

August 23, 2016

U.S. Department of Transportation  
 West Building, Ground Floor  
 Room W12-140  
 Routing Symbol M-30  
 1200 New Jersey Avenue SE  
 Washington, DC 20590

**Reference: Docket No. PHMSA-2011-0141 (HM-234)**

In reference to the above docket published in the Federal Register on July 26, 2016.

Hydro-Test Products Inc. is a long established manufacturer of cylinder re-qualification equipment and also provides cylinder re-qualifier training to meet 49CFR §172.704.

The cylinder re-qualification industry has a long and well established record of safety over the past 100+ years. With the proposed inclusion of the Compressed Gas Association Pamphlet C-1 (either the 2009 tenth edition or the proposed 2016 eleventh edition), the cylinder re-qualification industry will not be any safer and in fact will become more dangerous to re-testers and will cause an unnecessary monetary burden to all of the licensed cylinder re-qualification facilities.

*We appreciate the opportunity to comment on this NPRM and offer the following:*

**(I) §107.805 & §180.203 Define and Incorporate “Mobile Unit” Requalification Operations”**

**Comment:** Mobile cylinder requalification both volumetric and proof, have been performed in mobile operations for over 25 years. There has never been a requirement to indicate that the operation was mobile until recently. There has never been any definition of what a mobile re-qualification is. We agree that there needs to be a distinction between a mobile and stationary facility. However, the NPRM is maintaining a restriction of a mobile operation to a 100-mile radius. We feel that this is a restriction of trade. Many companies that are using a mobile system do so because of the ruralness of the area. Many of their existing customer base is further than a 100-mile radius. There is no practical reason for limiting a business’s ability to service customers in a 100-mile radius. If the licensed re-qualification mobile facility can properly re-qualify cylinders in a 100-mile radius, what is the logic that suggest that cannot perform this function properly outside of a 100-mile radius? Where the test is being performed has no impact on the license holder ability to perform the test properly. We believe that there should be no limit as to how far a mobile cylinder re-qualification vehicle can travel. With the ability to email or fax, a home base that can produce required records of test within a 24 hours’ notice of request to a PHMSA agent would be a reasonable request.

**(II) §180.203 Definition of Proof pressure test**

**Comment:** There has been no test done by PHMSA to determine the consequences of a cylinder rupturing during a pneumatic test as opposed to a hydrostatic test. Since the cylinder is required to be observed under pressure during the proof test, there is a more substantial risk of injury if the cylinder should fail. In the NPRM, page 48992, it states that this will be considered for low pressure testing only. However, there is no definition of “low pressure” provided. In this same paragraph, PHMSA admits that “*they realize that the safety risk for conducting this test is substantially more using gas such as air versus a liquid such as water*”. The NPRM also indicates that ... *it takes approximately one-third the time of a modified hydro test*



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*without wasting water.* It is our opinion that the value of the time savings advantage is not worth the risk of severe injury or death. Also, it is common practice in many facilities to recycle water. Since the goal of the PHMSA is safety, why would a potentially catastrophic test method be considered? We strongly believe that neither of the reasons indicated by PHMSA are valid for allowing a pneumatic proof test, and we suggest that the pressure testing of cylinders of any pressures with air or gas **not** be a viable option and be removed from the definition of Proof Pressure Test.

**(III) §180.213 Marking of cylinders**

**Comment:** In a recent change of ruling, see Federal Register dated January 21, 2016 under PHMSA-2013-0042 (HM-233F) section 180.213 was re-written as follows: *The markings must be made by stamping, engraving, scribing, or applying a **label embedded in epoxy** that will remain legible and durable throughout the life of the cylinder, or by other methods that produce a legible, durable mark.* It appears that PHMSA in this NPRM is suggesting the removal of this new requirement that allows for the use of a label.

We suggest that the verbiage used in HM-233F rulemaking be reinstated, as some companies are now using labels in lieu of stamping based on this current regulation. We do not understand why a ruling would be put into the regulations in February 2016 and then be attempted to be removed 6 months later without any appeal for doing so.

**(IV) §180.209 Table 1 The NPRM is missing a note that is in the current regulations as follows:**

*Any cylinder not exceeding 2 inches outside diameter and less than 2 feet in length is excepted from volumetric expansion test.*

**Comment:** Is this an intentional omission? Or is this no longer a requirement??

**(V) §180.215 Addition of Date of Manufacture to test record forms.**

**Comment:** This additional requirement has no bearing on the information required to properly re-qualify a cylinder. It would necessitate the manufacturers of software record keeping forms to re-program the software with this additional information. It would necessitate the manufacturers of written test record forms to re-design the form for inclusion of this field. The end user would be forced to purchase or upgrade their forms.

The manufacturing date of the cylinder does not impact the re-qualification of cylinders and should not be added to the list of required entries under §180.215. Also, the proposed C-1 pamphlet examples of recordkeeping forms do not contain this information. If the C-1 is adopted, then either this proposed change in record keeping needs to be addressed or the C-1 publication be corrected.

**(VI) Page 48997 of the federal register dated July 26, 2016, item 4 under Reporting and**

**Recordkeeping**, the NPRM states: *“This NPRM does not include any new reporting or recordkeeping requirements”.*

**Comment:** This is incorrect. The addition of the requirement to include the date of manufacture on the test record form is a new recordkeeping requirement. Please refer to our comment under section (V). This needs to be addressed as the NPRM is incorrect in this statement.

**(VII) §180.205(j) The addition of referencing the C-1.1 pamphlet as training material**

**Comment:** This statement was removed from the CFR Title49 under the request of Hydro-Test Products in an appeal of docket 05-2182 (HM 218D) in a letter dated February 6, 2008 and accepted by PHMSA in Federal Register / Vol. 73, No. 191 dated October 1, 2008. It took until 2012 for this verbiage to be removed from the



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CFR even though the appeal was accepted in 2008. Now the same verbiage is being introduced into the regulations again.

- 1) This requirement has no relevance to the training requirements as stated in §172.700. You do not list any other training guides for other hazmat functions, why do you list one for cylinder re-qualifiers?
- 2) The fact that you have stated a particular pamphlet (C-1.1) from a particular company (Compressed Gas Association (CGA)), gives the re-qualifier the obvious impression that they are required to use this pamphlet as a training guide. Although you may believe that you are only making a recommendation, the reality is that this suggestion in the CFR will be construed to be a requirement by not only the end user but also the majority of your independent and enforcement inspectors.
- 3) You use the C-1.1 as an example but our question is why. It is unclear why PHMSA would suggest any guidelines be used. Title 49 §172.702 clearly allows training to be provided by any means acceptable to the employer. By referencing the C-1.1 you are contradicting §172.702. If in fact you believe that the cylinder re-qualifier needs examples of publications, there are other, more current and in-depth training material that is readily available.
- 4) The C-1-1 last publication date is 2004 and it is not up to date with current regulations as they pertain to cylinder requalification. The following few examples illustrate the lack of current information available in the C-1.1;
  - a) There is no mention of the requirement for eddy current examination of aluminum cylinders as required since January 1, 2007 under section §180.209(m)
  - b) There is no mention of requirements for the requalification of UN cylinders under section §180.207
  - c) The section on requalification markings is out of date with no mention of §180.213(d)
  - d) It is obvious, being that the latest edition is dated 2004, that the C-1.1 publication will not be published on a yearly basis with new or revised regulations. Therefore, the cylinder re-qualifier who uses this guide for training purposes will not be up to date with the most recent regulations.
- 5) Other companies (Hydro-Test Products included) publish and update their training guides on a yearly basis and/or as regulations change. The Compressed Gas Association does not, as the latest issue is now over 12 years old.
- 6) The training requirements under §170.700 were put into place so that hazmat occupations would be safer for the hazmat employee and the general public. This proposed wording under §180.205(j) does nothing to enhance safety and due to outdated suggested guidelines may in fact increase the potential for catastrophic cylinder failure (i.e.; 6351 alloy cylinders).

**(VIII) §171.7 Incorporating by Reference (IBR) Compressed Gas Association Pamphlet C-1, Methods of hydrostatic testing.** (these comments are based on either the 2009 or 2016 edition being used).  
**Comment(s):** The authors of the CGA C-1 pamphlet have included definitions and examples of calibration and accuracy for Expansion Indicating Devices (EID) and Pressure Indicating Devices (PID) that will restrict most all current licensed cylinder re-qualifiers from performing cylinder re-qualification. Furthermore, there are statements in the C-1 that discriminate against procedures and equipment components that have been utilized in a safe, consistent and accurate manner for many years.



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As manufacturers of the cylinder re-testing equipment, we offer our expertise in affirming the difficulties incorporating the C-1 into the regulations are as follows:

1) **The definition of and accuracy requirements listed under section 5.3.1.2 for the EID.**

Below is a list of common burettes used by cylinder re-qualifiers to meet the current requirements under 49CFR §180.205(g)(3)(ii) and the range of coverage on the proposed C-1 requirements. It is estimated that these 4 burettes are used on 50% of the water jacket test equipment currently in use.

Full Scale of Burette	Accuracy Grade	Increments	Readable increment range	Current Acceptable Useable Range under 49CFR §180.205(g)(3)(ii)	Proposed C-1 §5.3.1.2 Useable Range
0-25	0.5%	0.05	0.025	2.5-25.0	12.5-25.0
0-50	0.5%	0.1	0.05	5.0-50.0	25.0-50.0
0-125	0.5%	0.2	0.1	10.0-125.0	62.5-125.0
0-360	0.5%	1.0	0.5	50.0-360.0	180.0-360.0

\* All readings are expressed in cc's unless otherwise noted

- a) There are gaps in the ranges that a typical burette setup can be used in under the proposed C-1, §5.3.1.2. In particular no cylinder could be tested with a total expansion of less than 12.5cc or in a range of 50.1 – 62.4cc and 125.1 – 179.9cc. This essentially means that any retest facility using the above popular burette setup will need to invest in additional burettes and manifolds or purchase a digital expansion scale to meet the C-1 requirements.
- b) For those retest facilities utilizing a digital expansion scale in lieu of burette tubes as the EID, further problems may exist. Under the current regulations the industry standard scale used is a 600g x 0.1 increment instrument verified with calibrated weights to 0.5% accuracy grade. This scale meets the current requirements for reading expansion values of 0.1 thru 600g. The scale cannot be used for this full range however as a container sits on top of the scale platform to collect the expansion water and must be filled with approximately 200g of beginning water to alleviate air entrapment in the expansion tube. The net expansion value is typically 350g. With the adoption of the C-1 the scale has a new range of reading 300 – 600g of water. 200g of starting water would need to be added to the usable starting range of 300g. This essentially means that this scale would have usable range of 100g only. 200g of starting water added to minimum usable range of 300g = 500g. This would not allow hundreds of licensed cylinder re-qualifiers to operate their calibrated cylinder properly or to test cylinders that expand more than 100g. This would also prevent these facilities from testing most industrial gas cylinders over 100 cubic ft. in size as these size cylinders typically expand more than 100g's.
- c) There are 2 expansion readings taken during a cylinder volumetric pressure test, Total Expansion and Permanent Expansion. Each of these readings are equally important as they dictate whether a cylinder passes or fails. Yet, the C-1 details readability and accuracy requirements for total expansion only, not permanent expansion. If in the opinion of the authors of the C-1 pamphlet, the 125cc burette as listed in the chart above, is not capable of reading Total Expansion of 55.0 cc than how is it possible that it can be used to read a permanent expansion of a much lesser value, typically in a range of 1.0 – 5.0cc? It does not make any sense. This is a conflict that the proposed C-1 accuracy requirements need to address and explain.
- d) This requirement under C-1 section 5.3.1.2 will require that the cylinder re-qualifier know or guess at what the total expansion of a particular cylinder is before he begins the test process. Since there is no indication of the total expansion value on DOT specification cylinders, how is a



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re-qualifier supposed to know what burette or scale is applicable and within the proposed regulations for a given test? The reason for performing the test is in part, to record what the actual total and permanent expansion values are. If you already know the total and permanent expansion values, there would be no reason to perform the test.

*As an example*, a re-qualifier performing a test on a DOT3A-2400, cylinder does not know what the permanent and total expansion values are. If the re-qualifier utilizes a 360cc burette in 1.0cc increments (proposed usable range of 180cc – 360cc), yet the actual total expansion is 175cc, what are the re-qualifiers options? Since the total expansion does not fall within the C-1 required expansion limits for that burette – can they retest the cylinder? Are they forced to condemn a perfectly good cylinder?

It is illogical that with all of the new accuracy requirements being proposed by incorporating the C-1 pamphlet into the regulations, that the whole successful cylinder re-qualification process relies on an operator’s best guess at an unknown expansion value.

**2) The definition of and accuracy requirements listed under section 5.3.2.2 for the PID.**

Below is a list of common pressure gauges used by cylinder re-qualifiers to meet the current requirements under 49CFR §180.205(g)(3)(i) and the range of current coverage and the coverage with the proposed C-1 requirements. It is estimated that these gauges are used on 50% of the water jacket and 75% of the proof test equipment currently in use.

Manufactured Accuracy Grade	Full Range	Increments	Current Useable Range Under 49CFR §180.205(g)(3)(i)	Useable Range under Proposed C-1 §5.3.2.2
¼ %	0-11,000	20	1100 – 10,000	2750 – 10,000
¼ %	0-5000	10	550 - 4500	1250 – 4500
¼ %	0-1500	2	111 – 1350	375 – 1350
½ %	0-1100	2	111 – 1000	550 - 1000

*\* All readings are expressed in psi unless otherwise noted*

- a) You will notice that the usable range of all of these gauges are reduced significantly by the requirements of C-1 §5.3.2.2. Therefore, most all DOT licensed cylinder re-qualifying facilities will be required to purchase either additional gauges or expensive finer accuracy gauges.
- b) The example shown in C-1 §5.3.2.2 does not take into account the practice of calibrating specific points outside of the range of manufactured accuracy. As an example, Hydro-Test Products will re-calibrate the above referenced 0-11,000 psi gauge at additional pressure points of 2500 and 2700 psi to ¼ % accuracy against a digital gauge accurate to 0.1 % full range. This allows testing to a larger span that what the manufactured gauge accuracy outwardly indicates. These additional calibration points are referenced on a supplied calibration certificate for each gauge. This service is provided on all of the referenced gauges at specific additional points outside of the proposed C-1 accuracy statement to insure that all test pressure values are able to be utilized under the “current usable range” column. This is a common practice in other industries but is not mentioned as acceptable in the proposed C-1 pamphlet.

The authors of the C-1 pamphlet recognize that on a ¼% accurate 0-11,000 psi gauge, that a reading is accurate to ± 27.5 psi at any point. However, that is the maximum allowable error, not the minimum. By adjusting the internals of the pressure gauge a calibration facility can meet the required accuracy requirements below 2750 psi by utilizing the minimum accuracy grade of a pressure instrument.



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**(IX) §5.5.2 of C-1 Pamphlet; Verification Procedure**

**Comment:** The authors of the proposed C-1 pamphlet have attempted to redefine the verification procedure for water jacket testing. Our comments on the problems with this section are as follows:

- a) The current requirement of CFR49 §180.205(g)(4) details the procedure for verifying system accuracy with the use of a calibrated cylinder and states *that the calibrated cylinder must show no permanent expansion*. This has been a challenged paragraph for decades because the regulations are asking for perfection where they previously state an overall accuracy of 1% and define system accuracy of components to 0.5%. The C-1 §5.5.2 states that the calibrated cylinder must return to “reference zero expansion”. This is defined in §3.2.22 as 0.1cc or 0.1% of total expansion. This is a new term that has no association in verifying the system accuracy. As stated by Hydro-Test Products in the APRM and others thru ought the past 30+ years. The requirement for acceptable permanent expansion on a calibrated cylinder should be  $\pm 0.5\%$  of the total expansion. This would put the calibrated cylinder in-line with other equipment component accuracy requirements. The reference zero point as defined in §3.2.22 is a random figure that further confuses the verification procedure.
- b) §5.5 Test system accuracy verification of proposed C-1 states that the verification must ... *include all PID's, EID, s and water jackets that are to be used during the day*. This will be impossible for those companies that are utilizing burette systems on the volumetric tester. Essentially facilities using burette tubes will be required to purchase a variety of different size and pressure calibrated cylinders to verify burette tube accuracy.  
As an example: A popular calibrated cylinder expands 33cc @ 3000 psi, 43cc @ 4000psi. A re-qualifier using a burette system, would be in compliance using the 50cc burette for this system verification with a useable range (under proposed C-1 requirements) of 25-50cc. However, if the re-qualifier attempts to test a cylinder (ie; 200 cubic ft. size, DOT3AA1800) to 3000 psi with a larger total expansion of 185cc, they would be in violation. They could not use the exemplified calibrated cylinder with the appropriate 360cc burette, due to the C-1 definition of verification. In this example they would require an additional calibrated cylinders to expand at a greater value to meet this sections requirement. This is unnecessary because burette tubes are not going to change in volume or accuracy. The increments are embedded into the glass; consequently, they are not susceptible to change. Therefore, it is not necessary to verify every EID used on the test system accuracy every day as part of the verification process.

**(X) §5.4.2 of C-1 Pamphlet; Instructions for the care of a calibrated cylinder.**

The above referenced section states that: *The calibrated cylinder shall not be used to slow down pumping speed when cylinders are being tested or for any purpose other than verifying the test system apparatus integrity and accuracy.*

**Comment:** This statement has no basis and is an opinion based on no known problem with the calibrated cylinder being used in this manner. Many facilities that have automated software driven test equipment, require a surge tank to dampen the speed of the pump when testing small size cylinders. The practice of using the calibrated cylinder as the surge tank has been done for years with no known safety or any other negative issues. If this statement is allowed in the regulations, it will require an additional smaller output pump or additional high pressure “dummy cylinder” to be installed on this type of equipment and will be another unnecessary expense to the cylinder re-qualifier.



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**(XI) Section VII. Regulatory Analysis and Notices, starting on page 48995 of the NPRM**

The NPRM states that these changes in regulations ... *would affect approximately 980 entities that conduct pressure testing, including cylinder re-qualifiers, re-testers and manufacturers.*

**Comment:** This is an incorrect figure. The office of PHMSA has confirmed with us that there are currently (as of July 2106) **2971 domestic** and **352 foreign** for a **total of 3323** licensed DOT cylinder re-qualification facilities that re-qualify cylinders by water jacket and/or proof test methods.

The figure that you have stated in the NPRM is off by 2343 facilities. Therefore, these proposed changes will have a much greater overall compliance cost then the NPRM has stated.

In this same paragraph the NPRM concludes that ... *PHMSA estimates a one-time compliance cost of \$186.00 for each entity purchasing the Eleventh Edition of CGA C-1. The upper bound of the total cost across all effected entities for this proposal would be approximately \$182.280. Actual cost are expected to be lower, as some of the 980 entities may be members, subscribers, or already own the revised edition...*

**Comment:** This is an incorrect assumption by PHMSA. As we have detailed in our above comments concerning the incorporation by reference of the CGA C-1, the cost will be much higher and for 3323 entities not 980 as stated in the NPRM. A breakdown on the average cost to licensed cylinder re-qualification facilities if this NPRM is accepted is as follows:

**Table A Re-qualification facilities utilizing manual burette or scale system for EID:**

*estimated to be 70% of re-qualification facilities or 2326 facilities*

<b>Item required to meet C-1 regulations:</b>	<b>Cost</b>
Additional burette(s) or switch/upgrade to scale as EID to meet C-1 §5.3.1.2	\$600 - \$800
Additional calibrated cylinders to meet C-1 §5.5.2	\$450 - \$1700
Additional or more accurate pressure gauge(s) to meet C-1 §5.3.2.2	\$700 - \$1500
Requirement of re-calibrating PID every six months	\$200 - \$400
Purchase of C-1 Pamphlet	\$0 - \$186
Purchase of new revised test record forms or software	\$15 - \$250
Re-training of all re-qualifiers listed on license (assumes average of 4 people per license)	\$300 - \$1200
<b>Total per facility:</b>	<b>\$2265 - \$6036</b>

**Table B Re-qualification facilities utilizing software driven automated test systems with scale system for EID:**

*estimated to be 30% of re-qualification facilities or 997 facilities*

<b>Item required to meet C-1 regulations:</b>	<b>Cost</b>
Upgrade scale as EID to meet C-1 §5.3.1.2	\$600 - \$800
Additional calibrated cylinders to meet C-1 §5.5.2	\$450 - \$1700
Additional or more accurate pressure transducer(s) to meet C-1 §5.3.2.2	\$1000 - \$2000
Requirement of re-calibrating PID every six months	\$200 - \$400
Addition of separate surge tank or lower volume pump to meet C-1 §5.5.2	\$1500 - \$2000
Purchase of C-1 Pamphlet	\$0 - \$186
Purchase of new revised software	\$300 - \$450
Re-training of all re-qualifiers listed on license (assumes average of 4 people per license)	\$300 - \$1200
<b>Total per facility:</b>	<b>\$4350- \$8550</b>



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**Table C Re-qualification facilities that perform proof testing solely or in combination with volumetric testing:**

*estimated to be 60% of combined Table A and B re-qualification facilities or 1994 facilities*

<b>Item required to meet C-1 regulations:</b>	<b>Cost</b>
Additional or more accurate pressure gauge(s) to meet C-1 §5.3.2.2	\$700 - \$1500
Purchase of C-1 Pamphlet	\$0 - \$186
Purchase of new revised test record forms or software	\$15 - \$250
Requirement of re-calibrating PID every six months	\$400 - \$800
Re-training of all re-qualifiers listed on license (assumes average of 4 people per license)	\$300 - \$1200
<b>Total per facility:</b>	<b>\$1415 - \$3936</b>

Also, in the same paragraph, the NPRM states *...Revising the HMR to incorporate the CGA C-1 would increase clarity, reduce confusion, provide enhanced guidance, and provide marginal safety benefits without imposing requirements that are potentially costly or difficult.*

**Comment:** We **strongly disagree** with this statement. As shown in detail in our comments, the inclusion of C-1 unquestionably **does not** provide relief from any confusion and provides no safety benefit. The cost analysis done by PHMSA in the NPRM is incorrect and the number of effected entities is significantly understated.

As we have hoped to have presented in these comments, the incorporation of the C-1 into the regulations will only confuse cylinder re-qualifiers more, while imposing nearly impossible accuracy requirements at a greater cost with absolutely no benefit in safety.

Many of the inaccurate statements made in the C-1 are in our opinion the views of individuals that have never re-qualified cylinders or have marginal experience and understanding in what is involved with the actual hands-on and practical cylinder re-qualification procedure. It is also apparent that they lack experience and knowledge in calibration methods and practices. The fact that the re-qualifier would have to know the results of a test, as demonstrated under our previous comments, prior to running the test should by itself be enough evidence that the C-1 is an unappropriated regulatory device.

### **Overall Conclusions:**

We applaud the PHMSA for attempting to clarify the regulations while maintaining the current level of safety in this industry. In our opinion this NPRM has failed to meet this objective for the following reasons:

- ✓ Reinstating previous regulations that have been previously removed (reinstating C-1.1 as a training guide and removing new regulation allowing labels to be used on all cylinders)
- ✓ Initiating a potentially dangerous test (pneumatic proof test) without providing any basis for enhanced safety and offering no reason other than it will save time.
- ✓ Requiring additional record keeping that has no bearing on cylinder testing (date of manufacture)
- ✓ Restricting the income of mobile operators by imposing a 100-mile limit on customers that they can provide a services to.
- ✓ Greatly understating the average cost to facilities to meet these proposed regulations
- ✓ The purpose of this NPRM, as stated in the Federal register, *... is to reduce regulatory burdens while maintaining or enhancing the existing level of safety.* The adoption of the C-1 pamphlet into the regulations does neither.
- ✓ It would be an injustice and economic hardship to impose these regulations on an industry that has shown an exceptional safety record over the past 100 years.



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We would suggest and offer our services to work with the PHMSA in re-defining some of the current confusing regulations, while offering our practical knowledge as to how potential regulation changes actually effect the cylinder re-qualification industry. We made many comments on the ANPRM in 2012, as was requested by PHMSA in the ANPRM, but unfortunately none of our suggestions were utilized in this NPRM.

We have supported our comments with factual, practical and common sense observations. We would ask that if there is any confusion or questions regarding any of our statements made in this letter that you contact us for clarification before making a decision on this proposed regulation change.

Thank you for your time and consideration.



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