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Executive Director
New Hampshire Public Utilities Commission
21 South Fruit Street, Suite 10
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RE: Docket No. DRM 11-077, Revisions to Part Puc 512 – LP and Landfill Gas Pipeline Safety Standards.

Set forth below are specific comments to the Commission's proposed changes to Part Puc 512 pursuant to the Order of Notice dated September 27, 2012, Docket No. DRM 11-077.

1.) Section Puc 512.02 (b) Compliance with Federal Standards Required

Eastern asks the commission to **not** delete (1) and (2) of this section. Deleting subsection (1) and (2) in (b) of this section will present issues for propane operators because there are conflicts between the requirements of NFPA 58 and 49 CFR 192. In certain circumstances, it is nearly impossible to comply with 49 CFR 192 for requirements which were written for natural gas systems not propane. NFPA 58 adequately addresses the conflicting areas and does not present a safety issue to the general public. Similarly, when something is not covered in NFPA 58, 49 CFR 192 adequately covers the matter.

Furthermore, 49 CFR 192.11(c) now provides that NFPA 58 prevails when there is a conflict between the two requirements. Although PHMSA has been discussing the possibility of removing this provision, they have not done so at this point. They recognize the potential issues this may cause. The propane industry has been working with PHMSA along with a member of the NH PUC staff, who together has identified any conflicts between the two requirements and is working to develop solutions for these concerns.

2.) Section Puc 512.09 (g) Construction and Maintenance

Eastern asks the commission to consider changing the proposed language in this section regarding odorant testing for the following reasons:

- NFPA 58 section 4.2 covers the testing requirements for propane odorant by sniff testing the product when it is distributed into a bulk storage tank. Although 49 CFR 192.625 covers testing for odorant, so does NFPA 58. 49 CFR 192.11 (c) indicates if there is a conflict between the two requirements, then NFPA 58 prevails.

- DOT requires carriers who transport propane over the roads to indicate on a shipping paper if the propane is odorized. Many propane marketers meet this requirement by conducting an additional sniff test when loading propane from the bulk storage tank into the cargo tank on the delivery vehicle and documenting this test. That way all propane being delivered into a consumers propane container has been documented it is sufficiently odorized.
- The requirement to use an odorometer adds an additional, overly burdensome and expensive requirement to propane marketers with no gain in public safety. The odorometer test method still relies on a person's sense of smell except it informs you of the particular concentration where it is detected by smell. At the end of the day, the objective is to make certain all propane consumers receive odorized propane. Our industry is already doing more than what is required by NFPA 58 or the federal code by conducting additional sniff tests.
- Our industry has not had an incident on a propane jurisdictional system where the lack of odorant was identified as the cause of the incident or even a contributing factor to the incident. Eastern conducts annual odor tests of all jurisdictional systems and we have *never* found an issue of unodorized propane with these system. We believe that other operators would confirm this experience.
- There are currently no other states that we are aware of that require propane operators to conduct odor testing by using an odorometer only.
- The cost to propane operators is substantial for purchasing, calibrating and maintaining equipment, training personnel on the proper use of the test equipment, and conducting the quarterly tests. Eastern has 15 different bulk plants which supply propane to NH jurisdictional facilities that would need to be tested 4 times per year. Because of the geographical area of these facilities and travel time to reach them, a technician would only be able to complete 3 facilities each day. 15 bulk plants would take one person 5 days to complete the testing 4 times per year. Testing alone using an odorometer would cost Eastern $20,000 annually. This cost is based on 3 tests per day times 5 days = 15 facilities times 4 tests per year = 60 individual tests. Labor is calculated by 5 days at 8 hrs/day = 40 hrs X 4 times per year = 160 hrs times $125.00 labor rate for the employee and vehicle = $20,000 per year. This breaks down to $333.00 per test ($20,000 divide by 60 tests per year). The cost to purchase the instrument is $2,870.00. The cost to train at least 2 employees (one as a backup) is $1,000.00. The cost to maintain the test equipment is unknown. The manufacturer does recommend sending the instrument to them on an annual basis and when using them for propane, they have indicated additional maintenance will be needed because the odorant (ethyl mercaptan) used to odorize propane can saturate the internal hoses which will not allow the unit to operate properly. Our best estimated annual cost for the instrument maintenance is $450.00. Our total cost to purchase one

instrument, train two employees, maintain test equipment, and conduct the quarterly tests is $ 24,320.

- During the public hearing at the commission on October 19, 2012, it was mentioned by a PUC staff member that the industry could share these expensive instruments to keep our costs down or that the Propane Gas Association of New England could purchase one and share it with its members. Eastern would like to express our concerns regarding shared liability that comes with many different companies using the same instrument and we would not take part in this because of the increased liability. Without a doubt our insurance carriers would feel the same way. Sharing a procedure with the competition is a lot different than sharing an instrument like an odorometer with them. Also during this hearing I testified that the Heath Consultants Odorator has a temperature range from 32 degree F. to 120 degrees F. Since then, we have found out that the only real issue when using it below 32 degrees F. is that the LED may not display and the instrument would need to be warmed up.

We ask the Commission to consider the following language regarding testing for propane odorant:

Puc 512.09(g) Each LPG operator shall test for odorant levels in accordance with (f) above at least quarterly each calendar year, with intervals not exceeding three and a half months at the operator bulk plant that supply LPG to LPG jurisdictional systems. These tests will be performed with an odorometer or equivalent device capable of determining the percentage of gas in air at which the odor becomes readily detectable by the tester in accordance with 49 CFR 192.625. **An alternative means of complying with this requirement is the use of a stain tube test in accordance with ASTM D5305-97 standard. Records shall be preserved documenting each delivery from the operator bulk plant to a LPG jurisdictional system for a period of not less than 2 years.**

Although we believe the current sniff testing is adequate for the safety of the general public, we would support a requirement to conduct a stain tube test as indicated.

This additional information will allow an LPG Operator to choose another effective means to test for propane odorant on a quarterly basis at the bulk plant facility that supplies propane to a jurisdictional system. Although there is still an additional cost to the operator, it is substantially less than the odorometer. There is no equivalent device to an odorometer, but the stain tube test as indicated in the ASTM D5305-97 standard (attached as exhibit A), will rapidly determine the presence and concentration of ethyl mercaptan in LP-gas vapor. LPG Operators may choose to purchase an odorometer and use it to conduct the odor testing.

Both of these testing methods will effectively determine if the propane is properly odorized once a quarter. The rule also requires LPG Operators to conduct an annual sniff test or any time maintenance is performed at a jurisdictional system. The sniff test has been effectively utilized in this industry for years and will continue to be.

Although NFPA 58 is not silent on odorant verification, and a conflict exists between NFPA 58 and 49 CFR 192.625 and NFPA 58 should prevail, we support the proposed language above regarding the need to use either an odorometer or a stain tube test once a quarter.

Eastern has and will continue to support safety rules and regulations that will help make propane systems safer for our customers as well as the general public. We have many jurisdictional systems throughout NH and we are committed to doing what is best for the safety of our customers with procedures that are tested and used within the industry.

Thank you for the opportunity to express our concerns for the changes to these rules. We look forward to seeing the final rule and hope you will consider our comments when making your final decision. Please contact me at any time with questions by calling 603-332-2080.

Respectfully submitted,

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EXHIBIT A

Designation: D5305 – 97 (Reapproved 2007)

Standard Test Method for Determination of Ethyl Mercaptan in LP-Gas Vapor[1]

This standard is issued under the fixed designation D5305; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers a rapid and simple procedure using length of stain tubes for field measurement of ethyl mercaptan in the vapor phase of LP-gas systems. Although length-of-stain tubes are available to detect ethyl mercaptan concentrations in the range of 0.5 to 120 parts per million volume (ppmv), this test method is specifically applicable to systems containing 5 ppmv or more of ethyl mercaptan in LP-gas vapors.

NOTE 1—A chromatographic technique can be used for more precise, quantitative determination of ethyl mercaptan in LP-gas.

1.2 The values stated in SI (metric) units are to be regarded as the standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *NFPA Standard:*[2]

NFPA 58 Standard for the Storage and Handling of Liquefied Petroleum Gases

3. Summary of Test Method

3.1 Using a manually-operated vacuum pump, a sample of LP-gas is drawn through a detector tube made specifically for detection of mercaptans. The length of stain (color change) produced in the detector tube when exposed to a measured volume of sample is directly proportional to the amount of ethyl mercaptan present in the sample being tested. The length of stain produced in the detector tube is converted to concentration, in parts per million volume (ppmv), by comparison with a calibration scale provided by the manufacturer of the stain tubes.

4. Significance and Use

4.1 LP-gas is colorless and odorless, and not detectable by normal human senses. To provide an olfactory warning in the event of a leak, LP-gas intended for domestic or commercial use is intentionally odorized so as to be readily detectable well below flammable or suffocating concentration levels of LP-gas in air. (See Appendix X1.) The most common odorant for LP-gas is ethyl mercaptan. The field use of this test method will rapidly determine the presence and concentration of ethyl mercaptan in LP-gas vapor without the necessity for complex laboratory equipment.

5. Interferences

5.1 Detector tubes can be subject to interferences from materials other than the target substance. Methyl mercaptan will likely interfere with tubes designed to measure ethyl mercaptan. Because of different detection chemistry by different manufacturers, interferences can vary. Consult the manufacturer's instructions for specific interference information and observe any instructions given.

5.2 Propylene (propene) will cause an interfering (gray) discoloration with some tubes designed for ethyl mercaptan. LP-gas from natural gas sources usually does not contain propylene (propene). However, LP-gas produced in refinery operations often does contain propylene (propene). Detector tubes calibrated for *t*-butyl mercaptan eliminate this interference, and should be used if the presence of propylene (propene) is suspected. Some tubes designed for measurement of *t*-butyl mercaptan are calibrated in milligrams per cubic metre (mg/m^3) and should be converted to ppmv ethyl mercaptan as shown in Annex A1.

6. Apparatus

6.1 *Pump*—A manually-operated vacuum pump, capable of drawing 100 mL per stroke of sample through the detector tube with an accuracy of ±2.0 mL.

6.2 *Detector Tubes*—Sealed tubes, made of glass with break-off tips sized to fit the orifice of the pump used (tubes and pumps from different manufacturers should not be interchanged). The tube used must be appropriate for the determination of ethyl mercaptan and must produce a distinct color change when exposed to a sample of LP-gas containing ethyl mercaptan. Any substance known to interfere must be listed in

[1] This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.H0 on Liquefied Petroleum Gas.

Current edition approved May 1, 2007. Published June 2007. Originally approved in 1992. Last previous edition approved in 2002 as D5305 – 97 (2002). DOI: 10.1520/D5305-97R07.

[2] Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, http://www.nfpa.org.

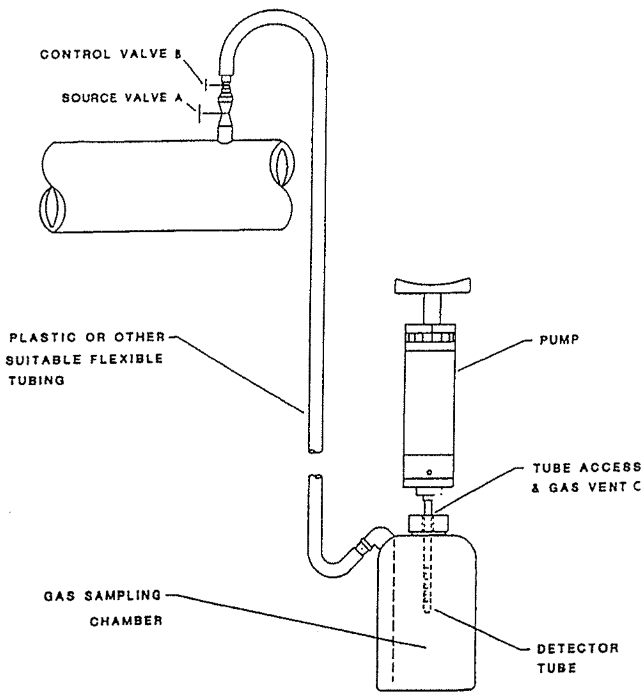

FIG. 1 Half Litre Polyethylene Bottle

instructions accompanying the tubes (see 5.2). A calibration scale or other markings referenced to a scale must be etched directly on the tube to allow direct interpretation of ethyl mercaptan concentration.[3]

6.2.1 Detector tubes must be calibrated for a tube temperature of approximately 20°C and normal atmospheric pressure. Shelf life of the detector tubes must be a minimum of two years when stored according to the manufacturer's recommendations.

6.2.2 Detector tubes and pumps form an integrally designed unit, that must be used as a unit. Each manufacturer calibrates detector tubes to match the flow characteristics of its pump, and the use of one brand of tube with another brand of pump will give unreliable results.

6.3 A suitable container can be devised from a half-litre polyethylene bottle (see Fig. 1). A 6 mm outside diameter polyethylene tubing sealed into the bottle and discharging near the bottom of the bottle provides for flow into the sampling container. A 12 mm hole cut into the cap of the bottle provides both access for the detector tube and a vent for the excess gas flow.

6.3.1 *Gas Sampling Container*—Any container of a material that is not reactive with mercaptan and that provides for access of the detector tube into a uniform flow of sample gas at atmospheric pressure and isolated from the surrounding atmosphere.

6.4 *Needle Valve and Tubing*—A stainless steel needle valve that can be adjusted to control the flow of gas into the sample container. Although a stainless steel needle valve is preferred, a pressure regulator can be used in lieu of a needle valve to control the flow of gas into the sample container. Polyethylene or TFE-fluorocarbon tubing can be used to connect the needle valve or pressure regulator to the gas sampling container.

7. Sampling

7.1 Select a sampling point that provides access to a representative sample of LP-gas vapor from the container to be sampled.

7.1.1 Open the source valve (Valve A in Fig. 1) and blow down vigorously to clear foreign material from the source valve and connecting nipple. Close the source valve.

7.1.2 Install the control valve (Valve B in Fig. 1) or pressure regulator on the outlet of the source valve. Connect outlet of the control valve to the gas sampling container using the shortest length practicable of suitable tubing.

7.1.3 Open the source valve and then the control valve to obtain a slight positive flow through the gas sample container, venting to atmosphere through the tube access and vent (Vent C in Fig. 1). Purged gas must be vented at a sufficient rate so that pressure does not build up in the sampling container and increase the flow rate through the detector tube.

7.1.4 Purge the gas sample container for at least 3 min to displace air.

7.1.5 Maintain flow of LP-gas during the test procedure in Section 9.

8. Preparation of Apparatus

8.1 Before sampling, all sampling equipment should be thoroughly clean and dry.

8.2 Immediately before each series of tests, test the pump for tightness in accordance with manufacturer's instructions. A loss in vacuum on the pump within 60 s indicates a leak. If a leak occurs, follow the pump manufacturer's instructions for re-sealing the pump and retest. If the pump vacuum cannot be maintained, do not use the pump for testing.

9. Procedure

9.1 Select the tube range that includes the expected concentration of ethyl mercaptan present in the sample. Reading accuracy is improved when the stain extends at least one-half of the tube length. Consider multiple strokes or a lower range tube, or both, to achieve this length of stain.

9.2 Break off both tips of the glass stain tube and insert the outlet of the tube (indicated by arrow in direction of flow) snugly into the pump head. Temperature of tube must be maintained in the 0 to 40°C range throughout the test.

9.3 Insert the detector tube well into the gas sampling container through the tube access and vent (Vent C).

9.4 Operate the pump to draw a measured amount of sample through the detector tube. Within any limits set by the manufacturer's instructions, use multiple strokes to achieve a stain extending to approximately one-half the tube length.

9.5 Remove the tube from the pump and follow the manufacturer's instructions if further handling of the tube is necessary.

[3] Detector tube No. 72, manufactured by Gastec Corporation, based on the palladium sulfate detection principle, is calibrated for ethyl mercaptan; Gastec detector tubes No. 75 and 75L, using mercuric chloride detection chemistry, are calibrated for *t*-butyl mercaptan. Other manufacturer's tubes may be based on other detection chemistry.

9.6 Immediately (within 30 s), read the concentration of ethyl mercaptan from graduations on the tube or from charts supplied with the tubes. The scale reading nearest the end of the stain is the measured concentration of ethyl mercaptan.

10. Interpretation of Results

10.1 If the number of pump strokes used is different from the number specified by the manufacturer, a correction must be made as follows:

$$\text{corrected ethyl mercaptan concentration} = \text{scale reading} \times (\text{specified strokes/actual strokes}) \quad (1)$$

10.2 Some detector tubes that can be used in this test method may be calibrated for other mercaptans in milligrams per cubic metre (mg/m^3). The conversion from mg/m^3 of *t*-butyl mercaptan to ppmv of ethyl mercaptan shall be performed as documented in Annex A1.

10.3 Correct the reading for barometric pressure, especially at high altitudes. For details of this correction, see Annex A1.

10.4 Readings of concentrations below 5 ppmv may not be reliable, and may warrant further investigation. (See Appendix X2.)

NOTE 2—This test method is a direct measure of the concentration of ethyl mercaptan in the vapor phase of LP-gas. If the temperature of the system is known, results can be used to obtain an approximation of the concentration of ethyl mercaptan in the liquid phase. (See Appendix X1.)

11. Report

11.1 Report the observed tube reading and corrected concentration of ethyl mercaptan in parts per million by volume (ppmv) to the nearest 0.5 ppm.

12. Precision and Bias

12.1 *Precision:*

12.1.1 The precision of this test method as determined by statistical analysis of interlaboratory test results is as follows:

12.1.1.1 *Repeatability*—The difference between successive test results, obtained by the same operator using the same apparatus under constant operating conditions on identical test material, would, in the long run, in the normal and correct operation of the test method, exceed the following values only in one case in twenty: from 5 to 20 ppmv, the larger of 1 ppm or ±15 % of the mean of the two results; above 20 ppmv, ±20 % of the mean of the two results.

12.1.1.2 *Reproducibility*—The difference between two single and independent results, obtained by different operators working in different laboratories on identical test material, would, in the normal and correct operation of the test method, exceed the following value only in one case in twenty: the larger of 1.5 ppmv or ±20 % of the mean of the two results.

NOTE 3—The preceding repeatability and reproducibility were obtained from statistical analysis of results submitted by twelve testers who cooperatively tested five samples of propane with ethyl mercaptan concentrations ranging from 3.3 to 32 ppmv in the vapor phase.

12.2 *Bias*—Within the precision limits defined in 12.1.1.1 and 12.1.1.2, this test method has no bias.

13. Keywords

13.1 ethyl mercaptan; liquefied petroleum gases; odorant; stain tube

ANNEX

(Mandatory Information)

A1. CONVERSION AND CORRECTION INFORMATION

A1.1 Conversion of mg/m^3 *t*-butyl mercaptan (TBM) to mg/m^3 ethyl mercaptan (EM):

$$\text{mg/m}^3\ \text{EM} = \text{mg/m}^3\ \text{TBM} \times (\text{mol weight EM/mol weight TBM}) \quad (A1.1)$$

Therefore:

$$1\ \text{mg/m}^3\ \text{TBM} = 1 \times (62.14/90.19) = 0.689\ \text{mg/m}^3\ \text{EM} \quad (A1.2)$$

A1.2 Conversion of mg/m^3 EM to ppmv EM at approximately 25°C:

$$\text{ppmv} = ((\text{mg/m}^3) \times (24.45))/(\text{mol weight EM}) \quad (A1.3)$$

Therefore:

$$1\ \text{mg/m}^3\ \text{EM} = ((1) \times (24.45))/(62.14) = 0.393\ \text{ppmv EM} \quad (A1.4)$$

NOTE A1.1—1 g mol = 22.4 *L* at 0° = 24.45 *L* at 25°C.

A1.3 A convenient tabulation of conversions:

mg/m^3 TBM	mg/m^3 × 0.689 = EM × 0.393 =	ppmv EM
2.5	1.72	0.68
5.0	3.45	1.36
10	6.89	2.71
15	10.34	4.06
20	13.78	5.42
25	17.23	6.77
30	20.67	8.12

A1.4 Correction for barometric pressure:

$$\text{ppmv (corrected)} = \text{ppmv} \times (760\ \text{mm Hg/barometric pressure, mm Hg}) \quad (A1.5)$$

Atmospheric Pressure, kPa (mm Hg)	Elevation in metres (feet)	ppm Reading	ppm Corrected
101.325 (760)	0 (0)	10	10.0
97.709 (733)	305 (1000)	10	10.4
93.977 (705)	610 (2000)	10	10.8
90.644 (680)	915 (3000)	10	11.2

Atmospheric Pressure, kPa (mm Hg)	Elevation in metres (feet)	ppm Reading	ppm Corrected
87.312 (655)	1220 (4000)	10	11.6
84.246 (632)	1524 (5000)	10	12.0
81.313 (610)	1829 (6000)	10	12.5

APPENDIXES

(Nonmandatory Information)

X1. RELATIONSHIP OF VAPOR-LIQUID CONCENTRATIONS

X1.1 Published data on vapor-liquid equilibria (k-ratios) of the ethyl mercaptan/propane system are as follows:

Temperature, °C	−30	−20	−10	0	10	20	30
Temperature, °F	−22	−4	14	32	50	68	86
K-ratio[4]	0.12	0.15	0.18	0.21	0.24	0.27	0.31

NOTE X1.1—The K-ratios given herein are for a pure propane/ethyl mercaptan system and may vary for commercial propane/ethyl mercaptan systems.

X1.2 Assuming system equilibrium and accurate data on the temperature of the system, the liquid-phase concentration of ethyl mercaptan can be approximated, based on the following relationship:

$$\text{liquid-phase concentration, ppmv} = \frac{\text{vapor-phase concentration, ppmv}}{\text{K-ratio (at system temperature)}} \quad (X1.1)$$

[4] Heng-Joo, Ng and Robinson, Donald B., "Vapor Liquid Equilibrium in Propane Odorant Systems," Gas Processors Assoc. Research Report, No. 113, 1989,. Available from Gas Processors Assoc., 6526 E. 60th St., Tulsa, OK 74145.

X2. ODORIZATION REQUIREMENTS

X2.1 NFPA 58 is the basis for most regulatory requirements for odorization of LP-gas. This standard stipulates, in part:

"1-4.1.1 All LP-gases shall be odorized prior to the delivery to a distributing plant by the addition of a warning agent of such character that they are detectable, by a distinct odor, down to a concentration in air of not over ⅕ the lower limit of flammability.

"Exception: Odorization, however, is not required if harmful in the use or further processing of LP-gas, or if such odorization will serve no useful purpose as a warning agent in such further use or processing.

"1-4.4.2 If odorization is required, the presence of such odorants shall be determined by sniff testing or other means and the results documented:

a) whenever LP-gas is delivered to a distributing plant, and
b) when shipments of LP-gas by-pass the distributing plant."

X2.2 An informational appendix to NFPA 58 states the following:

"A-1-4.1.1 It is recognized that no odorant will be completely effective as a warning agent in every circumstance.

"It is recommended that odorants be qualified as to compliance with 1-4.1.1 by tests or experience. Where qualifying is by tests, such tests should be certified by an approved laboratory not associated with the odorant manufacturer. Experience has shown that ethyl mercaptan in the ratio of 1.0 lb (0.45 kg)/10 000 gallons (37.9 m^3) of liquid LP-gas has been recognized as an effective odorant."