

# **Automatic Temperature Compensation Steering Committee**

**Progress Report  
January 28, 2008  
Albuquerque, NM**



# Background

- **Year 2000:**
  - **S&T presents item to address ATC in H44 VTM Code**
  - **L&R presents item to recognize ATC in H130 Method of Sale Regulation**
- **Year 2007:**
  - **Still no resolution**
  - **Items are expanded to include all retail sales**
  - **Membership is divided**
  - **Politicians and media getting involved**

# Background

- **January 2007: NCWM Board receives request to form a Steering Committee for ATC**
- **May 2007: Steering Committee is appointed**
- **June 2007: Steering Committee conducts conference call**
- **July 2007: Steering Committee requests a meeting with stakeholders**

# Background

- **July 2007: NCWM Board agrees to fund a meeting**
- **August 2007: Open meeting is held in Chicago, IL**
- **Fall 2008: Presentations of the Steering Committee at regional meetings**
- **Feedback obtained from stakeholders**

# Purpose of Steering Committee

- **Identify key issues surrounding possible implementation of ATC at retail**
- **Develop a plan to address those issues**
- **Present the plan to the NCWM Board of Directors**
- **Oversee implementation of its plan**
- **Communicate with NCWM membership**

**BOTTOM LINE: Assist NCWM membership in reaching resolution to ATC at retail**

# Committee Members

- **Don Onwiler (NE): Chairman**
- **Ross Andersen (NY)**
- **Stephen Benjamin (NC): L&R**
- **Ron Hayes (MO)**
- **Henry Oppermann: Consultant**
- **Richard Suiter (NIST): S&T Technical Advisor**
- **Ted Kingsbury (Canada): Technical Advisor**

# Chicago Meeting Attendees

- **W&M Officials: 16**
- **Petroleum Marketers Associations: 16**
- **Equipment Manufacturers: 11**
- **Advisory: 3**
- **Oil Companies: 2**
- **Consumer Groups: 2**
- **Service Industry: 2**
- **Press: 1**

**TOTAL ATTENDANCE: 53**

# Method of Sale Issues

- **Product Densities**
- **15° C vs. 60° F**
- **Permissive vs. Mandatory**
- **Labeling and Signage**
- **Tax Data**
- **Temperature Data from Retail**



# Technical Issues

- **Temperature Data from Retail**
- **Field Test Procedures**
- **Specs for Temperature Probes Used by Inspectors**

# **NTEP Issues**

- **Response Time of Thermometer Wells**
- **Identify existing checklists that might serve as models for NTEP evaluation**

# Product Densities

- **Different liquids have different expansion coefficients**
- **Gasoline composition changes seasonally and is based on the area in which the fuel is being marketed**
- **Other factors affecting the density of gasoline are caused by crude oil sources, refinery processes, and octane adjustment components**

# Product Densities

- **In the winter months, several marketers will blend No. 1 diesel fuel or kerosene with No. 2 diesel fuel**
- **Beginning in June, 2006, ultra low sulfur diesel (ULSD) was introduced into the market at a slightly lower density**
- **Jet fuels, aviation gasoline, and alternative fuels including E85 fuel ethanol and bio-diesel fuel have different densities**

# Product Densities: Wholesale

- **ASTM D 1250 Petroleum Measurement Tables are used by the industry to obtain the temperature volume correction factors (VCF) of hydrocarbon fuels**
- **The product density must be known in order to obtain the corresponding VCF**
- **Historically, this has worked well as the product density is measured many times from the time it leaves the refinery up to the time it is loaded onto trucks at the terminal loading rack**

# Product Density: Retail

- **New product delivered to a retail filling station co-mingles with existing fuel in the storage tank resulting in a change of density**
- **When actual densities are unavailable, a predetermined average for the specific product will be necessary**

# Density Data

## **Data received by the committee included:**

- Alliance of Automobile Manufacturers' North American Fuel Survey, Summer 2006 and Winter 2007
- Missouri's Fuel Quality Program of Retail and Terminal sample data
- Minnesota's Fuel Quality Program of retail samples
- State of New York's Fuel Quality Program retail sample data
- Northrop Gruman, Motor Gasolines and Diesel Fuel Surveys
- Average density values established in Canada
- Default density values meter manufacturers use

# Density Data: Gasoline

- **Comparing the Missouri, New York, and Minnesota data with the AAM data, the specific gravity (60°F/60°F) of gasoline and 10% ethanol blends averaged 0.739 g/ml.**
  - This average was applying more of a weighted factor for regular grade gasoline since approximately 90% of the gasoline sold is this grade.
- **The 0.739 value is very close to the AAM survey data average of 0.740 g/ml.**



# Density Data: Diesel

- Likewise, the average density of No. 2-D provided by the state labs showed an averaged SG of 0.846 g/ml, the same value as AAM reported.
- The state labs' data were taken on full year basis where the AAM data represents 4 months of the year

# Comparing US Density

- **Canada uses a density of 0.730 g/ml @ 15°C for gasoline. (converted to SG (60°F/60°F), it is equivalent to 0.7302)**
- **Canada uses a density of 0.840 g/ml for diesel (equivalent to SG of 0.8404)**
- **These same reference densities are also used by vehicle tank meter manufacturers at arriving with their default VCFs**

# Average U.S. Gas Density vs. Canadian Standard Density

## Typical Personal Vehicle Fill Up

		Gross	Net Gallons	
	Density	Gallons	30°F	90°F
Canadian	0.730	20.000	20.416	19.584
U.S. Gasoline	0.739	20.000	20.408	19.592
	Differences		-0.008	0.008

# Recommendation to L&R

**Table 2.31.X. Reference Tables and Fuel Densities for Temperature Correction**

Fuel	Reference Table for wholesale or retail temperature correction	Standard Fuel Density for retail transactions (optional density for wholesale transactions)
Gasoline, gasoline-oxygenate blends (3.7 mass % oxygen, max.), gasoline ethanol blends (10 vol. %, max.)	API Table 6b	62 API (730 kg/m <sup>3</sup> )
Diesel Fuel (grade 2-D), biodiesel blends (20 vol. % biodiesel, max)	API Table 6b	37 API (840 kg/m <sup>3</sup> )
Other fuels TBD		

# Response Time of Thermometer Well

- **The response time will vary according to wall thickness, size of well, etc.**
- **Limits may be necessary for response time**
- **OIML R 117-1 has standards for our consideration**
  - Bases response time on flow rate
  - Committee concerned if it is realistic

# Committee Recommendation

- **More Study**
  - NIST will conduct tests of various thermometer wells
- **Measuring Sector would eventually define the standards**
- **Steering Committee may make recommendations to Sector once it has reviewed NIST data**

# Referencing 15 °C vs. 60 °F

- **Small, but noticeable difference**
- **Referencing 15 °C would result in:**
  - Loss of about 97 million gallons (0.069%) of gasoline
  - Loss of about 17.2 million gallons (0.048%) of diesel fuel
- **Provers are calibrated to 60 °F**
- **OPEC and U.S. industry reference 60 °F**
- **15 °C would be consistent with Canada**

# Recommendation

- **NCWM S&T Committee and L&R Committee should reference 60 °F and 15.56 °C in any proposals related to recognition of automatic temperature compensation**



# Field Test Procedures

- **W&M officials are interested in:**
  - Equipment required
  - Time required
  - Overview of the test procedures
  - Additional training required

# Field Test Procedures

- **Ross Andersen traveled to Canada to conduct tests to compare results of Canada test vs. our proposed test**
  - His presentation from Chicago is on the NCWM web site at [www.ncmw.net](http://www.ncmw.net)
- **Results of comparison are consistent**
- **ATC requires additional steps, but certainly doable**

# Recommendation

- **Presentations were provided at regional meetings last fall**
- **Membership will provide feedback on preferences in test procedures**
- **Steering Committee may develop proposals for H44 LMD Code**
- **May lead to future modification of LPG and VTM codes if new procedures are preferred**

# **Specifications for Temperature Probes Used by Inspectors**

- **R-117 specs do not apply to inspector probes**
- **Comparisons were made between liquid-in-glass and digital thermistors during Ross's visit to Canada**
- **Results of both were acceptable**
- **Thermistor provides quicker response time**

# Recommendation

- **Liquid-in-glass is not recommended: it is slow response time and too fragile**
- **Temperature probes should digital thermistor**
- **Probes should be lab certified**
- **Accuracy of  $\pm .5$  ° F**
- **Resolution of  $.1$  ° F**

# Best Plan for Implementation

## ■ Basic options

- No implementation (no ATC)
- Permissive ATC
- Permissive to Mandatory ATC
- Mandatory without permissive phase-in

# Should We Adopt ATC?

- **Not the role of the Steering Committee to answer this question**
  - No clear evidence whether it would save money for consumers
  - ATC would provide transparency in unit price vs. volume.
- **The Committee explored options of how it could be implemented**
- **Obtained feedback on these options**

# Best Plan for Implementation

- **Considerations include**
  - Availability of NTEP certified devices
  - Limiting consumer confusion
  - Fairness to small markets with limited ability to recover cost of conversion
  - Equipment and training needs of inspectors



## Potential ATC Implementation Timelines

Option 1	Do Nothing: Make no change to existing requirements (possibly mandate gross sales for uniformity)		
Option 2	HTEP approval	← ATC may be used - no mandatory deadline (L&R Proposal) <b>Permissive Use of ATC</b>	
Option 3	HTEP approval	← Effective date: Permissive use of ATC <b>Permissive Use of ATC</b>	← Retroactive date: ATC in use <b>Mandatory Use of ATC</b>
Option 4	HTEP approval	← Effective date: Permissive use of ATC <b>Permissive Use of ATC</b>	← Nonretroactive date: New devices equipped with ATC ← Retroactive date: ATC in use <b>Mandatory Use of ATC</b>
Option 5	HTEP approval	← Nonretroactive date: New devices equipped with ATC ATC not turned on	← Effective date: ATC may be turned on <b>Permissive Use of ATC</b> ← Retroactive date: ATC in use <b>Mandatory Use of ATC</b>
Option 6	HTEP approval	← Nonretroactive date: New devices equipped with ATC ATC not turned on	← Retroactive date: ATC in use <b>Mandatory Use of ATC</b>

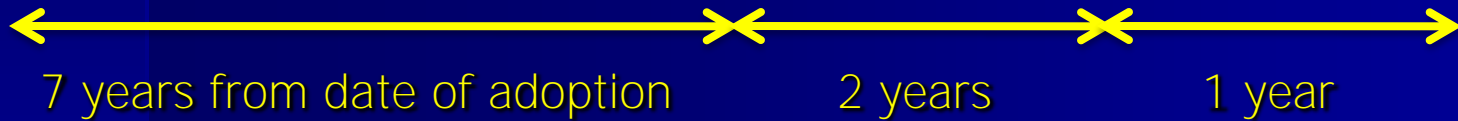
Note: The length of each bar is not to any scale and for presentation purposes only. All dates will be set in regulation, i.e. in HB44 or Hb130.

# **NIST HB130 Method of Sale Regulation**

## **Preamble:**

**The purpose of this regulation is to require accurate and adequate information about commodities so that purchasers can make price and quantity comparisons.**

# Committee Recommendation



# Disclosure to Public

- **Committee discussed necessity of disclosure of ATC on:**
  - Street signs
  - Dispensers
  - Customer receipts and invoices
- **All are deemed necessary**
- **Committee discussed standardized methods and words or symbols**

# Recommendation to L&R

- **Street Signs:** "ATC"
- **Dispenser Labels:** "Volume Corrected to 60 °F"
- **Receipts and Invoices:** "Volume Corrected to 60 °F"

# Tax Implications

- **The Steering Committee surveyed states to study how adoption of ATC would effect collection of taxes**
- **Would there be tax conflicts if the NCWM moved to adopt ATC?**
- **The survey questions and a brief summary of the responses are included in the Committee report**
- **The Committee did not address issues of windfalls and shortfalls, but only if there would be conflicts**

# ***Conclusions and Questions:***

- **The vast majority of taxes are collected at the wholesale level in all states.**
- **Seven (7) of the 20 states responding indicated there were conflicts that would require tax legislation or rule changes to permit use of ATC at retail.**
- **Those states collecting taxes on a gross basis are predominantly in cooler climates, i.e., MI, MN, MT, NE, NJ, SD, and WI.**
- **Those states specifying a net basis were predominantly in warmer climates, i.e. AL, AZ, KS, and SC.**

# ***Conclusions and Questions:***

- **The remainder would permit either gross or net reporting.**
- **There are issues revolving around collection of some or all of the sales taxes at the retail pump in several states. Will the change from gross to net result in significant seasonal changes in collections?**
- **The Committee remains convinced that W&M officials must continue to work and communicate with Tax counterparts to ensure that any conflicts are addressed in parallel with actions of the NCWM on ATC.**



# Temperature Data

- **Data is vital to understand true impact of ATC on volume measurements**
- **S&T developed standardized method for data collection**
- **Carol Fulmer and Don Onwiler provided Excel spreadsheet to all states**
- **Data to be submitted to Steering Committee for compilation and analysis**

# Temperature Data

- **Deadlines to submit:**
  - December 15, 2007
  - June 15, 2008
- **Submit to Henry Oppermann via email at [wmconsulting@cox.net](mailto:wmconsulting@cox.net)**

# **NTEP for ATC**

- **NTEP has not evaluated ATC devices**
- **Committee believes devices should be subject to NTEP if NCWM adopts ATC**
- **Timeline for implementation should allow for evaluation and certification**
- **NTEP should consider Canada and OIML**
- **NTEP may be able to use evaluation data from Canada and California to speed certifications**

# Conclusions

- **It is not clear whether current pricing structures t retail compensate for temperature**
- **ATC would provide enhanced transparency in pricing (all prices reflect a 60 °F gallon)**
- **ATC is a superior method of measurement**

# Conclusions

- **Additional equipment for the inspector is a digital thermistor**
- **The additional time to conduct the inspection is manageable**
- **The ability of the retailer to recover the cost of conversion to ATC will depend on throughput of a given station**

# Conclusions

- **The effect of conversion to ATC on the unit price for fuel will depend on throughput of a given station**
- **The Steering Committee has made recommendations to L&R for the best approach to ATC if it is adopted**
- **Future recommendations from the Steering Committee to address field test procedures are likely**

# In a Nut Shell

To quote Ross Andersen, "We can do this."

Each of us must decide for ourselves if the benefit of transparency in the measurement system is worth the cost of implementation to the retailers and consumers