial Statements: What are the uses and limitations of financial statements and related information in making both business and personal financial decisions?

- identify several ways in which financial accounting information is used to make business and personal decisions. [4-1]
- calculate at least one financial statement ratio within each of the following four categories and discuss its usefulness and limitations in making decisions:

(a) liquidity-e.g., current ratio and acid test ratio

(b) activity or turnover-e.g., average collection period

(c) financial leverage-e.g., debt to equity ratio

(d) profitability-e.g., profit margin ratio and return on equity (e) valuation-e.g., price-earnings ratio and dividend yield [4-2]

(e) valuation-e.g., price-earnings ratio and dividend yield [4-2]

- explain how percentage analysis can be used to uncover important relationships and trends in the financial statements. [4-3]
- explain how inventories and accounts receivable can be mismanaged and describe how a manager can use financial statement analysis to monitor and control them. [4-4]
- explain the relationship between net income and cash flows and discuss how a highly profitable, fast-growing business might face liquidity problems that could force it into bankruptcy. [4-5]
- identify several limitations of the financial statements found in the annual report. [4-6]
- discuss the basic principles of internal control and describe the attributes of an effective and efficient internal control system. [5A-2]

- identify the strengths and weaknesses of an internal control system and, if appropriate, suggest improvements to this system. [5A-3]

Part B: How are business transactions input, processed by an accounting information system, and output by that same system to produce financial statements? To appreciate the role of technology in this process, students should work with one or more of the following tools: a spreadsheet, an accounting software package, a database, or other technology.

- identify and apply the essential conditions necessary for a business event to qualify as an accounting transaction and, therefore, be recorded in the accounting information system. [5B-1]
- distinguish between the recording phase and the reporting phase of the accounting process or cycle by being able to:
  - (a) record the effects of accounting transactions in an accounting information system. [5B-2a]
  - (b) transfer the effects of these explicit transactions to individual asset, liability, and owners' equity accounts. [5B-2b]
  - (c) analyze whether an adjustment or correction is needed in a particular situation. [5B-2c]
  - (d) record and transfer the effects of adjustments and corrections to individual asset, liability, and owners' equity accounts. [5B-2d]
  - (e) prepare the financial statements. [5B-2e]
- explain the significance of debits and credits as they are used in an accounting information system. [5B-3]

Managerial Accounting Outcomes with Core Competencies

[6] Role of the Management Accountant

Part A: How does management accounting differ from that of financial accounting and what role does the management accountant playas a member of the management team?

- distinguish between the usefulness of managerial and financial accounting by considering the activities of planning, evaluating, controlling, and decision making. [6A-l]
- explain why managerial accounting applies to all types of industries (e.g., merchandising, manufacturing, non-financial services, financial services, government and other nonprofit entities). [6A-2]
- describe different ways in which the management accountant's advice can help an entity to operate more effectively. [6A-3]
- analyze a company's financial statements and/or management reports and identify several strengths and several weaknesses of the company from this analysis. [6A-4]

Part B: Why do management accountants need to have both a broad and in-depth understanding of their entity to fully participate in decisions about the products and services provided?

- discuss, using specific examples, the cause and effect relationship between expenses and revenues and how they affect operating decisions. [6B-l]
- discuss the need for and uses of a management control system and how accounting information facilitates control. [6B-2]
- explain how the operating philosophies of continuous improvement, total quality management and just-in-time manufacturing are used to manage optimal inventory levels; and discuss how the accounting function can be used to support their implementation. [6B-3]

[7] Using Accounting Information to Make Decisions

Part A: How is accounting information used to make and communicate short-term management decisions needed to run the entity?

- distinguish between fixed costs, variable costs, and mixed costs by categorizing various costs of an entity into these three categories. [7A-l]
- explain the usefulness and discuss the limitations of Cost-Volume Profit (CVP) analysis as a decision making tool. [7 A-2]
- read a CVP graph and explain the significance of the components illustrated. [7 A-3]
- calculate fixed and variable costs, contribution margin, contribution margin ratio, break-even point in sales dollars and units, and target sales volume in dollars and units. [7 A-4]
- calculate the effects of changes in sales volume, sales price, variable costs and/or fixed costs on company contribution margin, breakeven point, and operating income for both multi-product and single product situations. [7 A-5]
- explain how pricing decisions are made, including transfer pricing decisions. [7 A-6]
- identify the relevant costs in a make-or-buy decision and discuss both the qualitative and quantitative factors considered in this decision. [7 A-7]

Part B: How is accounting information used to make and communicate long-term strategic decisions needed to position the firm for competitive advantage?

- identify and explain the long-term strategic decisions that management needs to make. [7B-l]
- calculate both return on investment (ROI) and residual income (RI) and explain how each method is used. [7B-2]

[8] Using Accounting Information To Analyze and Improve Operational Efficiency: How is accounting information used to analyze and improve efficiency in operating, financing, and administering the entity?

- explain the purposes of budgets and prepare both a simple operating budget and a simple cash budget. [8-1]
- explain the relationship between budgeting and strategic planning. [8-2]
- discuss the limitations of budgets in managing organizations. [8-3]
- explain the relationship between accounting budgets and nonfinancial performance measures, e.g. cycle time, defect rate, and ontime delivery. [8-4]
- explain how the concept of responsibility accounting applies to cost centers, profit centers, and investment centers. [8-5]
- distinguish between controllable and non-controllable costs and discuss why the distinction is important. [8-6]
- explain how the concept of cost control is used to compare budgeted to actual amounts and to interpret any significant variances. [8-7]

[9] Processing Managerial Accounting Information: What is the importance and proper use of automated information processing in managerial accounting?

- identify alternative ways costs are tied to inventory and expense accounts (including the systematic and rational allocation associated with financial accounting). [9-1]
- trace the flow of costs in both a job order cost and process cost manufacturing system. [9-2]

- explain the causes and appropriate dispositions of over-applied and under-applied manufacturing overhead. [9-3]
- distinguish between a periodic and a perpetual inventory system for a merchandiser and a manufacturer. [9-4]
- describe the information benefits of maintaining a perpetual inventory. [9-5]
- distinguish between an activity-based cost accounting system and a traditional cost accounting system. [9-6]

Active Learning Outcomes With Core Competencies

[10] Communication Skills: How can students demonstrate their ability to communicate effectively in both oral (speaking and listening) and written form?

- engage in one or more of the following in-class speaking activities:
  (a) summarize an accounting-related newspaper or magazine article
  (b) present an accounting concept or homework problem applying a concept
  (c) debate at least one side of an accounting issue
  (d) present an analysis of an assigned case
  (e) present the results of a research assignment or project [10-1]
- engage in one or more of the following in-class listening activities:
  (a) listen to someone speak, summarize what they say, and ask them for feedback about your summary
  (b) listen to someone's response to a question or assignment and compare it to your own
  (c) compare notes you have taken to those taken by another student and evaluate the effectiveness of your listening skills [10-2]
- engage in one or more of the following written communication activities:
  (a) accumulate a written record of the concepts and terminology learned in the course, e.g. a writing journal
  (b) summarize the content of assigned readings, e.g. a reading log
  (c) describe what was learned in class, e.g. a one-minute response
  (d) submit questions about concepts or problems
  (e) submit potential exam questions
  (f) respond to discussion questions or cases
  (g) respond in essay form to questions in quizzes and exams
  (h) submit an essay describing a particular issue [10-3]

[11] Group Work Skills: How can students demonstrate their ability to work effectively in groups?

- participate in groups whose task is to do one or more of the following:
  (a) solve problems
  (b) discuss readings from the financial press
  (c) analyze financial statements
  (d) analyze case studies [11-1]

- perform the following tasks that are commonly associated with collaborative or cooperative learning:
  (a) facilitate the discussion and keep the group on task
  (b) record the group's results
  (c) report the results of the group's work to the class
  (d) keep time, assist the leader, and fill vacant roles [11-2]

[12] Problem Solving Skills: How can students demonstrate their ability to reason creatively and critically rather than to memorize?

- identify the problem, alternate ways of solving the problem, alternate positions, and position arguments for a controversial issue. [12-1]
- identify the assumptions and possible positions underlying an ethical issue. [12-2]
- evaluate a speaker's or writer's content for the appearance of underlying assumptions and of facts versus opinions. [12-3]
- analyze an unstructured problem that has no single correct answer. [12-4]

APPENDIX A: MILESTONES FOR IMPLEMENTING COMPETENCY-BASED ARTICULATION

The intent of the Committee on Accounting Education is to promote the widespread acceptance of essential student outcomes and competencies, while encouraging individual programs to implement these outcomes and competencies in ways that best suit their own students. The following milestones are used to evaluate progress in implementing this competency-based articulation system:

MILESTONE 1: Derive expected student outcomes (knowledge and skills) from AECC Position Statement No.2.

MILESTONE 2: Create core competencies (activities expressed in behavioral terms) that are logically derived from the expected student outcomes. The core competencies are developed from the input of the CSCPA Task Force and extensive feedback from both accounting educators and accounting practitioners.

MILESTONE 3: Promote a competency-based articulation approach by conducting workshops for interested faculty on how to implement and assess core competencies. The purpose if these workshops is to:

1. explain how the use of core competencies reduces the volume of material covered in the first course and provides:
   (a) more time to develop the communication, group work and critical thinking skills of students.
   (b) more flexibility to cover special topics that individual accounting programs or faculty believe their students must learn (i.e. special competencies).
2. describe how faculty at each school can develop their own special competencies to clearly communicate the unique aspects of their first course in accounting.
3. provide numerous examples of how faculty can test the degree to which their students have mastered the core competencies. This effort will culminate in the distribution of a *Guide to Competency Implementation and Assessment*.

MILESTONE 4: Establish acceptance of a single set of outcomes and core competencies–The California Core Competency Model–as the basis for articulation among all California four-year and two-year accounting programs.

APPENDIX B: DEFINITIONS: OUTCOMES AND COMPETENCIES

HOW DO YOU DISTINGUISH AN OUTCOME FROM A COMPETENCY?

An outcome is "what" you expect your students to achieve, whereas a competency demonstrates "how" your students can achieve that outcome. Think of an outcome as an end and a competency as a means to that end.

Outcomes are the knowledge and skills recommended in the AECC's Position Statement Number Two entitled The First Course in Accounting. Competencies are the specific activities used to measure a student's mastery of the knowledge/skills or outcomes.

The outcome/competency approach is different from the traditional textbook/topic approach to accounting instruction. First, the choice of a textbook no longer dictates the organization and coverage of the course. Instead, the outcomes and competencies become the driver and the textbook becomes their vehicle. A related difference is that the course is driven by an output measure (outcomes/competencies) rather than an input measure (textbook/topics). Finally, students more clearly know the content they are expected to study and the precise activities they must perform on examinations and other forms of evaluation by studying the outcome/competency pairings and working problems that reflect them.

AN EXAMPLE OF THE DISTINCTION

Outcome: Students completing the first accounting course should understand the elements of, the relationships among, and the accounting concepts underlying the primary financial statements. This understanding will be implemented if students can:

> Competency 1: discuss what information is typically found in the balance sheet, income statement, statement of owners' equity, and statement of cash flows.
>
> Competency 2: apply the fundamental accounting equation ASSETS = LIABILITIES + OWNERS' EQUITY– to prepare a balance sheet that reports the financial condition of any entity (e.g., a person, sole proprietorship, partnership, corporation, etc.).

HOW DO YOU DISTINGUISH CORE COMPETENCIES FROM SPECIAL COMPETENCIES?

Our task force's articulation approach includes both core competencies and special competencies.

Core competencies are competencies required of students in all accounting programs that subscribe to the outcome/competency articulation approach. Special competencies are competencies that are required by an individual accounting program to meet the special needs of its students.

It is expected that faculty at each school will identify and develop special competencies to communicate clearly the unique aspects of their first course in accounting.

WHAT COMPETENCIES ARE REQUIRED FOR ARTICULATION?

As the name implies, a core competency is an essential component of an articulation agreement, whereas a special competency is not. If a two year program can document that its students are required to satisfy all of the core competencies, its course fulfills the articulation agreement. It is not required to fulfill any of the four-year program's special competencies. For a more concrete understanding, consider the following example:

> Core Competency: Record the effects of accounting transactions in an accounting information system.
>
> Special Competency: Record accounting transactions in journal entry form (i.e., debit-credit form).

Notice that two-year programs that teach debits and credits in their first course through the special competency can articulate with four-year programs that do not teach debits and credits. All the two-year program has to do is document that its students are required to comply with the core competency above and all other core competencies.

If, instead, the four-year program teaches debits and credits in its first course through the special competency, it cannot deny articulation to a two-year program that teaches the core competency but not the special competency. Instead, the four year program will have to provide transferring students some vehicle (e.g. software materials or a one-unit bridge course) to master this special competency.

APPENDIX B: CHARACTERISTICS OF WELL-CONSTRUCTED COMPETENCIES

A well constructed behavioral learning objective or competency has the following characteristics:

- it expresses one objective;
- it is specific;
- it states what the student will be able to do after the learning experience; and
- it uses a concrete verb to specify the desired activity that must be performed by the student to demonstrate competency.

INVENTORY OF CONCRETE VERBS DENOTING ACTION TAKEN IN COMPETENCIES

The following suggested verbs are arranged in the six cognitive domains identified in Bloom's Taxonomy.

1. Knowledge		**2. Comprehension**		**3. Application**	
arrange	order	classify	record	apply	operate
define	recognize	describe	report	choose	practice
duplicate	relate	discuss	restate	demonstrate	schedule
label	recall	explain	review	dramatize	sketch
list	repeat	express	select	employ	solve
memorize	reproduce	identify	tell	engage	transfer
name		indicate	translate	illustrate	use
		locate		interpret	

4. Analysis		**5. Synthesis**		**6. Evaluation**	
analyze	differentiate	arrange	organize	appraise	evaluate
appraise	discriminate	assemble	plan	argue	judge
calculate	distinguish	collect	prepare	assess	predict
categorize	examine	compose	present	attach	rate
compare	experiment	construct	propose	choose	score
contrast	inventory	create	setup	compare	select
convert	question	design	suggest	debate	support
criticize	test	formulate	summarize	defend	value
diagram		justify	write	estimate	
		manage			

The model is a "living document." It will be re-evaluated annually to consider the evolving content and pedagogy of the first course in accounting. Thus, if you wish to comment on any aspect of the model, please contact:

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Guide for Developing Test Questions
For the National Training and Certification Program
Prepared by the
NCWM Professional Development Committee
First Draft - January 2007

This guide was prepared to assist those work groups preparing curriculum materials as they prepare test questions. These test questions will be used both as aids to training delivery and also as a measuring stick in any future certification effort. If the certification program is to have credibility, it is vital that the test questions adequately evaluate that the student has achieved the multiple milestones in each curriculum area.

As you write your questions, please remember that we have set the bar at a level of application, the third in Bloom's taxonomy. Thus, we expect that the trainee will KNOW certain things, UNDERSTAND other things, and be able to APPLY the remainder. We are not looking for higher learning levels in Bloom's Taxonomy for basic inspectors and we will not be testing for analysis, integration, or evaluation.

Testing for Knowledge – A test question for knowledge is usually in the form of a true/false, multiple choice, or fill-in-the blank question. At this point, the Committee is suggesting that developers focus on multiple choice and fill-in-the blank questions, such as questions 1 and 2 below. With true/false the person has a 50-50 chance of guessing and getting the right answer. Please note that at this level the trainee need only demonstrate that he/she knows the information and not necessarily that he/she understands it or can apply it.

1. Which statement best describes the legal standing of NIST Handbook 44? (Answer: B)

A. Handbook 44 is a federal regulation published by the National Institute of Standards and Technology that preempts the states.
B. Handbook 44 is adopted either by act of the state legislature or through promulgation in regulation by the state.
C. Handbook 44 is amended each year and all states agree to abide by the actions of the National Conference on Weights and Measures.
D. Handbook 44 is adopted as part of the administrative policy by order of the state director.

2. A paragraph beginning with "S." in any of the NIST Handbook 44 Codes is a _____. (Answer: Specification)

Testing for Understanding – A test question for understanding is usually a multiple choice question, such as questions 3 and 4 below. Questions concerning understanding often ask the trainee to pick the best response in situations where more than one answer could be correct in some respect. For example, in Question 3, answer B could be a correct answer if the equipment was manufactured after the effective date. Answer C. is a better answer since it is more specific and also includes items brought into the state after the effective date. Please note for understanding the trainee needs to demonstrate that he/she knows and understands the information and not necessarily that he/she can apply it.

3. A nonretroactive requirement is best described by which of the following statements? (Answer: C)

A. A nonretroactive requirement is enforceable on all equipment up to the terminal date.
B. A nonretroactive requirement is enforceable only on new equipment after the effective date.
C. A nonretroactive requirement is enforceable on equipment manufactured after the effective date or brought into the state after the effective date.
D. A nonretroactive requirement is enforceable on equipment with an NTEP Certificate granted after the effective date.

4. Which of the following best describes the difference between "d" and "e" in the Scales Code? (Answer: D)

A. The value of "e" is always displayed while "d" may or may not be.
B. The value of "d" is always smaller than or equal to "e".
C. The display of values for "d" must always be different in size or character from "e".
D. When "d" does not equal "e," the tolerances are applied to the value of "e".

Testing for Application – A test question for application should be either be a multiple-choice question or a "Yes/No with reason" question, such as questions 5 and 6 below. Questions concerning application will usually require the trainee to perform multiple steeps to reach the correct answer. In the field, they will not be guided to the correct section of the handbook, but will have to find it based on their knowledge and experience. For example, the question may provide information about the situation and some test results. The trainee must then decide whether to apply maintenance or acceptance tolerances and then evaluate the test results against the appropriate tolerances for that test. In question 5 below, the person must see that the scale is subject to the non-retroactive requirement in Scales Code S.1.7.(b) and then correctly deduce that the only correct response is an overload error. The Yes/No with reason question (question 6) also requires several steps but goes further in that it also requires the trainee to state the nature of any violation and cite the section of the Handbook that is violated. This is critical as this reason and citation would have to be indicated on any official stop-use order issued for the violation. Please note that the trainee needs to demonstrate that he/she knows, understands, and can apply the requirements.

5. You are inspecting a new price-computing sale (30 x 0.01 lb) in a deli that was placed in service last week. It has an NTEP CC # 99-205. You place a 1 lb weight on the scale and press the tare key. You then place an additional 29.2 pounds of test weights on the scale. Which of the following is an acceptable indication for this test load? (Answer: A)

A. Overload error
B. 29.24 lb
C. 29.18 lb
D. 29.16 lb

6. You are inspecting the scale at right and find that it has no zero tracking. With the scale at zero as indicated, you add 0.1 d (0.002 lb) to the platform and the scale indicates a stable 0.02 lb. Is this acceptable?

Yes or No (No must include reason and citation) _____

Answer: No –The digital zero indication must be maintained accurate within +/- ¼ d of true zero or the scale must have a center zero indicator. Scales Code S.1.1.1.

Initially the Committee is looking to build a bank of test questions that evaluate if the trainee has reached the milestones in each curriculum segment and cover a range of difficulty. Any exam that is prepared will include a mix of questions at each appropriate level in Bloom's Taxonomy from the curriculum, and varying levels of difficulty from easy to challenging. In that way, the test can be fair yet still differentiate those that really have mastered the discipline from those that haven't.

After the questions are prepared and tested (testing method to be developed), the Committee would then split the questions into two groups. The first group, called "sample questions," would be widely circulated for use in training programs. Instructors could use the sample questions in their training or as part of quizzes or final exams to measure effectiveness of the training. Most important, trainees would be exposed to the kinds of questions and the range of difficulty that would be included in a certification exam.

The second group of questions would be secured for use in a certification exam program. The Committee envisions charging some group to administer the certification exam and assist in the grading. That group would also create

alternative exams or periodically change the questions so the exam is not the same for candidates that fail to pass the first time. Please look to set the bar so it is fair yet represents the high level of ability you want working for you.

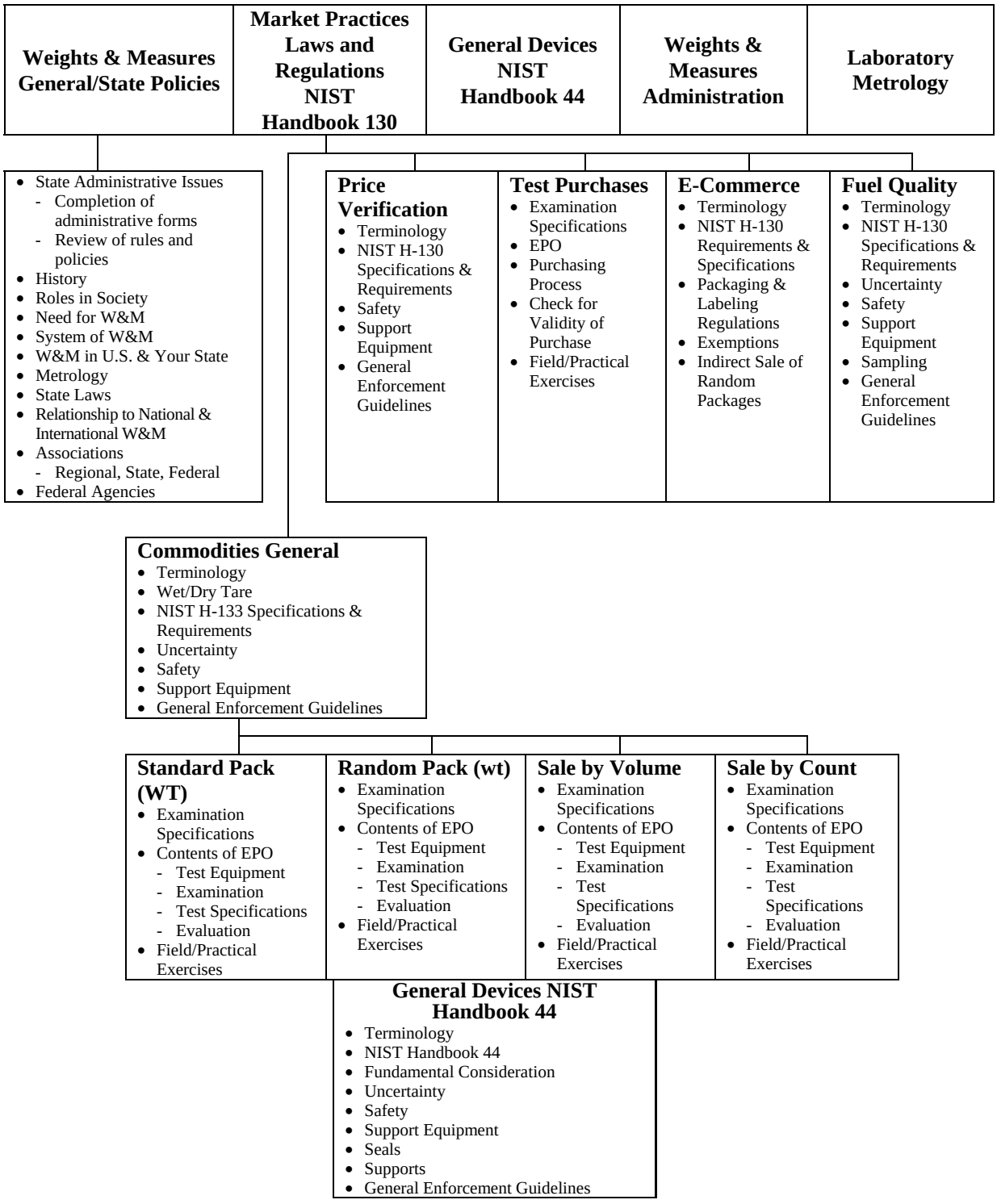
A long journey begins with one-step. We are counting on our curriculum development teams to start generating our bank of test questions (with an answer key) based on the milestones they choose in the curriculum segment(s) they are preparing. If we work together to create a good range of difficulty in those questions, we can be well on our way toward that certification program we are shooting for. There is plenty of room for creativity in this effort, including the use of graphics and photographs.

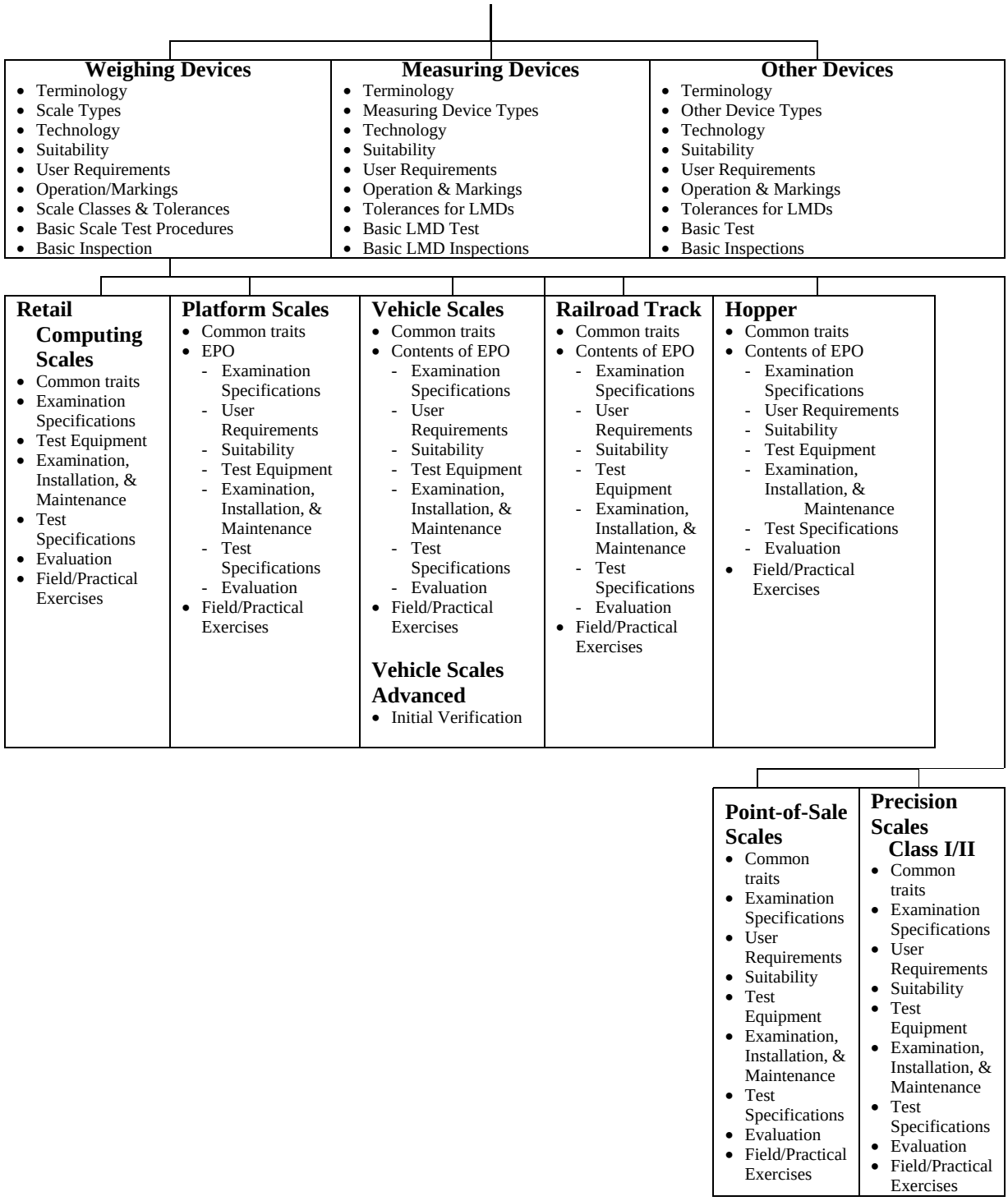
Thanks again for your willingness to contribute. Please call or email Ross Andersen, New York, with questions or comments at (518) 457-3146 or ross.andersen@agmkt.state.ny.us.

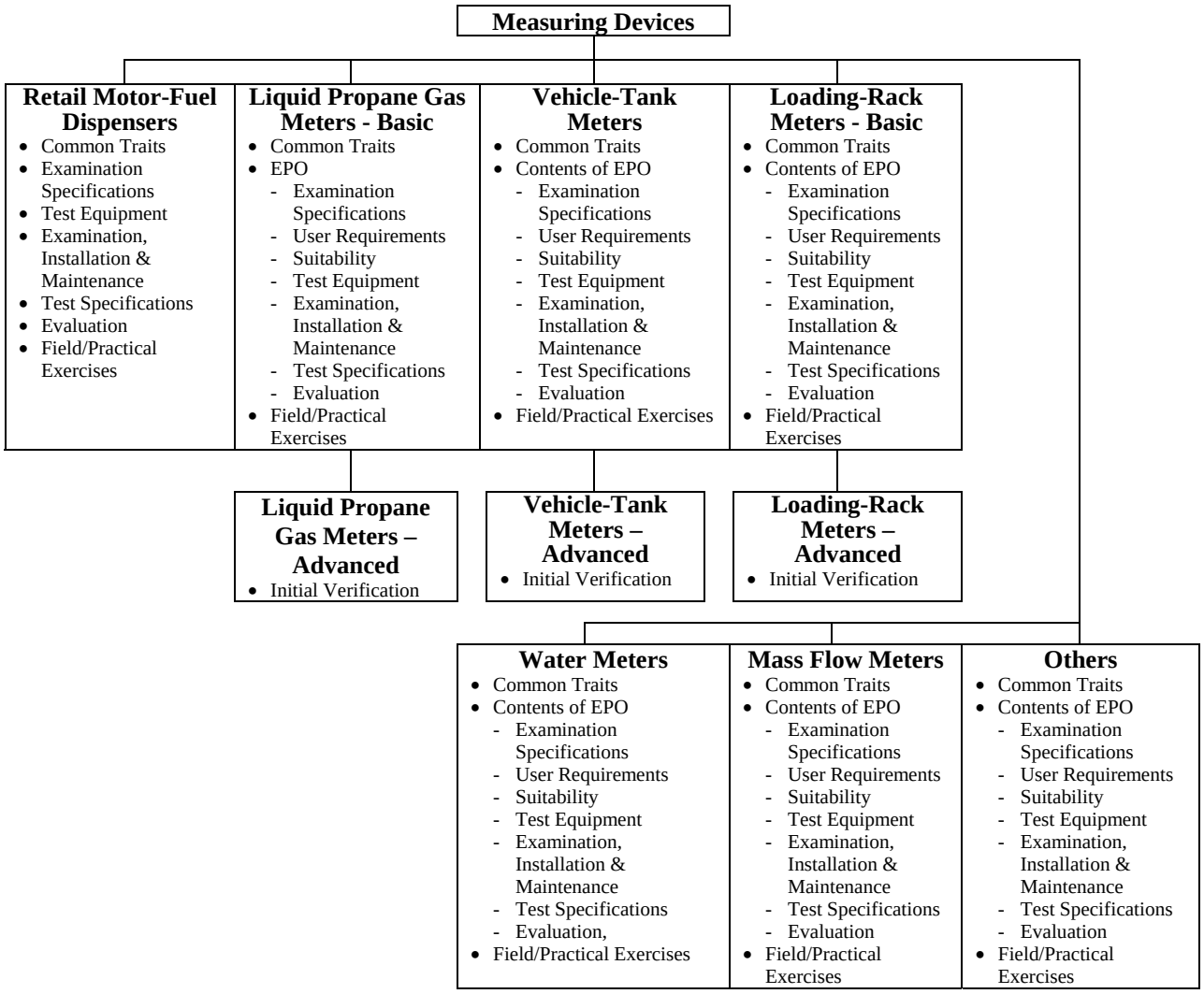
Appendix C

National Training Curriculum Outline

2004 Version




Weighing Devices
Terminology
Scale Types
Technology
Suitability
User Requirements
Operation/Markings
Scale Classes & Tolerances
Basic Scale Test Procedures
Basic Inspection
Measuring Devices
Terminology
Measuring Device Types
Technology
Suitability
User Requirements
Operation & Markings
Tolerances for LMDs
Basic LMD Test
Basic LMD Inspections
Other Devices
Terminology
Other Device Types
Technology
Suitability
User Requirements
Operation & Markings
Tolerances for LMDs
Basic Test
Basic Inspections
Retail Computing Scales
Common traits
Examination Specifications
Test Equipment
Examination, Installation, & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Platform Scales
Common traits
EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation, & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Vehicle Scales
Common traits
Contents of EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation, & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Vehicle Scales Advanced
Initial Verification
Railroad Track
Common traits
Contents of EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation, & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Hopper
Common traits
Contents of EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation, & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Point-of-Sale Scales
Common traits
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation, & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Precision Scales Class I/II
Common traits
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation, & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises


Measuring Devices
Retail Motor-Fuel Dispensers
Common Traits
Examination Specifications
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Liquid Propane Gas Meters - Basic
Common Traits
EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Vehicle-Tank Meters
Common Traits
Contents of EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Loading-Rack Meters - Basic
Common Traits
Contents of EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Liquid Propane Gas Meters – Advanced
Initial Verification
Vehicle-Tank Meters – Advanced
Initial Verification
Loading-Rack Meters – Advanced
Initial Verification
Water Meters
Common Traits
Contents of EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation,
Field/Practical Exercises
Mass Flow Meters
Common Traits
Contents of EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Others
Common Traits
Contents of EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises

Weights & Measures Administration

Weights & Measures Administration

- Understanding the Commercial Measurement System
- Responsibilities of W&M Regulatory Official
  - Consumer Protection
  - Fair Competition
  - Facilitating Value Comparisons
- Funding Considerations
  - Licensing of W&M Devices
  - Licensing of Service Agencies
  - Conflicts of Interest
- Roles of Stakeholders
  - Manufacturers
  - Packagers
  - Retailers
  - Service Agencies
- Powers & Duties of Officials
  - Weighmaster Considerations
- Type Evaluation, Initial Verification & Subsequent Inspection
  - Economic Impact
- Complete Scope of Weights & Measures Inspections
- Concurrent Federal & State Jurisdiction
- Federal Pre-emption
- Organizational Structure
- Budget
- Personnel
  - Knowledge, Skills & Abilities
  - Training
- Strategic Planning & Goals
- Education
  - Officials
  - Administrative Staff
  - Public
- Publicity
- Public Relations
- Communication
- Record Keeping
- Forms
- Legal Considerations
  - Due Process
  - Stop Orders
  - Standards Development
  - Prosecution
  - Court

Laboratory Metrology Administration

- Purpose of the Laboratory
- Responsibilities of the Metrologist
- NIST Expectations of the Laboratory
- Rationale for the Requirements for Recognition of the Laboratory
- Important Considerations for Laboratory Operation
- Factors Driving Changes in Laboratory Requirements
- Quality System
- NVLAP Accreditation
- Hierarchy of Laboratory Standards
- Calibration Intervals for All Standards
- Annual RMAP Round Robins & Training
- Laboratory Facility Requirements
- Uncertainty Analysis
- Management Review of Laboratory Operations

Laboratory Metrology

Concepts - Basic

- Introduction
- Statistics
- Uncertainty
- Measurement Assurance
- Standard Operating Procedures
  - Mass
  - Volume
- Calibration
- Calculations
- Traceability

Concepts – Advanced

- Program Philosophy
- New Technology
- Calibration Design Concepts
- Computerized Workshops
- Statistics for Quality
  - t-tests
  - F-tests
- Workshop on Errors
- Advanced Uncertainties
- Software Workshop
- Integration of Advanced Concepts

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Appendix D

NCWM Curriculum Work Plan

Revised July 9, 2007

Segment / Subject

Level 1 /Level 2/ Level 3

0. W&M General/State Policies
0.1 Introduction to W&M Programs
0.2 W&M Laws and Regulations
0.3 Official Powers & Duties
0.4 Field Standards & Test Equipment
0.5 State Program Scope and Overview

1. W&M Administration
1.1 Program Organization
1.2 Administration Functions (Personnel, Management, Budget, Safety, etc.)
1.3 Legislation and Regulations (Interaction with legislature, stakeholders, industry)
1.4 Regulatory Control (Device inspection, commodities, complaints)

2. Laboratory Metrology
2.1 NIST Basic Metrology
2.2 NIST Advance Metrology

3. Device Control Program
3.0 Introduction to Device Control
3.0.a Safety Considerations
3.1 Weighing Systems General
3.1.1 Static Electronic Weighing Systems, General
3.1.2 Static Mechanical and Hybrid Weighing Systems, General
3.1.3 Dynamic Weighing Systems, General
3.1.4 Precision Weighing Systems Class I and II
3.1.5 Small Capacity Weighing Systems Class I
3.1.6 Medium Capacity Weighing Systems Class III
3.1.7 Vehicle Scale Class III or IIIL
3.1.8 Railroad Track Scales
3.1.9 Hopper Scale Systems
3.1.10 Automatic Bulk Weighing Systems
3.1.11 Automatic Weighing Systems
3.1.12 Belt Conveyor Weighing Systems
3.1.13 Multiple Dimension Measuring Systems
3.1.14 In-Motion Railroad Track Scales
3.1.15 In-Motion Monorail Scales
3.1.16 Other Specialty Weighing Systems
3.2 Dynamic Volume Measuring Systems, General
3.2.1 Retail Motor Fuel Dispensers
3.2.2 Loading Rack and Other Stationary Metering Systems
3.2.3 Vehicle Tank Meter Systems
3.2.4 Milk Metering Systems
3.2.5 Water Meters
3.2.6 LPG/Anhydrous Ammonia Liquid Metering Systems

3.2.7 LPG Vapor Meter Systems
3.2.8 Mass Flow Metering Systems
3.2.9 Other Metering Systems (Cryogenics, Carbon Dioxide, etc.)
3.3 Static Volume Measuring Systems, General
3.3.1 Liquid Measures
3.3.2 Farm Milk Tanks
3.3.3 Dry Measures
3.4 Other Measuring Systems
3.4.1 Taximeters and Odometers
3.4.2 Wire and Cordage Measuring Systems
3.4.3 Linear Measures
3.4.4 Timing Devices
3.4.5 Weights
3.5 Quality Measuring Devices
3.5.1 Grain Moisture Meters
3.5.2 NIR Grain Analyzers
3.5.3 Fat Measuring Devices

4. Market Practices, Laws and Regulations (NIST HB 130)
4.0.a Safety Considerations
4.1 General Provisions of NIST Handbook 130
4.1.1 Packaging and Labeling Regulations
4.1.2 Method of Sale Regulations
4.1.3 Price Verification
4.1.4 Test Purchases
4.1.5 E-Commerce
4.1.6 Quality of Automotive Fuels and Lubricants
4.2 Package Net Contents Control, NIST HB 133 (General)
4.1.1 Packages Labeled by Weight, Standard and Random
4.1.2 Packages Labeled by Weight, Special
4.2.3 Packages Labeled by Liquid Volume, Volume and Gravimetric
4.2.4 Packages Labeled by Liquid Volume, Special
4.2.5 Packages Labeled by Length/Area
4.2.6 Packages Labeled by Count
4.2.7 Other Package Types

Note: Initial Verification has been intentionally left off this listing and will be addressed later.