NIST Address to NCWM at their 100th Meeting
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My goal here today is to give you a brief history of weights and measures and the NCWM, and to give you a feel for how and why NIST and NCWM are so closely intertwined.

To set the stage: In 1905 Life expectancy was 47 years; 14 percent of homes had bathtubs and 8 percent had telephones. There were 8000 cars in the US and 144 miles of paved road. Speed limit in most cities was 10 mph. California had 1.4 million people; the 21st most populous state. Tallest building – the Eiffel Tower. Average US wage - $0.22/hour. The American flag had 45 stars – missing Arizona, Oklahoma, New Mexico, Alaska and Hawaii. Two of every 10 adults couldn't read or write. Only 6 percent graduated from high school. Most births took place in the home (95 %)

Feb 13, 1904: A letter was sent by the NBS director to governors of the states proposing a meeting of state sealers. This meeting occurred early in 1905. At the first meeting, Louis Fischer read a paper that gave a brief history of weights and measures in the U.S. Of note, he mentioned the following historical actions.

1781 - In the Articles of Confederation, ratified by the colonies in 1781, there is found the authority for Congress to "fix the standard of weights and measures throughout the United States."

1788 - U.S. Constitution: It is the responsibility of the Congress to regulate both international and interstate commerce and to "fix the standards of weights and measures" in the United States.

Despite this, because Congress took no action, most of the states had adopted and secured their own standards. Studies of the marketplace found there was little uniformity within most states and still less between the states.

May 19, 1828 – Congress adopts the Troy Pound for the standard of coinage. The brass troy pound weight obtained by the United States from London and kept at the Mint in Philadelphia, became the standard troy pound of the Mint of the United States. This became the defacto mass standard in the U.S.

Note: When it was created, the Office of Weights and Measures was under the Treasury Department and prior to the creation of NIST in 1901, that agency defined the units and standards of measurement.

In 1832, large discrepancies were found to exist among the weights and measures in use at the different ports so…

Without waiting for authority from Congress, the Treasury Department, under the direction of Mr. Ferdinand Hassler, had the necessary weights and measures constructed for the customs service.

The avoirdupois pound adopted by Mr. Hassler as the standard for the Treasury Department was derived from the troy pound of the mint.

June 14, 1836: Congress finally directed sets of standards to be completed and delivered to the governor of each state. Most states adopted the standards once received, making the first attempt at uniformity. By 1850, states in the union at that time all had a complete set, and this continued as new states joined, the last set going to North Dakota in 1893. [How many states here today still have some of these original standards?]

July 28, 1866: Metric Act – This Act made it legal to employ the weights and measures of the metric system.

Interesting that only one day earlier: Congress authorized the delivery of metric standards to each State. The first state standards were made of brass.

May 20, 1875: Meter Convention – The US was an original signatory to the Treaty of the Meter. When the reference standards of the U.S. arrived from France (meter and kilogram), they were inspected by the President himself. The U.S. standards resided with OWM from the time of their arrival here.

April 5, 1893 - With the Mendenhall Order, the U.S. defines all customary weights and measures in metric units.

1901 – Congress created the National Bureau of Standards.

Now back to that first meeting in 1905. After Mr. Fischer gave this historical recount, the states provided reports on the status of weights and measures in their states. Here are some notable comments that were made:

The Commonwealth of Massachusetts Deputy Sealer (1905) had this advice - States should create a separate office for weights and measures work, with a State sealer, who should be appointed by and be responsible to the governor. He noted that this system had been adopted and was in force in the State of Rhode Island and that it was working.

He said that the office of sealers in the cities and towns should be placed in the civil-service and an examination required, so those hired are competent for the work. He also recommended that these officers be required to make an annual report of work performed to the State sealer.

Professor Weld, State Superintendent of Weights and Measures in Iowa told an interesting story about the vault at the university in Iowa City which was the original capital of Iowa and included the old capital building where the standards were kept. He said that no one knew what the standards were for or even that they were there. There were rumors that the vault was haunted.

He also said the laws of Iowa with reference to weights and measures were, like those of other States, exceedingly lax. In the rare occasion that standards were sent to Iowa City for inspection, the condition of the standards was pretty bad.

And my favorite quote from the Professor of Mathematics from Iowa: “The time will presently come, I hope, when it will be necessary for me to lay down the office in my own State, in order

to make way for someone whose other interests are not dominant, for someone with the necessary scientific training and endowed with the energy and executive ability essential to successful administration." [When I read this, I think of Ivan Hankins.]

It was reported that in Michigan, when the sealer of weights and measures in Grand Rapids resigned, the mayor decided that the work could be done by the police.

Mr. John Richardson, of Virginia indicated that standards only needed to be tested and sealed every 10 years, which he called a "farce".

Mr. Isaac Brown, of Pennsylvania, suggested that there should be annual meetings of the state sealers with the NBS and that a national law should be developed.

Moving ahead to the 1920 NCWM meeting:

California had developed the prototype for today's weight cart: an "automobile testing truck" with 4 tons of test weights on each.

In Connecticut, gasoline pump inspections were conducted undercover. In 156 inspections, 80 were within tolerance, only 4 gave product away. 50 were short but not beyond 1 quart in 5 gallons. 20 dealers were convicted of violation of the weights and measures law.

In Illinois, 432 gas pumps were inspected and all but two were condemned.

New Hampshire published a brochure called "Practical Facts for the Purchasing Public" to market weights and measures.

States were beginning to pass net weight laws.

In Pennsylvania, inspectors were called "cheater chasers".

In South Dakota, their first year of inspections of devices showed a 90 % compliance rate! But they could only test scales up to 30 pounds and they had two inspectors to cover the whole state.

New York was testing vehicle weights with a portable vehicle scale.

In New Jersey, the State Association believed they had the best set of weights and measures laws in the country, and they had the best paid staff.

Nevada reported that after a visit by NBS in 1911, Nevada passed its first weights and measures law which went into effect in 1913.

In Utah, they equipped two cars for weights and measures work with sleeping accommodations so the inspectors would not have to find a large town with a hotel.

In Vermont, the owners of gas pumps were required to test them before the first sale each day with a sealed measure.

Wisconsin reported using automobile trucks (1 ton) to cover their territory. Three trucks with two men in each.

Maine passed a type approval law, requiring NBS approval on devices used in commerce.

The sale of coal (large and small quantities) was a big deal. It's how people heated their homes!

Let's jump ahead again, to 1935 – the 25th Conference of NCWM. There hadn't been a meeting since 1931 due to the great depression.

Florida sent an Assistant State Chemist, who reported that while the State had no weights and measures division, there was a growing interest in the subject.

Georgia sent a State Oil Chemist, who reported that some changes had been made in the weights and measures law at the last session of the legislature, but stated that it was not being enforced, since no money had been appropriated for this purpose.

In Maryland it was reported that while the State had a general weights and measures law there was no State department of weights and measures to enforce it and that few of the counties had sealers.

In North Carolina it was reported that under the approval-of-type law, some 3,000 types of devices were submitted, and more than 1,000 had failed of approval.

In Virginia it was reported that there were an increased number of jurisdictions now having weights and measures officials and that the State law was now similar to the model law adopted by the NCWM.

In Wyoming it was reported that some types of devices were regularly tested twice **a** year; however, others, such as coal scales and vehicle tanks, were tested only upon request, while still others, including most large capacity scales, were not tested at all on account of lack of personnel and equipment.

In 1935, a tentative code for person weighers (scales used to weigh people) was modified and adopted. These were scales where you put a penny in the machine to get your weight. They didn't have bathroom scales back then. The conference report shows that this topic was discussed at length over a several days.

There was also extensive discussion on vehicle tank measurements.

States were acquiring special equipment for large capacity scale testing.

With the legalization of beer in 1933, legal capacities for beer barrels became an issue.

Did you know there is on record a death during an NCWM meeting? During the night between the first and second day of this conference in 1935, the Deputy sealer of Maine died:

"Apparently he was walking in his sleep, he fell from a window, and it is now announced that he is dead." [I wonder if there's more to this story?]

John Dickinson, Assistant Secretary of Commerce said: We must find where the lines between the Federal Government and the State powers come. Those differences are not very likely to be raised if the Federal power and the State power work hand in hand and step by step in a cooperative manner.

In 1965, the NCWM celebrated their 50th meeting.

43 States and Territories (and DC) represented; over 650 attendees.

Much has changed in 30 years, with the conference now electing officers and a chairman. NBS has changed too. Moving to Gaithersburg later that year (from Connecticut Ave in DC).

NBS Director Allen Austin attended a ribbon cutting ceremony to open exhibition. He reported on the CGPM meeting where they voted to redefine the second in terms of the invariant transition of the cesium atom.

Austin talked about the development at NBS of a new weighing technique for very large weights that would save millions of dollars. It was called elastic weighing and used load cells as comparators. They were also beginning to use lasers for length measurements.

OWM assisted the USPS to develop maintenance test procedures for their scales. At this conference, the USPS welcomed officials and inspectors to test Postal scales.

A model laboratory was on display.

Tom Stabler introduced the new state standards program, the most recent delivery of standards and equipment to the states by NBS. Many of these standards are in use today, while others (Russell balance) have been retired after a long and productive career.

There were strings attached to getting this set of standards. States needed to demonstrate that they had an adequate facility and full time personnel to run the lab. Huge change was taking place at this time. The state laboratory program was being launched. In the meantime, OWM was going to provide calibrations for the states until such time as their labs were ready. I love this quote from the conference report:
"We in the Office of Weights and Measures eagerly anticipate the establishment of weights and measures laboratories in all States of the United States and the training of qualified personnel to perform a most essential service, necessary not only for weights and measures activities of the States, but also for educational institutions, industry, business, and for research and development effort."

And what a success this program has been. We have state labs that today are better than a number of the National Metrology Institutes around the world.

The British had recently announced that they were switching to the metric system over the next ten years. Speculation on US changeover was discussed with agreement that the U.S. would follow suit.

There was a presentation given on "Weighing in 1985", 20 years down the road. In it, was the prediction that instrumentation and computers will be the backbone of industry, and that weighing devices will be more and more associated with data handling of process control equipment.

It was noted in the 1965 annual report that the SMA provided over 5000 Third Man posters that were distributed for Weights and Measures Week. [Ken Tichota from Nebraska is sending one to OWM.]

At this meeting they voted to change the time during which acceptance tolerances should be applied, reducing it from 90 to 30 days.

Also at the 50th meeting, Ohio Chief of Weights and Measures gave a presentation on NCWM – a Program for the Future: He said that the organization of the National Conference will likely change, and talked about how change was good and even important. He also said the following: "However, regardless of the organization [of NCWM], it should have its roots in the National Bureau of Standards- that I do not expect to change."

Jumping ahead again, to 1990:

At this meeting, there was a re-enactment of the first meeting of the conference. How many of you attended the meeting in 1990? And remember this re-enactment? Do you still have the red booklet?

Most correspondence was still done via mail. Documents weren't available online. There was discussion of staggering the publication of the handbooks to reduce costs.

There were 318 delegates (123 guests) and 45 states, two territories present. At that time, 20 states had 100 % membership in NCWM.

Gilles Vinet, Measurement Canada, attended the NCWM meeting in 1990 and determined that they were of value and that Canada would continue participation in the future.

NTEP was still growing, expanding and being adopted by the states.

Polyethylene sheeting was on the L & R agenda, as was camera film, softwood lumber, moisture loss in pasta and pet food, and animal bedding. On S & T, marking requirements for load cells made the list, along with minimum test weight load for railway track scales, and tolerance tables in the scales code.

The National Training Program was underway with 52 jurisdictions signing Letters of Agreement to participate. There was even discussion of a Certification program for NCWM.

Ken Butcher, from Maryland, was one of the Vice-Chairmen nominees to NCWM. Dick Suiter, from Nebraska, was appointed to the S & T Committee.

Incoming chairman N. David Smith talked about preparing for the 21st century. It was a great speech and I look forward to hearing what he has to say this afternoon. He started by talking about the old conference reports, similar to what I am doing now, and he mentioned that some things never change, like the fact that the integrity of the S & T committee had always been questioned. He suggested that the NCWM was undervalued and perhaps consciously avoided publicity. He also talked about what weights and measures would be like in 20 years, and how technology would change all aspects how we do our work. Finally, he challenged the NCWM to take stock of where they were and to plot a course for the future. He even created a task force to shake things up at NCWM. He wanted NCWM to go to the membership rather than having the membership come to the NCWM.

In the 1990 Keynote address by Congressman Valentine from North Carolina, he talked about the challenges we face ahead of us and ended his speech with this: "Therefore, I hope that business and government, at all levels, can continue to work together to meet the challenge. Let's begin now to lay the groundwork so that we have something really big to celebrate in 2015 at the centennial meeting of the National Conference on Weights and Measures."

So here we are 25 years later. Life expectancy is 78.8 years, average wage is $10.50/hour, there are 254 million cars on the road, and 2.65 million miles of paved roads. Many predictions made in previous years have come to pass. Many things have changed, and mostly for the better. A couple of items mentioned in David's speech in 1990 that I believe have changed for the better are that the integrity of the S & T committee is no longer questioned at every meeting and the NCWM is no longer avoiding publicity. Further, the NCWM has taken their services to the membership through its website, an example of which is having NTEP certificates available on mobile devices.

But some things have not changed, including the close relationship between the NCWM and NIST. As in all relationships, there have been growing pains and we've weathered some storms, but the commitment by both organizations to our common mission of uniformity and equity in the marketplace has allowed those times to fade in our memories.

I truly believe the NCWM has never been stronger or more effective than it is today, and it is positioned very well for the next 100 years. I will leave it to your chairman to talk about the specifics of where we are today as an organization, and what's in store for the future.

To paraphrase Louis Fischer at the first NCWM meeting: In conclusion, I know that in preparing such a short summary of so broad a topic, many things have been omitted, but I hope I have succeeded in giving you an outline of the growth and progress of our weights and measures system and the roles that NIST and the NCWM have played along the way.

Thank you very much for your attention. And now I'd like to present, on behalf of the NIST Office of Weights and Measures, this plaque to commemorate the 100th meeting of the National Conference on Weights and Measures.