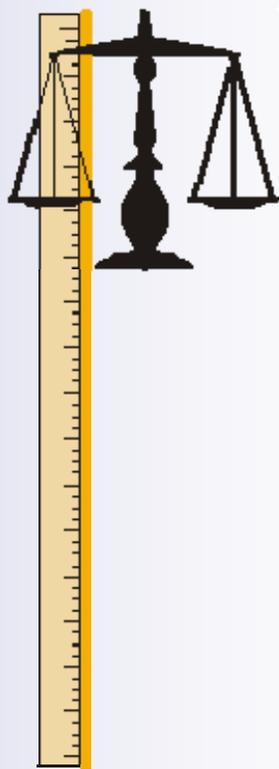


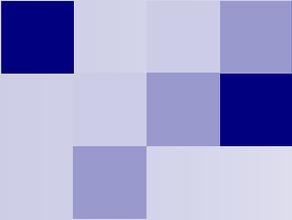
Training Module



One

Introduction to Weights and Measures

*Training for the
Weights and Measures Official*

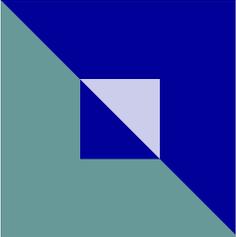


TRAINING FOR THE WEIGHTS AND MEASURES OFFICIAL

CURRICULUM

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- Module 3 - Enforcement Procedures**
- Module 4 - Legal Action**
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- Module 6 - Field Standards and Test Equipment**
- Module 7 - Basic Weighing and Measuring Principles**
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- Module 9 - Weighing Devices**
- Module 10 - Measuring Devices**
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- Module 12 - Petroleum Products**
- Module 13 - Quantity Control**
- Module 14 - Service Agencies and Agents**



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Module Team

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Introduction

Welcome to “Introduction to Weights and Measures”. This is the first module in the series “Training for the Weights and Measures Official.” It will introduce you to the history, development, and current status of weights and measures in the world of commerce today.

At the end of each segment in this module you will find a series of self-evaluation questions to test your knowledge. Although you are not required to complete the self-evaluation, we encourage you to take a few minutes to read the questions before moving on to the next segment. Answers are provided at the end of the module. If you are unsure of a response, reread the training material and it will give you the information you need.

Module Objectives

When you have completed this module you will be able to:

- Recognize and appreciate the relationships between the elements in the other training modules.
- Understand the necessity of weights and measures, the development of standards and systems of measurement, and the importance of weights and measures throughout the world.
- Become acquainted with California’s system of weights and measures, how it fits in with federal and national requirements, and our partnership with county sealers.
- Become aware of general legal principles and the significance of your authority and responsibility under the laws you will enforce.
- Gain an understanding and appreciation of the essential role you have in this important profession.

The Role of Weights and Measures in Society

Trade and Commerce have always been at the foundation of every civilization. No society can develop and prosper without its citizens conducting business transactions. No transaction can be conducted to the mutual satisfaction of the parties involved unless each is assured the other is fair and honest. The basis of fair and honest trade is, and always has, rested on the use of accurate weights and measures. Thus, throughout history, weights and measures has played an important, if largely unseen, role.

The Need for Weights and Measures

Ever since primitive societies first needed rudimentary measures for construction, clothing, and bartering food, or raw materials, weights and measures have been amongst the earliest tools used by humans. Early units derived from parts of the body and natural surroundings. Measures of length came from the forearm, hand, or finger. For weight, seeds, grains, and stones were used as standards. Time was measured by periods of the sun, moon, and other heavenly bodies.

These early inexact measures were, at best, only good for the time and locale they were being used and, at worst, a means of cheating and defrauding unsuspecting customers. As civilizations developed, it became necessary to enact laws to regulate transactions and the accuracy of standards. As standards of weight and measure developed so did the need for methods of determining their accuracy and the honesty of transactions using them.

In every transaction, an impartial unseen third party watchdog has been an essential element to ensure fair and honest play. This is the role of weights and measures laws and the weights and measures official. No one knows for sure when the first weights and measures official was appointed, but so vital are they to a nation's commercial wellbeing they probably existed before police, firefighters, and even health inspectors.

The basic tools of the weights and measures official are laws to ensure honest trade, standards with which to determine accuracy of transactions, and a desire for justice. Officials since the earliest times and throughout the world have carried out their duties with remarkable similarity. Unannounced inspections, seizure of false weights and measures, forfeiture of illegal goods, punishment with monetary fines, imprisonment, and, occasionally, public humiliation are all techniques that are and have been used by weights and measures officials. Punishment in times gone by was sometimes harsher than we would tolerate today. Tradesmen caught cheating or short weighing may have been subject to the removal of fingers, hands, or limbs. There have been instances where, as a public warning, offenders were nailed to the

door of their place of business by body parts such as ears, hands, or feet. It is even believed that executions were performed for the more egregious offences. Less barbaric treatment might include confinement in the stocks until the populace tired of abusing the miscreant. Today, in civilized societies, violators are more likely to suffer financial penalties, media exposure and maybe for really serious offenses, jail time. This is very different from the barbaric justice of yesteryear but although hard to contemplate, some of the more severe punishments may still occur in some part of the world today.

Systems of Weights and Measures

When we talk of weights and measures, we generally mean the standard units used to express specific quantities such as weight, capacity, or length. A unit is the name of a given quantity such as an inch, or a pound, centimeter, or kilogram and a standard is the reference to which the unit is compared.

By a system of weights and measures, we mean the collection of units and standards that relate to one another. In our familiar weight system, ounces are related to pounds and pounds to tons and for volume the fluid ounce, pints, quarts, and gallons are all related. Other countries had different systems. For instance, the Roman equivalents for ounce and pound were the *uncia* and *libra*. Our word “ounce” was probably derived from that word, and the “l.b...” from *libra* gives us the abbreviation “lb” for pound.

In devising systems of weights and measures, people used whatever was convenient to them. As mentioned earlier, some of the first standards developed were from various parts of the body.



Figure 1.1.
Egyptian Cubit

The Egyptian cubit is reputed to come from the length of the arm from the elbow to the outstretched fingertips. The yard may have come from the distance given by the outstretched arm of Henry I from nose to finger tips, or another idea is it was the distance around a person's waist. The word “yard” is derived from the Saxon word *gird* meaning the circumference of a person's waist. Weight standards probably originated from stones of a given size and weight convenient for handling and using in everyday commerce.

It is understandable how, throughout the world, a variety of differing systems developed independently from each other.

This led to a variety of standards with the same or similar names that differed in actual value. It is to the advantage of an unscrupulous merchant to have weights and measures that do not conform to any particular standard. If there is no fixed standard, who can say that a particular weight or measure is wrong!

Throughout history, there has been a constant striving for a uniform system of measurement, and attempts to standardize units of weights and measures have been numerous. In England, for example, the Magna Carta was an early attempt at standardizing measures:

“There shall be standard measures of wine, ale, and corn (the London quarter), throughout the kingdom. There shall also be a standard width of dyed cloth, russett, and haberject, namely two ells within the selvedges. Weights are to be standardised similarly.”

Early Tudor rulers established the length of a furlong (or furrow-long) as 220 yards. This led Queen Elizabeth I to declare, in the 16th Century, that henceforth the traditional Roman mile of 5,000 feet would be replaced by one of 5,280 feet. This made the mile exactly 8 furlongs and provided a convenient relationship between two previously poorly related measures.

The need for a single worldwide measurement system is becoming evermore necessary as trade between countries increases. Most of the world now uses the “system international” more commonly known as the metric system. The United States is the only major industrialized country that has delayed in its general use. This system, created by the French Academy of Sciences around the time of the French Revolution, has been legal, but not compulsory, in the United States since 1866. In the United States the more familiar system, using feet and inches, pounds and ounce, is known as the “customary” or “inch-pound” system, and was derived from the standards brought from England by the early colonists. These systems will be discussed in more detail in ***Module 5, Legal Metrology***.

International Standards

Devising a system of measurement is relatively easy compared to the work necessary to ensure agreement between various standards. How can a consumer be assured that the pound used to weigh apples in Kansas has the same value as the pound used to weigh oranges in San Francisco? This is done through a series of comparisons in which each standard is compared to a standard with greater

accuracy. The scale used to weigh commodities is checked by the official using field standards, which have been compared to state or county standards, which in turn have been checked against the national standards. This chain of intercomparisons with higher standards provides traceability all the way to the international prototype kilogram. This artifact is a platinum-iridium cylinder kept at the Bureau International des Poids et Mesures (BIPM), more commonly known as the International Bureau of Weights and Measures in the village of Sevres France. All mass standards in the world derive from this standard. Even pounds and ounces are defined in relation to the international kilogram. The Bureau serves as a depository for the primary international standards and as a laboratory for certification and intercomparison of national standard copies.



Figure .2.

International Bureau of Weights and Measures in the Village of Sevres France

The Convention of the Metre, a diplomatic international treaty that gives authority to the General Conference on Weights and Measures to act in matters of world metrology was signed by 17 countries in 1875. The Convention, modified slightly in 1921, remains the basis of all international agreement on units of measurement. There are now more than fifty Member States, including all the major industrialized countries.



SELF-EVALUATION QUESTIONS

1. What do you understand the role of weights and measures in society to be?
2. How were early standards and system of weights and measures devised?
3. What do we mean when we talk of a system of weights and measures?
4. Which major industrialized country does not use the “system international” as its prime system of weights and measures?
5. What is the purpose of the International Bureau of Weights and Measures?

Metrology

Metrology is the science of measurement and is the basis of weights and measures. When applied to the work we do it is more correctly described as legal metrology. The metrology department and the staff who work there are probably the most essential people in a weights and measures office. As mentioned earlier, an official needs laws and a desire for justice to be effective. Important as these are, they will be ineffective unless backed by accurate traceable standards with which to determine accuracy of transactions.

All systems of measurement require a means of defining the accuracy of the units in that system. There has to be a primary standard or standards to which all other units can be traced. There must be procedures by which they can be compared. Almost nothing that we do in weights and measures can be done without the standards provided to us by the metrology staff. **Module 5, Legal Metrology**, will explain the role of the metrologists in detail.

History of Weights and Measures in the United States

England by the 18th century had achieved a greater degree of standardization than most countries. The English units were well suited to commerce and trade because they had been developed and refined to meet commercial needs. Through colonization and dominance of world commerce during the 17th, 18th, and 19th centuries, the English system of measurement units was spread to and established in many parts of the world, including the American colonies.



2 lb ring weight

The weights and measures used in the British colonies of North America were all English in origin. Yet, at the same time, these measures were highly diverse as they had their origins in a variety of cultures - Babylonian, Egyptian, Roman, and Anglo-Saxon. The variety in the colonies reflected the diversity of customary usage in England. While the miscellany of measures in use in England had been simplified somewhat in the colonies, competing units of measure still added up to confusion. For example, all of the following capacity measures were used in the colonies: the firkin, kilderkin, strike, hogshead,



2 oz Victorian Weight

tierce, pipe, butt, and puncheon. Even when the same unit was used from colony to colony or locality to locality, it often was not assigned the same value. A bushel of

oats in Connecticut weighed 28 pounds, but in New Jersey, it weighed 32 pounds. The rationale behind a locality's adoption of a particular measure was often obscure. The port of Alexandria, Virginia used a bushel measure, which was used in England for a time around 1266. With the addition of New York to the British colonies in 1664, a whole new set of Dutch measures was introduced. After the American Revolution, French and Spanish measures were brought into the mix as the nation expanded to encompass Louisiana and Florida. Several early Presidents, fearing that American commerce could be injured by such diversity, encouraged Congress to exercise the power granted it in the Constitution to "fix the Standard of Weights and Measures." These Executive proddings were in vain. Congress remained reluctant to act in this sphere.



Half-Pint Measure



5 Modern Bell Weights



6 Cylindrical Troy Weights

The United States is unique in that it is the only major country that does not have a national weights and measures program. This responsibility is vested in each individual state. As each state developed its own program, slight differences in weights and measures requirements and enforcement occurred. In earlier times, this was of no great concern. Commerce between states was limited. Weights and measures officials' involvement in goods from other states was limited. However, as travel and trade between states became more frequent and widespread, these differences became more noticeable and onerous to industry. The need for uniform laws became ever more necessary.



20 oz Brass Weight



SELF-EVALUATION QUESTIONS

1. What is legal metrology?
2. What is required to define the accuracy of standard units in a system of measurement?
3. How does the administration of weights and measures in the United States differ from most major countries?

History of Weights and Measures in California

Just as national weights and measures were influenced by those measures brought over from England, early California weights and measures were influenced by those standards brought from Spain and Mexico. Explorers first traveled to the California coastline from the Spanish colonial empire of Mexico in the 1540's.



Figure 1.4.
"Vara" Stick

The main basis of linear measurement used in early California was the "vara" stick (Fig. 1.4), a yard measure between 32 and 35 inches. Wood copies, and later metal copies, of this Spanish measure were brought to Mexico. Alcaldes, or local magistrates, would keep officially stamped vara sticks in their offices to compare with measures brought to them. These vara measures varied greatly between different alcalde offices.

Next to the vara, the most commonly used measurement was the "fanega" which was used as a dry measure and a measurement of area. Less common was the "almud," which was part of the fanega.

Early attempts at standardization of weights and measures in provincial California are unclear, although some references are made to the early problems of variance in measures in the books of explorers, traders or missionaries and in the testimony of witnesses in the land grant cases. Much of the demand for standardization seemed to center around the need for standard measures of the fanega and the vara since they were most widely used. For example, in 1775, goods in San Blas were measured on the basis of 12 almuds to the fanega, but at Monterey the goods were delivered on the basis of 9-1/2 to 10 almuds for the same measure.

1833 **No legal standards of weights and measures.** The variation of the units reached a point where the Monterey Pueblo Council stated that there were no legal standards of weights and measures, merchants adopted such units as circumstances permitted, and that they had petitioned the District Assembly to take steps for correction of the situation. The Assembly met and requested that units of weights and measures be sent by the Governor to each government sector in the province; however, no action was taken.

1836 **Awareness of need for uniform measurement system.** A few years later, the Monterey Pueblo Council again acted by appointing a review committee for revision of standards of measurement. At the same time, the Los Angeles Pueblo Council promulgated a regulation specifying the dimensions of the half-fanega measurement, and decreed that all persons wishing the standard measure must apply at the proper office to have their measures sealed by the proper authorities at a stated fee. A pueblo official was to seal them annually. Presumably, this decree was to apply to all parts of the province.

Thus, decrees were made and committees formed, indicating an awareness of the need for a uniform measurement system, but no decrees were enforced.

- 1849** Laws were hodge-podge of mining camp laws created by each mining settlement and those remaining under the Spanish missionary system although California had gained independence from Mexico. Gold was discovered in California. The population swelled with fortune seekers, and new concerns for a uniform measurement system arose. In addition to the need for standard units in measuring land and grain in agriculture, people demanded accuracy in the weighing and trading of gold.
- 1850** California becomes a state. An act to establish standard weights and measures in California was passed during the first session of the Legislature on March 30, 1850. This act also made the Secretary of State Ex-officio State sealer of weights and measures, and the clerks of the county courts ex-officio county sealers.
- 1858 - 1911** Responsibility for weights and measures shifts back and forth between the county clerks and State Deputy sealers during this tumultuous period. The entire weights and measures act was repealed, re-enacted, repealed again until finally, to protect the interests of the purchasing public and the shippers of merchandise, the Constitution of California was amended to adopt a comprehensive weights and measures law.



Figure 1.5.

Charles G. Johnson

Appointed as First State Superintendent

- 1913** New legislation establishes statewide standard of weights and measures. On June 16, a weights and measures law was enacted on to carry out the provisions of the constitutional amendment with a view toward establishing a statewide standard of weights and measures. This new legislation relieved the Secretary of State as Ex-officio sealer of weights and measures, and placed at its head a superintendent of weights and measures, to be appointed by the Governor for a term of four years. The first superintendent, Charles G. Johnson, was appointed on July 10. In addition, a sealer of weights and measures was to be appointed in each county by the county board of supervisors to assist the State in enforcing weights and measures requirements.

1915 The first Annual Conference of California Weights and Measures Sealers was held on August 25 in San Francisco.



*Figure 1.6.
First Annual Conference of California Weights and Measures Sealers*

1921 The State Department of Weights and Measures became the Division of Weights and Measures as part of the Department of Agriculture when the Department of Agriculture was reorganized. The Director of Agriculture was appointed a chief of the Division at this time.

1922 The Division was administering seven programs and supervision of inspection work. The programs included the inspection of containers, gas pumps, weighing and measuring devices, milk bottles, mattresses, and bread.

- 1939** **The Division was made a Bureau under the Division of Economics.**
- 1948** **The Bureau was reorganized** under the Division of Marketing and later placed under the Division of Compliance.
- 1968** **The constitutional reference to weights and measures became unnecessary** with the development of various standards through numerous legislative acts. Its removal was proposed in Assembly Constitutional Amendment Number 30, but was rejected by the voters at the general election in November.

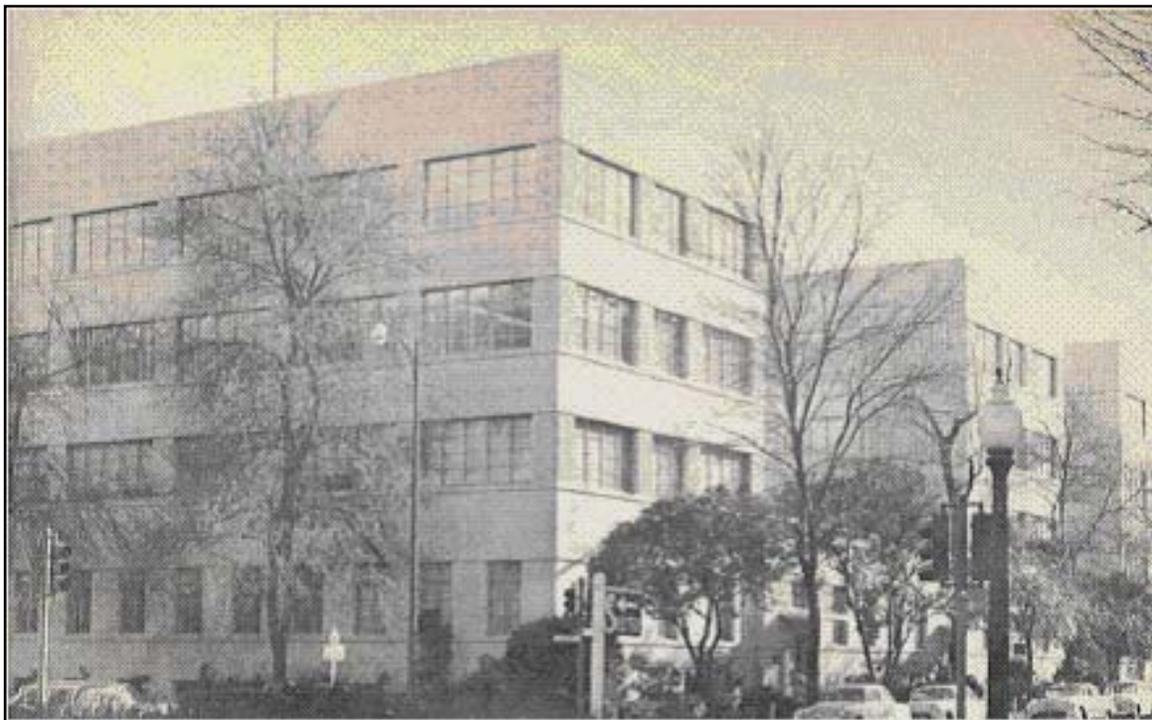


Figure 1.7.

1961
Department of Agriculture Building
 1220 N Street, Sacramento

- 1970** **Section 14 of Article 11 was successfully repealed on June 2, and no longer appears in the Constitution.**
- 1972** **The Department of Agriculture was renamed the Department of Food and Agriculture** and later, the Bureau of Weights and Measures under this Department became the Division of Measurement Standards.

Present Day Weights and Measures in California

At the present time, the Division of Measurement Standards administers several programs, including Metrology, Type Evaluation, Device Enforcement, Quantity Control, Petroleum Products and Weighmaster Enforcement, and Liaison and Training. The Division enforces those portions of the Business and Professions Code (B&P Code) pertaining to weights and measures and those rules and regulations in the California Code of Regulations which have been promulgated by the Secretary of the Department of Food and Agriculture. The State effectuates policy and supervises enforcement of weights and measures by county sealers and officials to ensure equity in commercial exchanges.



*Figure 1.8.
Division of Measurement Standards Building
8500 Fruitridge Road, Sacramento*

The county sealers are the local enforcement arm of the Department in the execution of weights and measures laws and regulations. Field activities for four of the Department programs, including quantity control, petroleum, weighmaster, and devices are operated through county offices.

In addition, in the interest of statewide uniformity and effectiveness, the sealers have had considerable input into the development of State mandated programs. Through the California Agricultural Commissioners and Sealers Association (CACASA), which is provided for by law, work is carried out cooperatively with operational units of the Division of Measurement Standards (DMS) in formulating policies and procedures responsive to State and local needs.

Through the continuing cooperation between the State Division of Measurement Standards and the county offices in formulating policy and enforcing weights and measures laws, the State assures a more equitable and competitive marketplace for industry and value comparison for consumers.

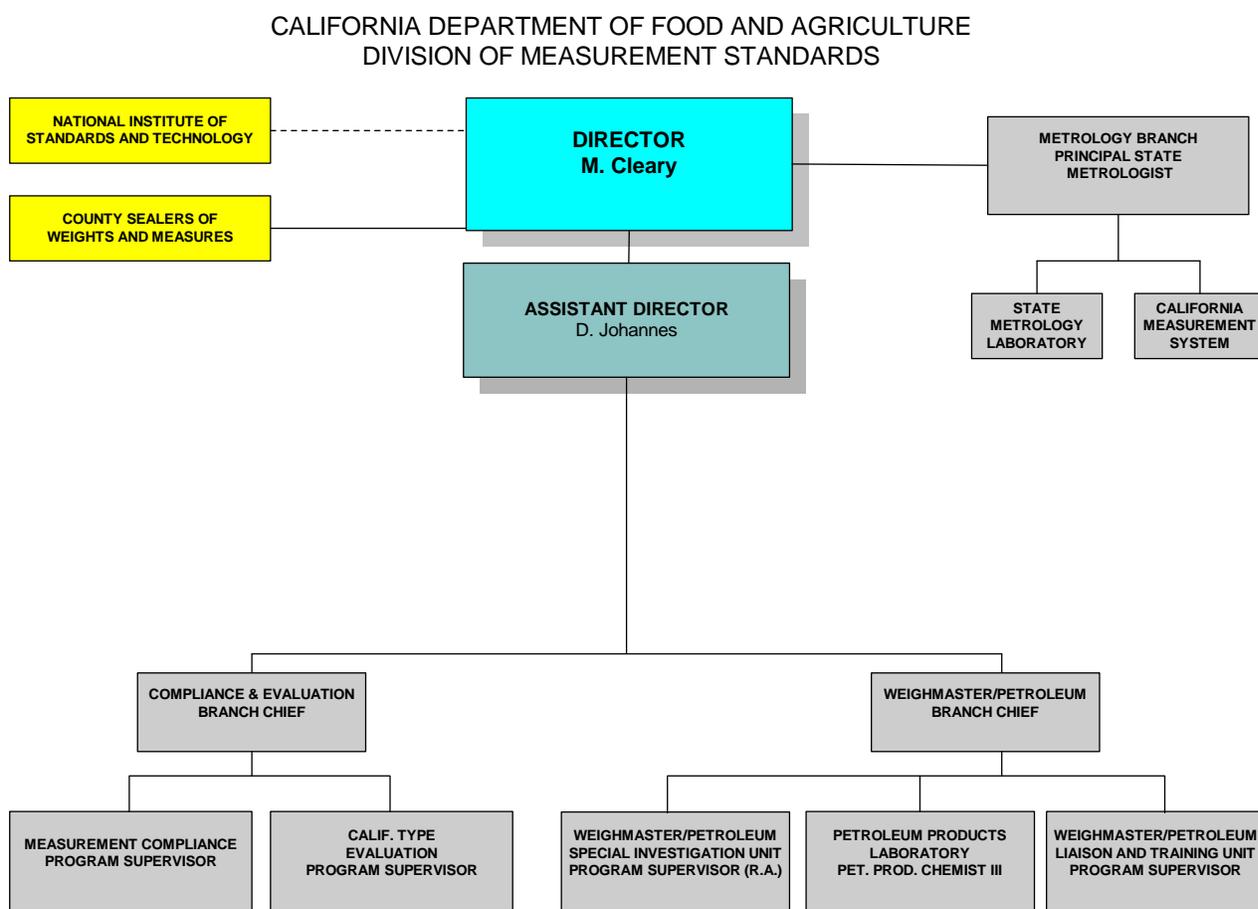


Figure 1.9.
DMS Organization Chart



SELF-EVALUATION QUESTIONS

1. What factors led to the need for a uniform system of weights and measures in California?
2. In what year did weights and measures become part of the Department of Agriculture?
3. Describe the administration of weights and measures programs in California today.
4. Describe the role CACASA plays in the development of statewide uniformity of weights and measures programs.

Relationships With Other Organizations

In this segment, you will be introduced to some of the organizations and their acronyms that you will encounter throughout this training and in your work. By the end of this section, you will be speaking a different language.

In carrying out its mission ***"To preserve and defend the measurement standards essential in providing the citizens a basis of value comparison and fair competition in the marketplace,"*** the California Department of Food and Agriculture (CDFA), through the Division of Measurement Standards (DMS) interacts with many international, national, federal, and county organizations.

These include; the International Organization of Legal Metrology (OIML), the National Institute of Standards and Technology (NIST), the United States Department of Agriculture (USDA), and the California Agricultural Commissioners and Sealers Association (CACASA), among others.



Figure 1.10.
Various Organization Logos

Organization of Weights and Measures in California

CDFA is charged with general supervision of weights and measures and weighing and measuring devices sold or used in California [B&P Code § 12100]. The duty of carrying out the code provisions and requirements is vested in the Secretary of CDFA, and in the Sealers acting under his supervision and direction [B&P Code § 12103.5]. Provision is made in the statute for a state sealer and for county sealers to be appointed by the individual counties [B&P Code §§ 12004 and 12006].

CDFA is required to investigate conditions in the various counties and cities with regard to weights and measures, and the sale of commodities, including those sold in containers [B&P Code § 12101]. Instructions are to be issued and recommendations made to county sealers, which govern the procedure to be followed by the sealers in the discharge of their duties [B&P Code § 12104]. At a frequency determined by the Director, the Department is required to inspect the work of the local sealers, and may itself inspect the weights and measures, or devices used for weighing and measuring, belonging to any person [B&P Code § 12105].

Relationship With CACASA

CACASA is important to several Divisions within CDFA. Our partnership with the county Sealers of Weights and Measures is critical to the success of our programs in California. While the Department provides training and oversight, the counties, in most cases, are the front line, and provide the essential services at the local level. There are written agreements between the Department and CACASA, known as Memoranda of Understanding (MOU), which detail our working relationship.

Organization of Weights and Measures in the United States

In most other countries, weights and measures is a federal program. In the U.S., no one federal agency has overall jurisdiction; while USDA, Food and Drug Administration (**FDA**), Federal Trade Commission (**FTC**), etc., play a role in issues, and sometimes preempt the states, weights and measures remains a "States' rights" issue. The Department of Commerce, through NIST, has an Office of Weights and Measures (**OWM**), a non-regulatory agency, which serves to coordinate the activities of states. NIST (formerly the National Bureau of Standards, NBS) established the National Conference on Weights and Measures (NCWM) in 1905. The NCWM is a professional organization of State and local weights and measures officials and representatives of business, industry, consumer groups, and Federal agencies. There are over 750 state, county, and city weights and measures jurisdictions throughout the country.

NIST/OWM partners with the NCWM to develop standards in the form of uniform laws, regulations, and methods of practice, which are then published by NIST. When State or local governments, or Federal regulatory agencies, adopt these standards, they become mandatory.

Essential Relationships National and International Organizations

<i>ORGANIZATION</i>	<i>WHAT IT DOES</i>	<i>OUR RELATIONSHIP</i>
National Conference on Weights and Measures (NCWM)	National standards writing organization where model laws and regulations are developed for adoption by the States. This is the mechanism for uniformity in requirements enforced by the jurisdictions.	We (and a number of key California counties) have maintained leadership roles and participate in the development of the requirements we ultimately will need to live with. Our participation is critical to not only our program, but to California manufacturers and businesses. In most cases, we adopt the model regulations automatically, by reference (NIST Handbooks 44, 133, and 130), so shaping those regulations provides a hand in our own destiny. Through NCWM we are working toward “one stop shopping” with respect to weighing and measuring devices, type approval.
National Type Evaluation Program (NTEP)	Cooperative agreement within NCWM. Through 4 participating laboratories NTEP examines the design, features, operating characteristics and performance of weighing and measuring devices to ensure compliance with national standards.	California Type Evaluation Program (CTEP) is a participating NTEP laboratory.
American Society for Testing and Materials (ASTM)	Develops consensus standards for the petroleum products and engine coolants that we regulate.	We actively participate and adopt standards for gasoline, diesel fuels, motor oils, gear oils, and engine coolants by reference. California is one of the few states that have weights and measures regulating petroleum product standards.
Organization of Legal Metrology (OIML)	An International body which develops standards for weights and measures activities.	We have been active and through OIML have the capability in our CTEP laboratory to test certain devices to OIML requirements.
Asia Pacific Legal Metrology Forum (APLMF)	An International body of Pacific Rim Nations which develops standards for weights and measures activities.	We have been active in this organization.

Regional Organization of the National Conference on Weights and Measures (NCWM)

Throughout the country, the states are organized into various regional groups or associations where weights and measures issues are discussed and proposals submitted to NCWM. These include the Northeastern Weights and Measures Association (**NEWMA**), the Southern Weights and Measures Association (**SWMA**), the Central Weights and Measures Association (**CWMA**), and the Western Weights and Measures Association (**WWMA**).

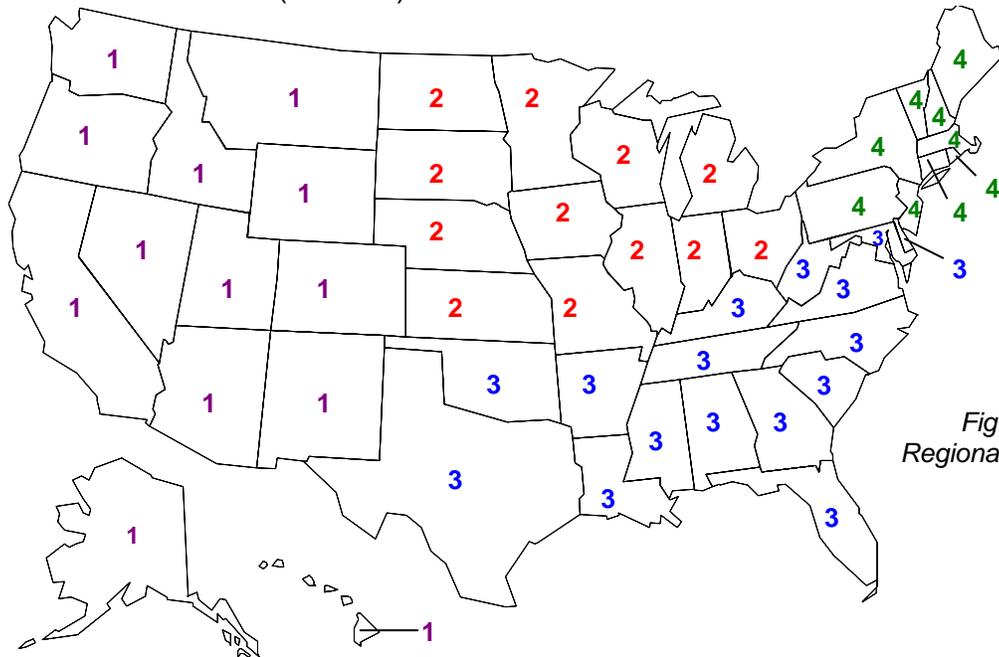


Figure 1.11. Regional Associations

1	2	3	4
Western Weights and Measures Association (WWMA)	Central Weights and Measures Association (CWMA)	Southern Weights and Measures Association (SWMA)	Northeastern Weights and Measures Association (NEWMA)
Alaska Arizona California Colorado Hawaii Idaho Montana Nevada New Mexico Oregon Utah Washington Wyoming	Illinois Indiana Iowa Kansas Michigan Minnesota Missouri Nebraska North Dakota Ohio South Dakota Wisconsin	Alabama Arkansas Delaware Florida Georgia Kentucky Louisiana Maryland Mississippi North Carolina Oklahoma South Carolina Tennessee Texas Virginia West Virginia	Connecticut Maine Massachusetts New Hampshire New Jersey New York Pennsylvania Rhode Island Vermont

Western Weights and Measures Association (WWMA)

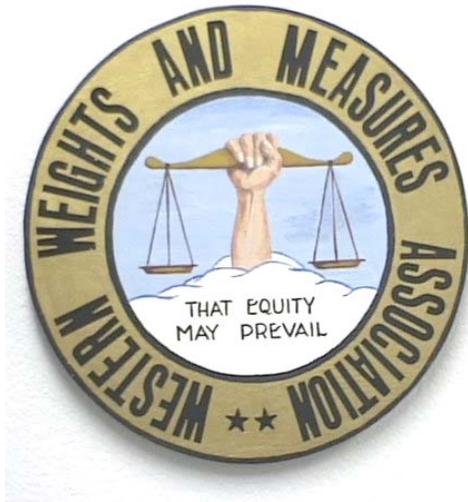


Figure 1.12.
WWMA Logo

The WWMA is our regional tie to the NCWM, and is comprised of 13 western states (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming). California, being such a large and diverse state, has many more issues than the other states in the West. We are able to initiate and develop proposals through the WWMA, which then go to the NCWM as Western proposals, with the support of the region behind them.

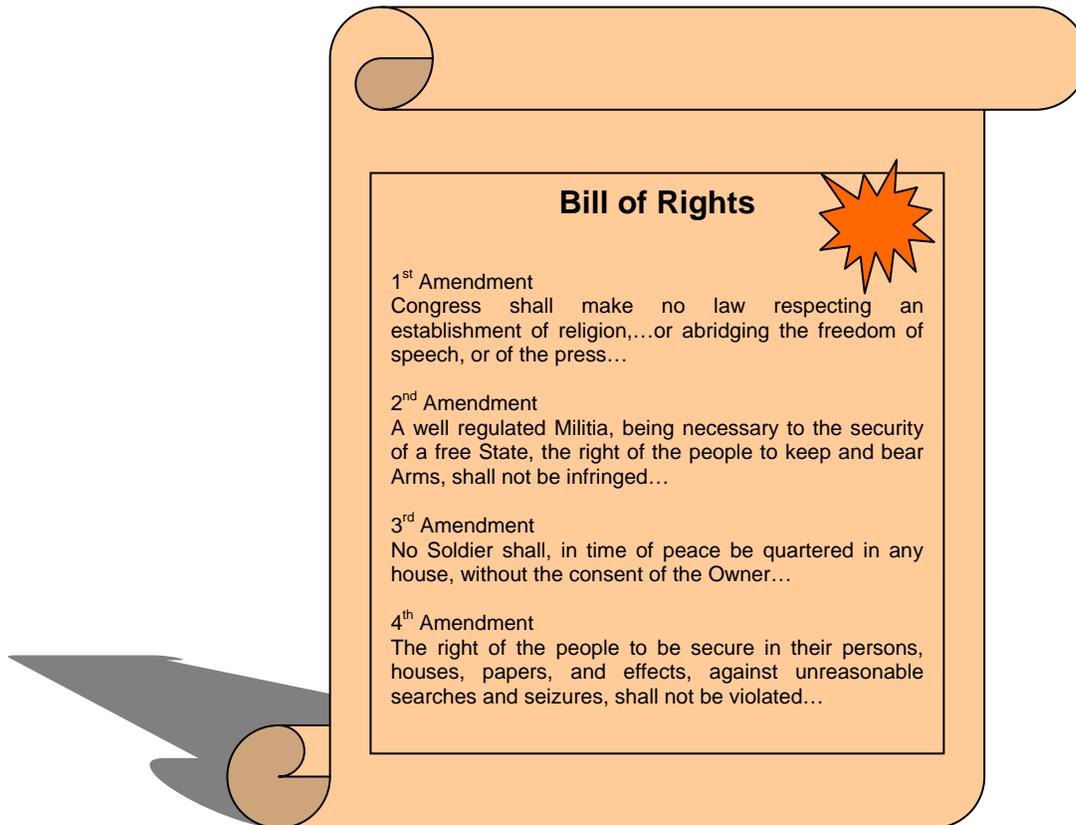
We have taken a strong pro-active stand on uniformity issues as non-uniform requirements create very real trade barriers. With over 700 weights and measures jurisdictions in the U.S., interstate commerce would virtually stop if commodity, device specification, or label requirements differed from jurisdiction to jurisdiction. Manufacturing costs would soar if custom products were required in different regions.



SELF-EVALUATION QUESTIONS

1. What is the mission of CDFA?
2. Which organization develops model weights and measures laws and regulations for adoption by the states?
3. What do the acronyms CACASA, CTEP, WWMA, and NIST mean?

General Legal Principles



In your role as a weights and measures official you will be inspecting devices, products, and documents for compliance with California laws. The actions you take will affect the lives and property of people and may impose liability on you and your employer. There will also be times when you will be investigating violations. The following is a brief overview of the legal principles you will need to be aware of and follow at all times.



General Legal Principles Governing Weights and Measures Laws

Weights and measures laws, in California, are found in the B&P Code, Division 5. All weights and measures laws are criminal in nature and many are strict liability laws. That means that intent is not an element of the crime, the fact that the act occurred is enough to establish a violation. They are classified as misdemeanors unless otherwise specified as infractions. Misdemeanors are punishable by a fine up to \$1,000 and/or six months in a county jail.



Constitutional Issues

Persons who violate weights and measures laws, like any other violator, are innocent until proven guilty in a court of law. Violators have the right against self-incrimination, the right to a trial, and the right to confront witnesses against them.



Due Process

The United States Constitution (fifth and fourteenth amendments) and the California State Constitution both guarantee all people the right to "due process" in the questions of life, liberty, or property. The fundamental requisite of "due process" is the opportunity to be heard, to be aware that a matter is pending, to make an informed choice whether to agree with or contest the action, and to assert before the appropriate decision-making body the reasons for such choice. It is only under the most unusual circumstances that a person can even be temporarily deprived of their property without opportunity for a prior hearing. Unusual circumstances, when the important governmental or general public interest permits postponement of notice and an opportunity for a hearing without deprivation of due process, are generally recognized as health and safety issues; i.e., mislabeled drugs, adulterated food, etc. The potential injury to the public must outweigh the potential injury to the purveyor from a temporary interference with its business.



Search and Seizure

Search and seizure are often referred to as one concept or act. While they frequently go hand-in-hand, they are two separate and completely distinct acts. A search is an exploration to find things. If nothing is found there can not be a seizure. You can have a search without a seizure. A seizure is the taking of custody or control over something. Although a seizure often occurs as a result of a search, you can have a seizure without a search; i.e., you find evidence lying on the ground in plain view.

The fourth amendment to the U.S. Constitution states, in part, that: “The right of the people to be secure in their person, house, papers and effects against unreasonable searches and seizures shall not be violated.” This amendment does not prohibit all searches, just “unreasonable” ones. Even though the amendment does not specify a penalty for a law enforcement officer’s violation of this right, the courts have decided that the remedy for a violation is to exclude the seized item from admission into evidence. This is known as the “Exclusionary Rule”, and briefly stated, it says that illegally seized evidence is inadmissible in court and additional evidence developed from it is also inadmissible – “Fruit of the Poison Tree Doctrine”.



Powers and Responsibilities of Weights and Measures Officials

B&P Code Section 12013 states that: “Any sealer (weights and measures official) has the authority as a public officer to arrest, without a warrant, any person whenever such officer has reasonable cause to believe that the person to be arrested has, in his presence, violated any provision of this division (Division 5), the violation of which is declared to be a public offense.” This section goes on and identifies the procedure by which the sealer may issue a citation to the violator. The important thing to remember is that you are a “public officer,” not a “peace officer”. Do not use force. Call a peace officer when necessary.

Along with your powers as a public officer come many responsibilities. Not only are you required, by the B&P Code, to test and seal commercially used weighing and measuring equipment, verify the quantity statements of packaged goods and bulk products, and oversee the advertising, labeling and quality of petroleum products; but the law also requires that you cause the prosecution of violators of the law you enforce. This means that you must have a working knowledge of investigations, report writing, constitutional guarantees, and the workings of the California legal system.



Levels and Types of Enforcement and Appropriate Use

As previously stated, B&P Code Section 12015 requires weights and measures officials to cause the prosecution of violators of weights and measures law.

Enforcement actions generally start at the lowest level and work up to higher levels. The first step may be a verbal warning for a minor technical violation that can be corrected immediately. A Notice of Violation should be issued for any violation that you observe that can not be corrected immediately or if you feel the violator will not maintain compliance after you leave.

In situations where the commercially used weighing and measuring equipment is found to be out of tolerance, the use of a “red tag” to prevent the equipment’s use until it is repaired is required. Packaged commodities that fail to meet the labeled net quantity statement are removed from sale by the use of an “Off Sale Order” until the violation is corrected.

The Civil Administrative Penalty (CAP) process allows the sealer to impose a penalty upon a violator for weights and measures violations without having to go through the District Attorney’s office and the court. As a general rule, all the legal requirements that apply to a case handled in the court system also apply to a CAP. Technical violations of the law are an appropriate use of this tool.

For serious violations that involve monetary loss to consumers or are fraudulent in nature, a Notice to Appear (direct court citation) or a criminal filing with the District Attorney is appropriate.

Businesses that are operating in violation of weights and measures law such that they are involved in unfair business practices or unfair competition with other businesses may be appropriately considered for a civil filing with the District Attorney or California Attorney General.

The bottom line to keep in mind is that you are trying to gain compliance with the law. Your enforcement action should be appropriate for the magnitude of the violation you observed.



Civil Administrative Penalty v. Criminal v. Civil Prosecution

Typical Civil Administrative Penalty cases involve:

- Infraction and/or misdemeanor charges only, generally technical violations;
- A preponderance of evidence proof burden;
- Penalties in the \$50 - \$1000 range as specified in regulation;
- Relatively minor resources needed for investigation and prosecution (as most cases are settled with a stipulated plea).

Typical Criminal cases involve:

- Infraction and/or misdemeanor charges only;
- Beyond a reasonable doubt proof burden;
- Fines in the \$50 - \$1000 range and possible incarceration;
- Probation, usually summary probation, with a maximum term of three years;
- Relatively modest resources needed for investigation and prosecution.

Typical Civil cases involve:

- Deceptive practices and unfair competition allegations, under B&P Code Sections 17200 and 17500;
- Preponderance of evidence proof burden;
- A limited term or a permanent injunction prohibiting the unlawful practices;
- Potential civil penalties of \$2,500 - \$500,000;
- Agency costs may be recovered;
- Restitution for injured consumers or businesses;
- Substantial investment of resources in relatively complex civil litigation process; most cases are settled through negotiations, but litigated cases require extensive discovery and trial preparation.

Reference Materials and Manuals

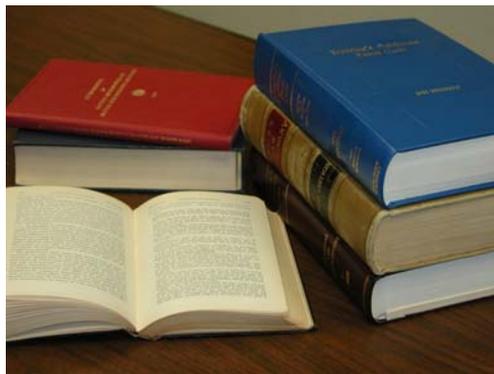


Figure 1.13.
Code Books

The California B&P Code contains the laws designed to govern nearly all business operations in the State. Division 5 is the section that contains the weights and measures law that we are responsible for enforcing. Frequently the law is general in nature and does not provide enough specificity or guidelines to adequately enforce it. These areas generally are overcome by the adoption of regulations that provide the specificity needed to comply with the law and allow for its enforcement.

The California Code of Regulations, (CCR) Title 4, Division 9, contains the regulations that apply to weights and measures law. The Field Reference Manual contains the applicable CCR sections you need for your work. The State, as required or allowed by the B&P Code, adopts many uniform laws and regulations and specifications into the CCR. These include National Institute of Standards and Technology (NIST) Handbooks (44, 130, 133), and American Society for Testing and Materials (ASTM) or Society of Automotive Engineers (SAE) standard specifications. By adoption, these documents become California law.

The B&P Code makes the Division of Measurement Standards (DMS) and county sealers of weights and measures responsible for enforcement of the weights and measures laws and regulations. The B&P Code also requires that the DMS provide instruction and recommendations to the county sealers for the carrying out of their duties. The DMS accomplishes this responsibility by providing the various county weights and measures officials with standardized procedure manuals for their use. These manuals include the Quantity Control Procedure Manual, the Weighmaster Enforcement/Petroleum Products Branch Procedure Manual, the Device Enforcement Program Manual for commercial weighing and measuring devices, and the Weights and Measures Citation Procedure Manual. The DMS also offers and gives on a regular basis, many classroom and field training programs.

There are many inspection tools available to weights and measures officials. These tools include device inspection equipment, end product testing through undercover purchases or sales, and surveillance of suspect businesses. Enforcement tools include yellow unapproved device tags, red out of order tags, off sale orders, condemned petroleum/automotive product tags, notices of violation, citations, and filings with the District Attorney or California Attorney General.



SELF-EVALUATION QUESTIONS

1. What is the punishment for a misdemeanor?
2. Where does the right of “due process” come from?
3. What authority does B&P Code Section 12013 give a weights and measures official?
4. Name at least three manuals that DMS provides to county weights and measures officials?



GLOSSARY

A LISTING OF TERMINOLOGY AND ACRONYMS MOST COMMONLY USED BY WEIGHTS AND MEASURES OFFICIALS.

APLMF - Asia Pacific Legal Metrology Forum

ASTM - American Society for Testing and Materials

B&P - Business and Professions Code

BIPM - Bureau International des Poids et Mesures (more commonly known as the International Bureau of Weights and Measures)

CACASA - California Agricultural Commissioners and Sealers Association

California Agricultural Commissioners and Sealers Association - Alliance of California officials formed to discuss and solve mutual agriculture and weights and measures problems.

California Business and Professions Code - A body of California law, first enacted in 1937, which in general governs the manner in which businesses and professionals conduct their business. When used in these modules, specifically Division 5 pertaining to Weights and Measures and Petroleum Products.

California Code of Regulations - A body of California rules that explains, clarifies, and carries out provisions of California law. When used in these modules, specifically Title 4 Division 9.

California Evidence Code - A body of California law, first enacted in 1965, that consolidated and revised various State laws found in other codes relating to the collection, preservation, and presentation of evidence during a court proceeding.

California Penal Code - A body of California law, first enacted in 1872 that identifies the common law penal (criminal) statutes within the State.

CDFA – California Department of Food and Agriculture

Citation - Also known as a Notice to Appear; a written notification given to a person or business accused of misdemeanor or infraction violations, issued by a law enforcement officer, which by signing, the accused promises to appear in court at a date and time specified.

Civil Administrative Penalty - A monetary penalty imposed on a person or business by an agency for a violation of laws or regulations which that agency has the responsibility to enforce.



GLOSSARY

A LISTING OF TERMINOLOGY AND ACRONYMS MOST COMMONLY USED BY WEIGHTS AND MEASURES OFFICIALS.

Civil Case - An action brought in a court to enforce, redress, or protect private rights, generally any case other than a criminal case.

Civil Litigation - An action brought about to enforce, redress, or protect private rights, generally any case other than a criminal case.

Civil Penalties - Monetary assessments and/or injunctive language imposed by a court to enforce, redress, or protect private rights in any case other than a criminal case.

Convention of the Metre - Diplomatic treaty between fifty-one countries, to develop and maintain international agreement on weights and measures.

Criminal Case - An action brought in court in which the accused is charged with a violation of a law that is identified as a crime. The accused can be brought to trial and found guilty or not guilty and may be sentenced to a monetary fine and/or imprisonment.

Criminal Fines - Monetary assessments and/or imprisonment imposed by a court upon an accused found guilty of a criminal act(s).

CTEP - California Type Evaluation Program

Cubit - Ancient unit of length believed to have derived from the distance between a man's elbow and tip of his longest finger.

“Customary” or “Inch-Pound” System - System of weights and measures traditionally used in the United States based on English units.

CWMA - Central Weights and Measures Association

Device Enforcement - Program within the Division responsible for compliance of commercial weighing and measuring devices with specifications and tolerances in California.

DMS – Division of Measurement Standards

Due Process - A U.S. Constitutional right of a person to be notified of the actions to be taken by a law enforcement officer and the options the person has, the right to review procedures and the authority of the law enforcement officer, and the opportunity to be heard and present their side of the case in any hearing regarding alleged violations.



GLOSSARY

A LISTING OF TERMINOLOGY AND ACRONYMS MOST COMMONLY USED BY WEIGHTS AND MEASURES OFFICIALS.

Exclusionary Rule - A “rule” or decision handed down by the U.S. Supreme Court in 1961 which provides that evidence which has been illegally obtained will be excluded from use at a trial.

FDA – Food and Drug Administration

FTC - Federal Trade Commission

Infraction - A violation of a California law that is punishable only by a monetary fine of up to \$250.

International Standard Kilogram - Platinum iridium artifact made in 1889 which defines the kilogram in the “system international” and is kept at the International Bureau of Weights and Measures in Sevres France.

Legal Metrology - Science of measurement when applied to standards used for regulatory enforcement.

Liaison and Training Unit - One of three units that make up the Weighmaster Enforcement/Petroleum Products Branch that works directly with county weights and measures officials to provide uniform training and assistance in weighmaster and petroleum inspection techniques.

Metric System - Decimal system of weights and measures based on the meter as a unit of length and the kilogram as a unit of mass.

Metrology - Science of measurement

Misdemeanor - A violation of a California law that is punishable by a monetary fine of up to \$1,000 and/or 6 months in county jail.

NCWM - National Conference on Weights and Measures

NEWMA - Northeastern Weights and Measures Association

NIST - National Institute of Standards and Technology

Notice of Violation - Written notification of a violation to the violator.



GLOSSARY

A LISTING OF TERMINOLOGY AND ACRONYMS MOST COMMONLY USED BY WEIGHTS AND MEASURES OFFICIALS.

Notice to Appear - Also known as a citation; a written notification given to a person or business accused of misdemeanor or infraction violations, issued by a law enforcement officer, which by signing, the accused promises to appear in court at a date and time specified.

NTEP - National Type Evaluation Program

Off Sale Order - Written notification ordering the removal of product from sale or devices from service for violations of the Business and Professions Code.

OIML - International Organization of Legal Metrology

OWM - Office of Weights and Measures

Peace Officer - A law enforcement officer, as defined in Chapter 4.5 of the California Penal Code, with general authority to enforce the laws of the State of California.

Permanent injunction - A court order prohibiting a person or business from violating conditions identified in the order permanently or ordering a person or business to undo a wrong or violation. Violations of the injunction can carry monetary penalties.

Petroleum Products - Gasoline, diesel fuel, liquefied petroleum gas when used as a motor vehicle fuel, kerosene, solvent, thinner, liquefied natural gas, white gasoline, engine oil, motor oil, and gear oil.

Preponderance of evidence - A body of evidence that proves the alleged violation(s) beyond a level of more than 50%. This level of proof is applicable in civil administrative penalty hearings.

Primary Standard - Standard of a higher accuracy against which other standards are compared.

Public Officer - A law enforcement officer, who is not a peace officer, with specific authority and responsibilities defined in the statutes the official is charged with enforcing.

Quantity Control - Program within the Division of Measurement Standards that checks the net content of packaged products, verifies bulk purchases and ensures pricing accuracy.



GLOSSARY

A LISTING OF TERMINOLOGY AND ACRONYMS MOST COMMONLY USED BY WEIGHTS AND MEASURES OFFICIALS.

Red Tag - Tag, with the words “out of order” or “condemned” used by a sealer to remove a device from service or product from sale. The tags used for this purpose are red and thus “red tagging” has come to mean removing, “an incorrect device from service” or “non compliant product from sale”.

Standard - Item established for use as a basis of comparison in measuring quantity.

SWMA - Southern Weights and Measures Association

“System International” (SI) - Modern form of the metric system.

Traceability - Unbroken chain of comparisons relating the measurement or value of a standard to stated references.

Traceable Standards - Weights or measures that have documentation tracing their testing and accuracy to other standards.

Type Evaluation - Process by which new weighing and measuring equipment is evaluated to ensure compliance with legal specifications and tolerances.

Unit - Name of a given quantity fixed by definition used to designate a standard.

USDA - United States Department of Agriculture

Weighmaster Enforcement - The Division of Measurement Standards’ program that oversees the licensing and regulation of persons or businesses required to license as a weighmaster.

WWMA - Western Weights and Measures Association



BIBLIOGRAPHY AND REFERENCES

Units and Systems – National Institute of Standards and Technology
Handbook 44



SELF-EVALUATION ANSWERS

Segment 1

1. Weights and measures role is to assure fair and honest commercial transactions.
2. Early standards and systems of weights and measures were derived from parts of the body and natural surroundings.
3. The collection of units and standards that relate to one another.
4. The United States is the only major industrialized country that has delayed in the general use of the “system international”.
5. The Bureau serves as a depository for the primary international standards and as a laboratory for certification and intercomparison of national standard copies.

Segment 2

1. Metrology is the science of measurement and is the basis of weights and measures. When applied to the work we do it is more correctly described as legal metrology.
2. There has to be a standard or standards to which all other units can be traced and there must be procedures by which they can be compared.
3. The United States is unique in that it is the only major country that does not have a national weights and measures program.



SELF-EVALUATION ANSWERS

Segment 3

1. As the population of California grew, the hodge-podge of mining camp laws and residual Spanish system were insufficient for measuring land and grain in agriculture. Accuracy in the weighing and trading of gold was essential.
2. The State Department of Weights and Measures became the Division of Weights and Measures as part of the Department of Agriculture in 1921.
3. The Division of Measurement Standards administers several programs, including Metrology, Type Evaluation, Device Enforcement, Quantity Control, Petroleum Products and Weighmaster Enforcement, and Liaison and Training.
4. The sealers have, through the California Agricultural Commissioners and Sealers Association (CACASA), had considerable input into the development of State mandated programs. In cooperation with the Division of Measurement Standards, CACASA has assisted in formulating policy and enforcing weights and measures laws to assure a more equitable and competitive marketplace for industry and value comparison for consumers.

Segment 4

1. "To preserve and defend the measurement standards essential in providing the citizens a basis of value comparison and fair competition in the marketplace."
2. The National Conference on Weights and Measures (NCWM).
3. California Agricultural Commissioners and Sealers Association
California Type Evaluation Program
Western Weights and Measures Association
National Institute of Standards and Technology



SELF-EVALUATION ANSWERS

Segment 5

1. Misdemeanors are punishable by a fine up to \$1,000 and/or six months in a county jail.
2. The fifth and fourteenth amendments to the Constitution.
3. The authority as a public officer to arrest, without a warrant, any person whenever such officer has reasonable cause to believe that the person to be arrested has, in his presence, violated any provision of Division 5.
4. Quantity Control Procedure Manual; Weighmaster Enforcement/Petroleum Products Branch Procedure Manual; Device Enforcement Program Manual; Weights and Measures Citation Procedure Manual.



MORE SELF-EVALUATION QUESTIONS

Following are more self-examination questions, which will test the knowledge you have gained in this module. Answering them is not required but please take a few minutes to read them before you move on to the next module. No answers are provided, but if you are unsure of a response, rereading the training material will give you the information you need.

1. Why is weights and measures important to trade and commerce?
2. What were some of the punishments enacted on tradesmen who cheated or sold short weight?
3. Why did so many differing systems develop in the world?
4. Name a system of weights and measures that is used by almost every country in the world.
5. How many furlongs are there in a mile?
6. What is the Convention of the Metre?
7. Why is legal metrology so important to the weights and measures official?
8. What cultures contributed to the English system of weights and measures used in the United States?
9. When did the Bureau of Weights and Measures in California become the Division of Measurement Standards?
10. Who was the first state Sealer?
11. What two international organizations (names or acronyms) develop standards for weights and measures activities?



MORE SELF-EVALUATION QUESTIONS

12. Which states comprise the Western Weights and Measures Association?
13. Approximately how many weights and measures jurisdictions are there in the United States?
14. What is the fundamental requisite of “due process”?
15. What is the distinction between search and seizure?
16. Who would be the appropriate agency to take action against a business involved in unfair business practices or unfair competition with other businesses?
17. Describe some of the inspection and enforcement tools available to you.



We would appreciate your taking a few moments to complete our training evaluation feedback form. We welcome your comments and any suggestions you might have regarding Training Module 1. You may E-mail your response to us at DMS@cdfa.ca.gov or mail to Division of Measurement Standards at 6790 Florin Perkins Road, Suite 100, Sacramento CA 95828-1812.

1. Did this module fulfill your expectations?
2. What did you like/dislike about this module?
3. What areas would you like to see improved?
4. What specific changes, if any, would you recommend?
5. How could this module be better organized to make it easier to follow and learn from?
6. Was this module too basic or too advanced for someone with an entry level background in weights and measures?
7. Additional comments or suggestions.