Dear NTEP Committee,

Badger Meter is a water meter manufacturer, a member of the AWWA Water Meter Manufacturers and Water Meter Committee. Badger Meter, Inc., along with manufacturers Diehl Metering, Kamstrupt, MARS Company, Master Meter Inc., Metron-Farnier LLC, MTW, Mueller, Neptune, RG3, Zenner, consultants Don Faber, Ken Moli, SLserco, does not support ADM-25.1 Addition of Water Meters to the Verified Conformity Assessment Program for the list of covered devices and ask for the item to be withdrawn.

American Water Works Association (AWWA) has many water meter manufacturers that represent and who participate to meet the standards (C7XX) established by Utilities, Manufacturers/Producers and General Interest Members. Water meter manufacturers are held to high standards in terms of materials, design requirements, and ultimately strict accuracy of performance requirements.

Quality meter manufacturers go through an NTEP approval process. In order to meet those requirements, an NTEP inspector reviews current processes and witnesses the accuracy of water meters submitted for approval. Included in the approval is a review of calibration certifications and additional supporting procedures.

AWWA publishes the M6 Manual which provides guidelines for meter selection, installation, and testing. In 2018 a new meter standard, C715 Cold Water Meters Electromagnetic and Ultrasonic Type for Revenue Application, was released as this technology had been around for many years but not for revenue. Along with the new standard, an Addendum to AWWA M6 was released for test guidelines of electromagnetic and ultrasonic meters. It is important to note that these C715 static water meters have an AWWA M6 recommendation that is below the low (minimum) flow than mechanical water meters. Additionally, an update to the AWWA M6 Manual has been in process with improved guidance and clarity for Utilities and General Interest groups to use for testing that is expected to get released in the next 6 months.

National Institute of Standards and Technology (NIST) under Handbook 44, Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices under Section 3.36 Water Meters outlines the code for measuring water. The test recommendation in AWWA M6 Addendum Type I Electromagnetic and Ultrasonic Meters goes below the NIST HB44 3.36 Table N.4.2.b minimum flow rate. This creates a gap for utility test benches to possibly not be up to a standard to test C715 meters at the low (minimum) flow rate when test drafts, repeatability and other component equipment are not at a higher level than the product being tested. Utilities may be working to make improvements and modifications to the test stands but it is not known what percentage could properly test to the AWWA M6.

In 2013, Utah Water Research Laboratory (UWRL) published an article, Meter-Testing Methods Matter by Devan J. Shields, Steven L. Barfuss, Michael C. Johnson and Craig Hannah. UWRL resides within Utah State University and has provided leading water research for half a century. The goal of the article was “to illustrate to utilities that have active meter-testing programs that meter testing methods matter...” Briefly summarizing the article, 5 different mechanical meters were sent to 12 utilities in the United States and the same meters were retested at UWRL. Some of the key conclusions were the low flow differences were within 1.5% between the utility and UWRL while other utilities ranged between 2-4% different. The difference decreased as the intermediate test and maximum flow were compared. Procedurally, not having sufficient volume at minimum flow rate was noted for creating uncertainties

plus flow disturbances could have an impact as well. Even though this article was published in 2013, it is still relevant today if not more with the evolution of static meters for revenue and the low capabilities this technology brings.

The justification in the policy change for the Verified Conformity Assessment Program is the high failure rate of NTEP Certified water meters. Data is a driving force in understanding and making critical decisions in which the ADM-25.1 proposal lacks context to why water meters are failing. Currently, there is no data supporting that the meters purchased were AWWA C7XX meters. Quality is essential for manufacturers, and we go through various steps to ensure we meet those standards. This includes internal and external checks in which an additional audit will impact customer costs.

Meter acceptance is critical to utilities, whether it is mechanical meters, electromagnetic, ultrasonic, etc., but meter manufacturers have noticed various examples that have shown the need to improve meter testing which includes:

1. Meter Test Practice

   The proper procedure of testing to AWWA M6 includes set-up such as meter bore to test stand fittings, which is important to C715 meters. Following a proper purge and/or following meter manufacturers' recommendation is important to remove entrapped air that can create poor results. Hydrating the equipment, valves, and tanks are necessary to ensure a consistent starting point for testing.

2. Uncertainty is not always considered or understood very well. The items noted below are examples that can create uncertainty and influence test results. Each item adds to the overall uncertainty and will have a direct impact to meter results:

   a. Poor scale resolution

   b. Scale repeatability

   c. Weigh scale

   d. Temperature compensation from a constant value vs actively calculating

   e. Manual read vs automated, including an incomplete read of the register (cutting off significant digits)

3. Test bench

   a. Preventive maintenance which includes evaluation of daily or weekly stand checks.

   b. Poor flow rate control valves

   c. Pump influence/pulsation

   d. Proper fittings and lay length should be considered when testing one meter but becomes more important when testing multiple units on a bench

   e. Avoid velocity profile disturbances

f. What is the performance of the test bench for repeatability (Gage R & R)

g. Lack of filters in the test bench

Test benches are a key process in verifying water meters. It is important to understand that utilities are also able to meet the demands needed for keeping test benches on a scheduled preventive maintenance process to ensure proper test practice. Utilities typically will wait to calibrate scales and temperature probes once a year, but if testing is done on a regular basis, a routine audit/calibration is needed on test benches.

With the items outlined above and not understanding the 20% fallout on the high failure rate, we cannot support ADM-25.1 for water meters to get added to the list of covered devices for auditing. If a task group is formed to further understand the fallout details, we would like to be included in the task group. If there are any questions or additional information we can provide, please let us know.

Sincerely,

Badger Meter, Diehl Metering, Kamstrupt, MARS Company, Master Meter Inc., Metron-Farnier LLC, MTW, Mueller, Neptune, RG3, Zenner, Don Faber, and Ken Moli

Additional requests to sign following the submission (added by NCWM on request):

- RG3 Water Meters (per email from Lee Gregory)
- Ken Molli
- Zenner Water Meters USA (per email from Dan Devane)
- Diehl Metering (per email from Dr. Harman Shihn)
- Neptune Technology Group (per email from Wyatt Northrop)
- Mueller Systems (per email from Jeremy McCraven)
- Kamstrup (per email from Sondra Brown)
- J. Don Faber
- Monte Merkel
- MARS Company (per email from Mike Mastic)
- Xylem Corporation [Sensus] (per email from James Smith)
- Craig C. Hannah, P.E.
- Metron Farnier
- Martin Cole of MTW