Preliminary Regulatory Evaluation

Amend Hazardous Materials Regulations (49 CFR Parts 107, 171, 172, 173, 175, 176, 177, 178, 179, and 180) to Update and Clarify Requirements (HM-218H)

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1. Executive Summary

The Pipeline and Hazardous Materials Safety Administration (PHMSA) proposes to make miscellaneous amendments to the Hazardous Materials Regulations (HMR) to update and clarify certain regulatory requirements. These proposed amendments are designed to promote safer transportation practices, address seven petitions for rulemaking, respond to National Transportation Safety Board (NTSB) Safety Recommendations, facilitate international commerce, make editorial corrections, and simplify the regulations.

The proposed provisions in this rulemaking include, but are not limited to, removing the packing group II designation for certain organic peroxides, self-reactive substances, and explosives and incorporating requirements for manifolded acetylene trailers. In addition, this rulemaking proposes revising the requirements for the following: the packaging of certain concentrations of nitric acid when shipped by highway, rail, or water and testing of pressure relief devices (PRD) on cargo tanks. In addition, the proposed rule includes a proposal to require odorization for rail tank cars and cylinders in liquefied petroleum gas (LPG) service.

The proposals would implement a clarified set of requirements in order to simplify the HMR and close regulatory gaps identified through PHMSA's internal review of the HMR and by rulemaking petitions from PHMSA stakeholders. This action would provide greater clarity to the HMR, thereby promoting greater compliance. In addition, this action would incorporate into the HMR two NTSB Safety Recommendations.

This rule is not economically significant under section 3(f) of Executive Order (EO) 12866. This proposed rule would affect some PHMSA stakeholders, including industry associations who submitted petitions on behalf of their members; NTSB; hazardous materials shippers; carriers by highway, rail, vessel, and aircraft; package manufacturers; and testers.

Some proposed changes—for example requiring an intermediate layer of packaging for certain nitric acid shipments and the odorization of tank cars and cylinders in LPG service—may result in some minor burdens on the regulated community. The benefits of these proposed amendments are realized via improved safety and include reduced costs of injuries and environmental damage after accidents as well as improved compliance and easier training for shipping firms. The majority of the rule's provisions are intended to ease the regulatory burden on transporters of hazardous materials, and the net benefits are expected to be positive.

The intended effect of this action is to enhance the safe transportation of hazardous materials and clarify, simplify, and relax certain regulatory requirements for carriers, shippers, and other stakeholders. These regulatory revisions would offer more efficient and effective ways of achieving the PHMSA goal of safe and secure transportation of hazardous materials in commerce. Overall, the benefits outweigh the costs.

Section 202 of the Unfunded Mandates Reform Act of 1995 requires that agencies assess anticipated costs and benefits before issuing any rule whose mandates would require spending $151 million in any 1 year. This proposed rule does not impose enforceable duties on State, local, or Tribal governments, or on the private sector, of $151 million in any 1 year.

Table 1. Summary of Net Benefits of Rulemaking

Provision	Annual Benefits	Annual Costs	Annual Net Benefits
Quantified Provisions			
No. 1. Harmonization of Poisonous by Inhalation (PIH) Shipment Marking	4,800	–	$4,800
No. 2. Remove Packing Group Designation for Class 1, Division 4.1 and Division 5.2 Materials	$4,800	–	$4,800
No. 3. Emergency Response Telephone Number Format	$4,800	–	$4,800
No. 4. Enhanced Nitric Acid Packaging	$113,004	$25,474,493	$(25,361,489)
No. 5. Relaxation of Requalification Period for Cargo Tanks in Dedicated Propane Service	$500,000	–	$500,000
No. 7. Clarification of Requirements for Pressure Relief Devices on DOT Cargo Tanks	$4,800	–	$4,800
TOTAL	**$632,204**	**$25,474,493**	**$(24,842,289)**
Nonquantified Provisions			
No. 6. Standards for Mobile Acetylene Trailers	Not quantified	–	Not quantified
No. 8. Liquefied Petroleum Gas (LPG) Odorant	Not quantified	$4,066,635 to $8,704,143	Not quantified

2. Introduction

2.1. Background

The purpose of this Notice of Proposed Rulemaking (NPRM) is to update and clarify existing requirements by incorporating changes into the HMRs (49 CFR Parts 171–180) based on PHMSA's own initiatives. PHMSA's goal is to improve; PHMSA strives to make our regulations clear, simple, timely, fair, reasonable, and necessary.

The proposed amendments were identified through an extensive review of the HMRs and letters of interpretation previously issued to the regulated hazardous materials transportation community. In addition, this NPRM proposes regulatory requirements that respond to seven petitions for rulemaking and address two NTSB Safety Recommendations. To this end, PHMSA is proposing to revise, clarify, and relax certain regulatory requirements.

2.2. Description of Regulatory Impact Analysis

This Regulatory Impact Analysis (RIA) assesses the positive and negative effects of the proposed actions and non-regulatory alternatives; it provides an assessment of the costs and benefits of proposed amendments to the HMR that would clarify and simplify many aspects of hazardous material transportation regulations. The proposed amendments are expected to:

- Promote regulatory compliance by reducing economic hardship and transit delays.
- Decrease overall transportation risk.
- Facilitate emergency response.
- Reduce the need for cargo tanks to be taken out of service.
- Eliminate confusion by simplifying labeling and packaging of hazardous materials.
- Make U.S. and international regulations consistent.

The proposed actions are deemed beneficial. Chapter 5 contains the RIA for each of the proposed actions.

3. Regulatory Impact Analysis

3.1. Executive Order 12866 (Regulatory Planning and Review)

Under EO 12866, "Regulatory Planning and Review" (issued September 30, 1993, published October 4 at 58 FR 51735), as supplemented by EO 13563 and Department of Transportation (DOT) policies and procedures, the Agency must determine whether a regulatory action is "significant" and therefore subject to Office of Management and Budget (OMB) review. EO 12866 defines "significant regulatory action" as one likely to result in a rule that may:

1. Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or Tribal government or communities.
2. Create a serious inconsistency or otherwise interfere with an action taken or planned by another Agency.
3. Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof.
4. Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the EO.

PHMSA determined this final rule is not a "significant regulatory action" under EO 12866 and is not significant under DOT regulatory policies and procedures due to significant public interest in the legal and policy issues addressed. Therefore, this final rule has not been reviewed by the Department's Office of the Secretary of Transportation (OST) or OMB. The Agency estimates that the economic impact of this final rule will not exceed the $100 million annual threshold for economic significance.

This regulatory analysis:

- Identifies the target problem, including a statement of the need for the action.
- Discusses alternative approaches considered.
- Defines the baseline.
- Defines and evaluates the costs and benefits of the action and the main alternatives identified by the analysis.
- Compares the costs and benefits.
- Interprets the cost and benefit results.

3.2. Identification of the Problem and the Need for the Rule

PHMSA proposes to amend the HMRs (HMR; 49 CFR 171-180) by making miscellaneous revisions to update and clarify a number of regulatory requirements. The proposed rule responds to seven petitions for rulemaking submitted to PHMSA by various stakeholders and addresses two NTSB recommendations.

These amendments are intended to promote safety, regulatory relief, and clarity. The proposed changes were identified through an internal review of the HMR as well as in response to communications from various stakeholders affected by the HMR. These proposed minor changes would clarify the HMR and enhance safety, while offering net economic benefits.

This action is necessary for PHMSA to (1) fulfill the statutory directive to promote transportation safety; (2) fulfill the statutory directive under the Administrative Procedure Act (APA) that requires Federal agencies to give interested persons the right to petition an agency to issue, amend, or repeal a rule (5 U.S.C. 553(e)); (3) support governmental efforts to provide regulatory relief to the regulated community; (4) address safety concerns raised by the NTSB and remove regulatory ambiguity identified by the regulated community; and (5) simplify and clarify the regulations in order to promote understanding and compliance.

The intended effect of the proposed action is to enhance the safe transportation of hazardous materials and clarify, simplify, and relax certain regulatory requirements for carriers, shippers, and other stakeholders. These regulatory revisions would offer more efficient and effective ways of achieving the PHMSA goal of safe and secure transportation of hazardous materials in commerce.

3.3. Analytical Baseline and Parameters

The baseline for this analysis in each of the cases is the no-action alternative (the status quo), with no amendments, as proposed here. This rulemaking would impact training and operating costs for some transporters of hazardous materials; reduce the costs of some accidents involving hazardous materials, including the costs associated with fatalities, personal injuries, and property damage; and help prevent environmental damage. These reduced costs of accidents as well as reduced costs to industry represent the benefits of the rule.

3.4. Discussion of Alternatives

The alternative to this rulemaking considered by PHMSA is the continuation of the status quo, with no revisions to current regulations and no additions. This course of action would forgo efficiencies that the proposed alterations hope to gain: the clarification and simplification of some rules are expected to ease compliance with the HMR, which should increase compliance and safety. Besides those business efficiencies, PHMSA expects there would be a reduction in the negative impact of safety and environmental incidents involving hazardous materials.

4. Notice of the Proposed Rulemaking

4.1. Explanation of Proposed Amendments

HM-218 series of rulemakings is a periodic rulemaking vehicle designed to make miscellaneous revisions to update and clarify certain regulatory requirements. PHMSA is proposing eight different actions (see Table 2). They are as follows:

1. **Harmonization of Poisonous by Inhalation (PIH) Shipment Marking:** In response to a petition for rulemaking, the NPRM would amend the marking requirements in §§ 171.23(b)(10)(iv)(A) and 171.23(b)(10)(iv)(B) by removing the phrase "regardless of the total quantity contained in the transport vehicle or freight container" for PIH shipments transported in accordance with the International Maritime Dangerous Goods (IMDG) Code or Transport Canada's Transport of Dangerous Goods (TDG) Regulations to align Part 171 with shipments transported domestically in accordance with § 172.313(c).
2. **Remove Packing Group Designation for Class 1, Division 4.1 and Division 5.2 Materials:** In a response to a petition for rulemaking, PHMSA proposes to remove the Packing Group "II" designation from Column (5) of the § 172.101 Hazardous Materials Table (HMT) for organic peroxides (Division 5.2), self-reactive substances (Division 4.1), and explosives (Class 1) and align the HMR with the Dangerous Goods Lists (DGL) in the International Civil Aviation Technical Instructions (ICAO TI) and the IMDG Code.
3. **Emergency Response Telephone Number Format:** In response to a petition for rulemaking, PHMSA is proposing to amend the requirements applicable to emergency response telephone numbers by only permitting the use of numeric telephone numbers and prohibiting the use of alphanumeric telephone numbers in § 172.604(a).
4. **Enhanced Nitric Acid Packaging:** In response to a petition for rulemaking, PHMSA is proposing to enhance the packaging requirements for highway, rail, or water shipments of nitric acid in concentrations of less than 90 percent by revising § 173.158(e) to state that for glass inner packagings in a fiberboard outer packaging, the glass inner packagings would be required to be packed in tightly closed, non-reactive intermediate packagings, cushioned with a non-reactive absorbent material.
5. **Relaxation of Requalification Period for Cargo Tanks in Dedicated Propane Service:** In response to a petition for rulemaking, PHMSA is proposing to extend the requalification period for certain MC 331 cargo tanks in dedicated propane service from 5 years to 10 years. The extension of the requalification period for these cargo tanks, commonly known as "bobtails," will be for pressure tests and visual inspection.
6. **Standards for Mobile Acetylene Trailers:** In response to a petition for rulemaking, PHMSA is proposing to incorporate into the HMR a reference to the Compressed Gas Association pamphlet CGA G-1.6, *Standard Mobile Acetylene Trailer Systems, Seventh Edition (G-1.6, 2011)*. This also responds to two Safety Recommendations from NTSB issued to PHMSA. This standard would provide minimum requirements necessary for the design, construction, and operation of mobile acetylene trailer systems that charge, transport, and discharge acetylene. The standard would also cover ground-mounted

auxiliary equipment used with mobile acetylene trailers such as piping, meters, regulators, flash arrestors, and fire protection equipment.

7. **Clarification of Requirements for Pressure Relief Devices on DOT Cargo Tanks:** In response to petition for rulemaking PHMSA is proposing to amend the HMR applicable to PRDs for DOT specification cargo tank motor vehicles. Specifically, PHMSA would revise the HMR to more clearly establish the set pressure of a PRD for each of the DOT specification cargo tank motor vehicles.
8. **Liquefied petroleum gas (LPG) odorant:** In accordance with Federal and State laws and regulations, LPG intended for use by non-industrial entities is generally required to be odorized, or stenched, to enable the detection of any unintended release or leak of the gas. LPG is highly flammable and dangerous to inhale in large quantities. As a result of an accident involving LPG and after consulting with stakeholders from industry, firefighter associations, and other regulatory agencies, PHMSA is proposing to require odorization for rail tank cars and cylinders in LPG service, consistent with the existing requirements for cargo and portable tanks, and add a performance standard to address the issues of "under odorization" and "odor fade."

Table 2. Estimated Entities Affected by the NPRM by Proposed Requirement Area

Requirement Area	Source	Data	Entities Affected
1. Harmonization of Poisonous by Inhalation (PIH) Shipment Marking	Air Products and Chemicals, Inc., P-1591	No cost data provided; cost data estimated based on other similar proposed actions by PHMSA. No direct incident data available.	No information provided to make this determination.
2. Remove Packing Group Designation for Class 1, Division 4.1 and Division 5.2 Materials	Dangerous Goods Advisory Council (DGAC), P-1590	No cost data provided; cost data estimated based on other similar proposed actions by PHMSA. No direct incident data.	Almost all firms represented by the petitioner.
3. Emergency Response Telephone Number Format	DGAC, P-1597	No cost data provided; cost data estimated based on other similar proposed actions by PHMSA. No direct incident data.	Almost all firms represented by the petitioner.
4. Enhanced Nitric Acid Packaging	UPS, Inc., P-1601	No cost data provided. Cost and benefit data estimated. Incident data from UPS and PHMSA.	Certain offerors and carriers of nitric acid in concentrations less than 90 percent.

Requirement Area	Source	Data	Entities Affected
5. Relaxation of Requalification Period for Cargo Tanks in Dedicated Propane Service	National Propane Gas Association (NPGA), P-1604	No cost associated with a reduction in inspection frequency; there is instead a cost-savings. No direct incident data; cost-savings calculated by Econometrica based on other similar proposed actions by PHMSA.	Petition covers all members of NPGA, which numbers 3,000 companies.
6. Standards for Mobile Acetylene Trailers	Compressed Gas Association (CGA), P-1605; NTSB recommendations (H-09-1 and H-09-2)	No cost data provided; qualitative data provided. Incident data retrieved from Hazmat Intelligence Portal.	Petitioner represents 115 members; there are only two known carriers that transport mobile acetylene trailers.
7. Clarification of Requirements for PRDs on DOT Cargo Tanks	Petition from the Truck Trailer Manufacturers Association (TTMA), P-1609	No direct incident data.	Petitioner represents approximately 90 percent of the trailers manufactured in the United States.
8. LPG Odorant	PHMSA-initiated	PHMSA statement of no significant cost. Incident data reported by NTSB.	Unknown – number of small operators and number of large operators.

4.2. Factors That May Affect the Costs and Benefits

Estimates of impacts, costs, and benefits are calculated based on the action taken by requirement area. Regarding compliance cost, there is no specific general rule that can cover all situations. The costs will depend on factors such as the particular entities affected and the method used to address the requirements. The benefits depend on the risks, level of safety, rate of effectiveness, and the incidents for the segment of the market in question.

The transportation of dangerous goods industry has been relatively safe.[1] Over a 10-year period (2003–2012) in the transportation of dangerous goods, there have been 162,575 incidents involving hazardous materials transported by all modes of transportation; on average, there are approximately 16,260 accidents per year. Over the same time period, there were 132 fatalities (on average less than 14 per year) and 2,726 injuries (on average 273 per year).

[1] https://hip.phmsa.dot.gov/analyticsSOAP/saw.dll?Dashboard&NQUser=HazmatWebsiteUser1&NQPassword=HazmatWebsiteUser1&PortalPath=/shared/Public%20Website%20Pages/_portal/10%20Year%20Incident%20Summary%20Reports (accessed November 18, 2013).

5. Regulatory Analysis of Costs and Benefits for Each of the Areas

5.1. Area 1 – Harmonization of Poisonous by Inhalation (PIH) Shipment Marking

Statement of the Problem: The petitioner states that there are inconsistencies between Paragraphs 171.23(b)(l0)(iv)(A) and 171.23(b)(l0)(iv)(B) and paragraph 172.313(c). The paragraphs under 171.23(b)(l0)(iv) both include the phrase, "regardless of the total quantity contained in the transport vehicle or freight container" while simultaneously stating the marking shall be "in the manner specified in paragraph 172.313(c) of this subchapter," which includes a provision for the quantities on the vehicle.

The petitioner states, "the regulation causes economic hardship because of the additional labor to apply the extra UN ID numbers and the lost time due to delays at the port. It provides no additional benefit from a hazard communication or emergency response perspective."

Suggested Change: The petitioner suggests removing the phrase "regardless of the total quantity contained in the transport vehicle or freight container" from Paragraph 171.23(b)(l0)(iv)(A) and Paragraph 171.23(b)(l0)(iv)(B) and replacing it with "The transport vehicle or freight container must be marked with the identification numbers for the hazardous material in the manner specified in 172.313(c) of this subchapter and placarded as required by subpart F of part 172 of this subchapter." The petitioner asserts that making these proposed changes will bring the hazard communication requirements for PIH substances in Subpart C of Part 171 into alignment with the standard U.S. domestic regulations for PIH materials and maintain the level of safety necessary to transport the PIH shipments.

5.1.1. Alternatives Considered

5.1.1.1. Alternative 1 – No action

This is a viable and reasonable alternative that could be selected, serves as a basis for comparison with the other alternatives, and can be defined as the continuation of the current management practices. This alternative would continue the status quo and allow incongruent interpretations of the language in Paragraph 171.23(b)(l0)(iv)(A) and Paragraph 171.23(b)(l0)(iv)(B).

5.1.1.2. Alternative 2 – (The Preferred Alternative) Amend the marking requirements in §§ 171.23(b)(10)(iv)(A) and 171.23(b)(10)(iv)(B)

PHMSA proposes to remove the phrase "regardless of the total quantity contained in the transport vehicle or freight container" for PIH shipments transported in accordance with the IMDG Code or TDG Regulations to align Part 171 with shipments transported domestically in accordance with § 172.313(c).

The Department's goal is to achieve safe transportation of goods and compatible, understandable regulations and globally harmonized systems.[2] PHMSA believes that having uniform language that is clear and easy to understand by all those involved in transporting dangerous goods can help minimize risk. Petitions that have international implications are subject to increased harmonization. PHMSA believes that its involvement in harmonization promotes compliance and promotes the "efficacy of the transportation system by minimizing the regulatory burden on the public."[3] EO 13563's goal is to simplify and make regulations less burdensome, and the Department's commitment is to promote international harmonization in regulations.

This proposed change for PIH shipments would be in accordance with the IMDG Code.

5.1.1.3. Analysis of costs and benefits

Cost of the Action
Although the petitioner states that they are a "Fortune 500 company with annual revenue exceeding $10 billion…and a major international manufacturer and distributor of compressed gases and chemicals, supplying products to global markets in various industrial and electronics applications," the petitioner did not include any information regarding the impact of the proposed action, including direct effects on States and other levels of government and effects on small firms.

From our perspective, barring any additional costs to small firms and barring any adverse effects on competition in the market segment, the only cost associated with this action is a cost to PHMSA for making changes to the regulations as suggested by the petitioner. We do not know the level of effort required for making the changes, but in our opinion the additional costs to PHMSA would be minimal and of a negligible amount.

Benefits of the Action
The proposed action is aimed at reducing confusion, which in turn impacts shipping time positively. Benefits can also include greater ease of compliance and hence a reduced number of incidents that result from the action and reduced costs to the Agency from having to review fewer compliance actions as a result of greater harmonization and better understanding by industry of the requirements.

PHMSA considered the following in its preliminary assessment of benefits:

- ***Reduced fatalities, injuries, and property damages:*** We do not have enough information on regulatory actions and incidents related to the requirements under consideration; however, even without that information, we believe that it is unlikely that the changes

[2] http://www.phmsa.dot.gov/portal/site/PHMSA/menuitem.ebdc7a8a7e39f2e55cf2031050248a0c/?vgnextoid=65807f6b4d369110VgnVCM1000009ed07898RCRD&vgnextchannel=597583b287227110VgnVCM1000009ed07898RCRD&vgnextfmt=print.
[3] See: http://www.phmsa.dot.gov/hazmat/regs/international; http://www.phmsa.dot.gov/portal/site/PHMSA/menuitem.ebdc7a8a7e39f2e55cf2031050248a0c/?vgnextoid=65807f6b4d369110VgnVCM1000009ed07898RCRD&vgnextchannel=597583b287227110VgnVCM1000009ed07898RCRD&vgnextfmt=print (accessed November 18, 2013).

requested by the petitioner will have an impact on the potential benefits ensuing from a reduction in societal costs, since incidents related to the transportation of hazardous materials are already very low, as noted above.

- ***Reduced enforcement actions (if any) resulting from a better understanding of the regulation:*** According to PHMSA data in 2012, there were 271 regulatory enforcement actions initiated by PHMSA for all kinds of regulatory infractions.[4] Depending on the time it takes PHMSA to process and close an enforcement action, the per-hour earnings of the staff member who does the work, and the number of reduced actions ensuing from the greater harmonization, there could be a positive impact on PHMSA resources. For example, assuming (1) PHMSA's regulatory case load were reduced by a modest 1 percent, or three cases per year; (2) each regulatory action takes on average 40 hours to process and close; and (3) the individual processing the action earns approximately $40 per hour (GS-13, Step 6), PHMSA's annual total savings would be approximately $4,800 (3 cases × 40 hours × $40 hourly wage rate).

Conclusion
Based on the foregoing assessment, and as long as PHMSA's costs to make the change (which are not known at this time) are less than the estimated benefits of $4,800, we believe the requested changes are likely to be beneficial.

Standardized and consistent regulations enhance safety and environmental protection. Consistency between international regulations and the HMR makes training hazmat employees easier and enhances their understanding of the regulations. Also, transport of hazardous materials would be made safer because the possibility of improper preparation or transportation would be decreased. Emergency response in the event of an incident would be made more consistent as well, adding to the protection of human health and the environment.

5.2. Area 2 – Remove Packing Group Designation for Class 1, Division 4.1 and Division 5.2 Materials

Statement of the Problem: The petitioner states, "Shipping paper requirements on the required hazardous materials description, in §172.202(a)(4), require: 'The packing group in Roman numerals, as designated for the hazardous material in Column (5) of the §172.101 table.' While the text in this regulation also acknowledges that explosives, self-reactive substances and organic peroxides are excepted from the requirement to provide a packing group as part of the required description, a great deal of confusion is created given that, irrespective of this *text,* packing groups are provided for these substances in the §172.101 Table."

Suggested Change: The petitioner suggests that PHMSA "amend the §172.101 Table by removing 'II' from Column 5 in the case of each explosive, self-reactive substance and organic peroxide listed. An additional consequential amendment would be to delete §173.129."

[4] http://primis.phmsa.dot.gov/comm/reports/enforce/EnfHome.html?nocache=9870 (accessed November 18, 2013).

5.2.1. Alternatives Considered

5.2.1.1. Alternative 1 – No action

This is a viable and reasonable alternative that could be selected, serves as a basis for comparison with the other alternatives, and can be defined as the continuation of the current management practices. This alternative would continue the status quo using the same designation for Class 1, Division 4.1 and Division 4.2 Materials.

5.2.1.2. Alternative 2 – Remove Packing Group Designation for Class 1, Division 4.1 and Division 5.2 Materials

PHMSA would remove the Packing Group "II" designation from Column (5) of the § 172.101 Hazardous Materials Table (HMT) for organic peroxides (Division 5.2), self-reactive substances (Division 4.1), and explosives (Class 1) and align the HMR with the DGL in the ICAO TI and the IMDG Code.

Petitions that have international implications are subject to increased harmonization. PHMSA believes that its involvement in harmonization promotes compliance and promotes the "efficacy of the transportation system by minimizing the regulatory burden on the public."[5]

Removing the Packing Group "II" designation from Column (5) of the § 172.101 Hazardous Materials Table (HMT) for organic peroxides (Division 5.2), self-reactive substances (Division 4.1), and explosives (Class 1) and align the HMR with the DGL in the ICAO TI and the IMDG Code will enhance the Department's goal of promoting safe transportation of goods and clear, compatible, and understandable regulations. The change will also be in line with EO 13563's goal is to simplify and make regulations less burdensome.

5.2.1.3. Analysis of costs and benefits

Costs of the Action

Based on the petitioner's standing in the industry, their assertion that the change "would impose no additional costs" and not finding contradictory evidence, we concur that there would not be additional costs to industry.

The only cost associated with this action is a cost to PHMSA for making changes to the regulations as suggested by the petitioner. We do not know the level of effort required for making the changes, but in our opinion the additional costs to PHMSA would be minimal and of a negligible amount.

Benefits of the Action

The action will reduce confusion and ease the ability to comply with the HMR. Benefits can include reduced number of incidents that result from the action and reduced costs to the Agency

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[5] See: http://www.phmsa.dot.gov/hazmat/regs/international; http://www.phmsa.dot.gov/portal/site/PHMSA/menuitem.ebdc7a8a7e39f2e55cf2031050248a0c/?vgnextoid=65807f6b4d369110VgnVCM1000009ed07898RCRD&vgnextchannel=597583b287227110VgnVCM1000009ed07898RCRD&vgnextfmt=print (accessed November 18, 2013).

from having to review fewer compliance actions as a result of greater harmonization and better understanding by industry of the requirements, as noted in the petition.

PHMSA considered the following in its preliminary assessment of benefits:

- ***Reduced fatalities, injuries, and property damages:*** We do not have enough information on regulatory actions and incidents related to the requirements under consideration. However, even without that information, we believe that it is unlikely that the changes requested by the petitioner will have an impact on the potential benefits ensuing from a reduction in societal costs, since incidents related to the transportation of hazardous materials are already very low, as noted above.
- ***Increased efficiency and safety:*** The petitioner states that the action "would result in a net savings in that many unnecessary delays in hazardous material shipments would be avoided. It is our expectation that there would be an improvement in safety in that elimination of delays decreases the overall transportation risk." We can neither refute nor accept the statement based on the information we have.
- ***Reduced enforcement actions (if any) resulting from a better understanding of the regulation:*** According to PHMSA data in 2012, there were 271 regulatory enforcement actions initiated by PHMSA for all kinds of regulatory infractions.[6] Depending on the time it takes PHMSA to process and close an enforcement action, the per-hour earnings of the staff member who does the work, and the number of reduced actions ensuing from the greater harmonization ensuing from the proposed change, the Agency can save resources as a result of the changes requested by the petitioner. For example, assuming (1) PHMSA's regulatory case load were reduced by a modest 1 percent, or three cases per year; (2) each regulatory action takes on average 40 hours to process and close; and (3) the individual processing the action earns approximately $40 per hour (GS-13, Step 6), the annual total savings would be approximately $4,800 (3 cases × 40 hours × $40 hourly wage rate).

Conclusion

Based on the foregoing assessment, and as long as PHMSA's costs to make the change (which are not known at this time) are less than the estimated benefits of $4,800, we believe the requested changes are likely to be beneficial.

Based on the foregoing assessment, we believe the requested changes are likely to make requirements clearer and consistent with other regulations, and enhance safety and environmental protection. Consistency between international regulations and the HMR makes training hazmat employees easier and enhances their understanding of the regulations. Transport of hazardous materials would be made safer because the possibility of improper preparation or transportation would be decreased. Furthermore the requested changes are not likely to be onerous or costly for the regulated industry or PHMSA.

[6] http://primis.phmsa.dot.gov/comm/reports/enforce/EnfHome.html?nocache=9870 (accessed November 18, 2013).

5.3. Area 3 – Emergency Response Telephone Number Format

Statement of the Problem: The petitioner states, "The requirement for an emergency response telephone number in 172.604(a) does not currently limit telephone numbers that may be provided to ones consisting only of numbers. Consequently, it is the experience of some DGAC members that some shippers provide alphanumeric telephone numbers." It appears that the regulation has not kept pace with technology. This lack of synchronization may delay emergency response.

Suggested Change: PHMSA proposes to amend "172.604(a) to read as follows: "A person who offers a hazardous material for transportation must provide a numeric emergency response telephone number, including the area code, for use in the event of an emergency involving the hazardous material. For telephone numbers outside the United States, the international access code or the "+" (plus) sign, country code, and city code, as appropriate, must be included."

The petitioner asks for a 2-year implementation period to allow time for the revision of electronic shipping papers.

Reaching out to emergency responders is one of PHMSA's core goals to ensure that the preparedness and response communities are fully primed to deal with any type of incident.[7]

5.3.1. Alternatives Considered

5.3.1.1. Alternative 1 – No action
This is a viable and reasonable alternative that could be selected, serves as a basis for comparison with the other alternatives, and can be defined as the continuation of the current management practices (CEQ 1981).

5.3.1.2. Alternative 2 – Emergency Response Telephone Number Format
Amend 172.604(a) to require emergency response telephone numbers by only permitting the use of numeric telephone numbers and prohibiting the use of alphanumeric telephone numbers in § 172.604(a).

5.3.1.3. Analysis of costs and benefits

Cost of the Action
The petitioner did not include any information regarding the impact of the proposed action, including direct effects on States and other levels of government and effects on small firms. PHMSA believes that the proposed revision will not induce costs, since shippers already indicate emergency telephone numbers and numbers can be displayed in any format.

From our perspective, barring any additional costs to small firms and barring any adverse effects on competition in the form of inability to revise electronic shipping papers, the only cost associated with this action is a cost to PHMSA for making changes to the regulations as

[7] http://phmsa.dot.gov/prepare-responds.

suggested by the petitioner. We do not know the level of effort required for making the changes, but in our opinion the additional costs to PHMSA would be minimal and of a negligible amount.

Benefits of the Action
PHMSA considered the following in its preliminary assessment of benefits:

- ***Reduced fatalities, injuries, and property damages:*** Emergency services play a pivotal role in providing "first response." In the case of incidents with serious injuries or life-threatening episodes, treatment delays may affect patient outcome. We do not have enough information on regulatory actions and incidents related to the requirements under consideration. Even without that information, we believe that it is unlikely that the changes requested by the petitioner will have an impact on the potential benefits ensuing from a reduction in societal costs, since incidents related to the transportation of hazardous materials are already very low, as noted above.
- ***Increased efficiency and safety:*** The petitioner does not have a clear statement, but it is obvious that any action to help speed up emergency services is beneficial in the long run.
- ***Reduced enforcement actions (if any) resulting from a better understanding of the regulation:*** According to PHMSA data in 2012, there were 271 regulatory enforcement actions initiated by PHMSA for all kinds of regulatory infractions.[8] Depending on the time it takes PHMSA to process and close an enforcement action, the per-hour earnings of the staff member who does the work, and the number of reduced actions ensuing from the greater harmonization ensuing from the proposed change, the Agency can save resources as a result of the changes requested by the petitioner. For example, if one assumes that (1) PHMSA's regulatory case load were reduced by a modest 1 percent, or three cases per year; (2) each regulatory action takes on average 40 hours to process and close; and the individual processing the action earns approximately $40 per hour (GS-13, Step 6), the annual total savings would be modest [(approximately $4,800 (3 cases × 40 hours × $40 hourly wage rate)].

Conclusion
Based on the foregoing assessment, and as long as PHMSA's costs to make the change (which are not known at this time) are less than the estimated benefits of $4,800, we believe the requested changes are likely to be beneficial.

If a caller needs to convert alphanumeric telephone numbers to a corresponding number it can cause delays in providing emergency services during an incident, since the emergency responder must first convert each letter to a corresponding number. Such delays are preventable with the help of the proposed action.

[8] http://primis.phmsa.dot.gov/comm/reports/enforce/EnfHome.html?nocache=9870 (accessed November 18, 2013).

5.4. Area 4 – Enhanced Nitric Acid Packaging

Statement of the Problem: In its petition (P-1601)[9], the United Parcel Service (UPS) requested that PHMSA revise the packaging requirements for ground shipments of nitric acid. Their petition was based on four incidents that occurred in a 6-month period during loading and sorting operations. The incidents did not result in any casualties, but varying degrees of property damage were assessed in each situation. UPS noted that each incident involved the same packaging configuration, glass inner packagings within fiberboard outer packagings. In each case, one or more inner packagings were breached and the resulting leakage released fumes followed by the initiation of a fire involving the fiberboard outer packaging material. UPS believes that the packaging requirements of the HMR applicable to ground shipments of nitric acid do not adequately address the hazards present.

Currently, the HMR § 173.158(e) allows combination packages constructed of fiberboard, wood, or other organic materials to be shipped without intermediate packaging layers. This sub-section allows such packaging for concentrations of nitric acid of less than 90 percent. Both PHMSA and the petitioner have detected an increase in incidents involving nitric acid shipments that result in a spontaneous fire.

Suggested Change: The petitioner proposes the following amendment to § 173.158(e): "(e) Nitric acid of less than 90-percent concentration, when offered for transportation or transported by rail, highway, or water, may be packaged in 4G fiberboard boxes or 4C1, 4C2, 4D, or 4F wooden boxes with inside glass packagings of not over 2.5 L (0.66 gallon) capacity each. The glass inner packagings must be packed in tightly closed, non-reactive intermediate packagings, cushioned with a non-reactive absorbent material." (New language proposed is underlined.)

5.4.1. Alternatives Considered

5.4.1.1. Alternative 1 – No action

This is a viable and reasonable alternative that could be selected, serves as a basis for comparison with the other alternatives, and can be defined as the continuation of the current management practices (CEQ 1981). In PHMSA's view, this provides an acceptable level of safety. This alternative would not result in incremental costs or benefits from the status quo.

5.4.1.2. Alternative 2 – Adopt the terms of the petition, thus requiring intermediate packaging in non-bulk nitric acid shipments

The petitioner, UPS, requested that PHMSA amend 49 CFR § 173.158(e) to change the packaging requirements for "… [n]itric acid, UN2031 when the material is prepared for shipment via surface modes."[10]

[9] Available at http://www.regulations.gov/#!docketDetail;D=PHMSA-2012-0236.
[10] Ibid.

5.4.1.3. Analysis of costs and benefits

Cost of the Action

There are some costs associated with packaging. In its petition, UPS noted that industry trends in packaging design of combination packages used for hazardous materials, including nitric acid, are moving towards "…elimination of molded expanded polystyrene (EPS) inserts and replacing them with molded fiberboard trays and caps to secure inner packages within outer packagings."[11] The proposed additional text (noted above) would require shippers to enclose glass inner packagings (a) with non-reactive intermediate packagings and (b) cushioned with a non-reactive absorbent material.

New Packaging Requirements

Section 173.158(d)(2) regulates the transportation of nitric acid in concentrations greater than 90 percent when transported by rail, highway, or water by providing an option for its shipping where combination packagings with (among others) 4G outer packagings with inner glass packagings of 2.5L or less capacity are cushioned with non-reactive absorbent material and packaged with an tightly closed intermediate packaging; this paragraph (d)(2) could reasonably be expected to have practically equivalent expected compliance behavior to the new proposed paragraph (e), which applies to nitric acid in concentrations less than 90 percent. Additionally, 173.158(d)(f)(3) regulates the transportation of nitric acid in concentrations less than 70 percent when transported by rail, highway, or water by allowing combination packages consisting of outer fiberboard boxes with plastic inner packagings further overpacked in tightly closed metal packagings.

In estimating the costs of the proposed rulemaking provision, we were unable to differentiate between nitric acid in concentrations of 90 percent or greater or less than 90 percent, primarily due to the same UN classification number being assigned to various forms nitric acid. We were, however, able to differentiate between nitric acid shipments (specifically, for reported hazardous materials incidents involving nitric acid) in concentrations under and over 70-percent concentration in some instances.

For purposes of this analysis, we assume that shippers will choose to comply with this alternative by packing glass bottles containing nitric acid with intermediate EPS inserts to include a non-reactive absorbent material instead of shipping via a fiberboard box alone without EPS inserts (and potentially without absorbent cushioning materials). Therefore, a cost of this provision is the incremental cost of the new packaging materials that must be purchased by shippers that are offering nitric acid in accordance with new paragraph (e).

Most (approximately 90 percent) nitric acid produced in the United States is consumed in the process of producing ammonium nitrate fertilizer or other industrial products, and therefore not offered for transportation.[12] We therefore sought to further characterize the remaining 10 percent

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[11] Ibid.

[12] ICIS.com, "Chemical Profile: Nitric Acid," 19 May 2008, available at http://www.icis.com/resources/news/2008/05/19/9124327/chemical-profile-nitric-acid/.

of U.S.-produced nitric acid that would be offered for transportation (and the primary subject of this rulemaking) using estimating techniques.

We examined PHMSA's Incident Report Database and assumed that the distribution of concentrations of nitric acid (including UN1796 and UN2031) shipped via non-bulk means in the United States is generally similar to that observed in the PHMSA Incident Reports from 2002 to 2013; for incidents reported to occur between April 30, 2002, and December 31, 2013, a search revealed 761 reported non-bulk nitric acid incidents, distributed as in Table 3. For UN2031, approximately 20 percent of all non-bulk shipments were definitively transported via a cardboard box outer packaging and inner glass packaging configuration. This approximation continues to hold for reports of incidents involving nitric acid of over 40-percent concentration as well as for incidents involving nitric acid in concentrations between 65 percent and 70 percent.

Table 3. Incidents Involving Non-Bulk Shipments of Nitric Acid, 2002 to 2013

UN Number	UN1796	UN2031	UN2031	UN2031	UN2031	UN2031
	Commodity Long Name					
Combination Packaging Configuration	All	All	Nitric Acid, Other than Red Fuming, With Not More Than 20-Percent Nitric Acid	Nitric Acid (Over 40%)	Nitric Acid, Other than Red Fuming, With at Least 65 Percent But Not More Than 70-Percent Nitric Acid	Nitric Acid, Other than Red Fuming, With More Than 70-Percent Nitric Acid
All Configurations	**2 (100%)**	**759 (100%)**	**1 (100%)**	**50 (100%)**	**657 (100%)**	**51 (100%)**
Fiberboard Outer + Glass Inner	0	152 (20%)	0	10 (20%)	125 (19%)	17 (33%)
Fiberboard Outer + Plastic Inner	0	71 (9%)	0	4 (8%)	65 (10%)	2 (4%)
All Other or Unknown	2 (100%)	630 (71%)	1 (100%)	36 (72%)	467 (71%)	32 (63%)

[13] *PHMSA Incident Reports Database, 2002-2013.*

The 2007 Commodity Flow Survey (CFS) (the most recent date for which nitric acid shipment data is available) indicated that a total of 1.4 million tons of UN2031, Nitric acid other than red fuming, was transported by all modes in the U.S.[14] We estimated the shipment tonnage of nitric acid in 2007 by using the following assumptions:

[13] Database available at http://www.phmsa.dot.gov/hazmat/library/data-stats/incidents. Population search criteria (in addition to the date range noted above) include the highway, rail, and water modes of transportation (however, only highway mode incidents were reported during this date range), identification numbers of UN1796 and UN2031, and non-bulk packaging type. Entries were considered to definitively involve inner glass packagings contained in fiberboard boxes based on the corresponding entries to the *HMIS Container Description* (outer packaging), *Cont2 Package Type*, *Cont2 Material of Construction* (inner packaging type), and *Description of Events* fields contained language that would indicate inner glass packagings were involved in the incident. Those that did not meet these criteria were excluded and considered as other incidents involving non-bulk shipments of nitric acid.

[14] See CF0700H08 - Hazardous Materials Series: HazMat Shipment Characteristics by Mode by UN Number for the United States: 2007, available through American FactFinder, factfinder2.census.gov.

- Non-bulk tonnage is 30 percent of total shipment tonnage:
    - Drum shipment tonnage is 1/3 of non-bulk shipments tonnage.
    - Bottle shipment tonnage is 2/3 of non-bulk shipments tonnage.

We make additional assumptions about the volume of packagings in which nitric acid is offered for shipment to estimate the number of shipments from the tonnage shipped. Hazardous materials incident data for 2002 through 2013 indicate that the median drum volume is 55 liquid gallons (approximately 0.2045 tons) and the median bottle size is 2.5 liters (approximately 0.0025 tons). Using these assumptions to convert the unit of measure from tonnage to gallons results in the estimated number of shipments of nitric acid by drums and by bottles in Table 4 below (non-bulk shipments, 21,412,824, is estimated as the total of drum and bottle shipments). We assumed one drum per drum shipment and 5.528 [rounded] bottles per bottle shipment, which is the mean number of bottles per non-bulk, boxed shipments of nitric acid containing inner packagings-reported incidents; we further assumed that the distribution of inner packagings in such reported incidents is representative of all non-bulk shipments of nitric acid. We also assumed that the distribution of number of reported incidents of non-bulk, boxed shipments with inner glass packagings of nitric acid shipped by highway, rail, or vessel as a proportion of all reported incidents involving non-bulk shipments of nitric acid shipped by highway, rail, or vessel—approximately 20 percent, based on the results presented in Table 4—is a reasonable approximation to all such shipments involved in reported incidents or not; this allows for an estimate of number of shipments of glass bottles of approximately 4.1 million.

Table 4. Number of Shipments of Nitric Acid (2007)

	Tonnage	Number of Shipments
Total	1,400,000	
Non-Bulk	420,000	**21,412,824**
Drum	138,600	677,912
In Bottles	50,904	20,734,911
Glass Bottles		**4,141,533**

To arrive at 2014 estimates, for which survey data is not available, we relied on the forecasts of growth in nitric acid production in the United States from an economic impact analysis (EIA) produced for the U.S. Environmental Protection Agency (EPA) for its nitric acid manufacturing New Source Performance Standards (NSPS) established under Section 111 of the Clean Air Act. In that EIA, EPA estimated that nitric acid production in 2007 would total 7,569,552 tons and in 2014 would total 9,309,594 tons.[15]

We were not able to find a reliable estimate of tons of shipments of nitric acid and therefore needed to estimate number of shipments; we based our estimates on tons of nitric acid produced in the United States. Specifically, we assumed that the proportion of nitric acid (in tons)

[15] U.S. Environmental Protection Agency, *Economic Impact Analysis for the Nitric Acid Manufacturing NSPS*, p. 2–15, available at http://www.epa.gov/ttn/ecas/regdata/EIAs/HNO3final_EIA_5-14-2012finalv.pdf (accessed on September 10, 2014).

produced that is *not* consumed onsite as a percentage of total tonnage production of nitric acid—that is, 10 percent—would be representative of the proportion of total shipments of nitric acid to total nitric acid production in 2014.[16] This results in an estimated total tonnage of nitric acid shipped in 2014 of 930,959 (= 10 percent × 9,309,594 tons produced) tons shipped. Results are presented in Table 5**Error! Reference source not found.** below.

Table 5. Number of Shipments of Nitric Acid, Estimated 2014

	Tonnage	Number of Shipments
Total	**930,959**	
Non-Bulk	279,288	**14,238,907**
Drum	92,165	450,792
In Bottles	33,850	13,788,115
Glass Bottles		**2,753,999**

To arrive at an estimate of the incremental cost of new packaging requirements to shippers of nitric acid under the proposed § 173.185(e), we surveyed several hazardous materials packagings suppliers' Web sites for examples of costs. We believe that offerors of nitric acid will likely choose the least-cost alternative to comply with new paragraph (e), which may include retesting an existing combination packaging design on a periodic basis (i.e., every 24 months, as required by the HMR). However, we were unable to locate reliable information on the cost of retesting such packaging configurations comprising fiberboard boxes with intermediate packagings and cushioned with a non-reactive absorbent material, nor were we able to find the likely number of offerors to whom such testing would apply (though the PHMSA staff believes that high-volume shippers of nitric acid would likely adopt such an option).

As an alternative, we were able to monetize an estimate of the marginal cost of an offeror who chooses to comply with the new paragraph (e) by acquiring a specification 4G fiberboard packaging instead of a fiberboard box containing inner glass bottles without intermediate packaging or absorbent material. We consider this to be a high-cost option for compliance, and thus we provide an estimate of the maximum cost of this new provision. Assuming that the market for such materials is fairly competitive, we believe that using two estimates from one supplier is a reasonable approximation of the costs faced by shippers of nitric acid. One cost of a fiberboard box measuring 13" L × 13" W × 13" D is $5.44 when ordered in a quantity of one box.[17]

The same supplier sells a specification 4G fiberboard box that accommodates six 1-liter glass bottles with foam inserts and poly bags (but without glass bottles) in kits of one at $14.69 per kit.[18] This results in an *high* estimated incremental packaging cost to ship nitric acid in

[16] ICIS.com, "Chemical Profile: Nitric Acid," 19 May 2008, available at http://www.icis.com/resources/news/2008/05/19/9124327/chemical-profile-nitric-acid/.
[17] See product number 4GV13C at labelmaster.com, available at http://www.labelmaster.com/store/scripts/view-product.cfm?product=UN4GV13C&cataloglevel=24617 (accessed on September 11, 2014).
[18] See product number UNIP61LF at labelmaster.com, available at http://www.labelmaster.com/store/scripts/view-product.cfm?product=UNIP61LF&cataloglevel=24740 (accessed on September 11, 2014).

concentrations of less than 90 percent when offered for transportation or transported by rail, highway, or water of $9.25 (= $14.69 - $5.44) per package transported.

We multiply 2,753,999 shipments of glass bottles by the (maximum) incremental per-shipment costs of using compliant intermediate packaging and absorbent materials (noted above) of $9.25; this results in a **total annual cost to shippers of less than or equal to $25,474,493 (rounded)**.

Retraining Costs
Additional costs may arise from shippers' need to train its employees on new packaging requirements for the shipment of non-bulk nitric acid; these costs are unknown and not estimated. We believe that retraining would primarily consist of new or revised packing procedures for offerors of certain shipments of nitric acid, which is likely of minimal additional labor effort. Nonetheless, we request comment on the numbers of firms and employees likely to require retraining, along with other pertinent information available that may allow us to quantify these unknown amounts.

Benefits of the Action
The benefits of the proposed amendment will result from reduced injuries and property damage. We expect that incidents involving fires and other incidents, such as leaking bottles and packages, will be reduced by compliance with this proposed provision. Emergency services play a pivotal role in providing "first response." In the case of incidents with serious injuries or life-threatening episodes, treatment delays may affect patient outcomes.

As noted earlier, our search of PHMSA's Incident Report Database revealed 152 reported non-bulk nitric acid incidents that could be positively identified as involving inner glass packagings contained in fiberboard boxes between April 30, 2002, and December 31, 2013. 125 of these incidents involved solutions with at least 65-percent but not more than 70-percent nitric acid: the most specific commodity name reported in the incident reports that would be clearly impacted by the proposed paragraph (e) (since they are solutions of less than 90-percent nitric acid and for which the existing paragraph (f)(3) does not apply because of such solution not being contained in inner packagings of plastic with a metal overpack).[19] These results serve as the basis for the calculations (below) of expected benefits of this rulemaking.

Material Damages
Total material damages (which includes value of lost material, property damages, and response and remediation costs) from the reported incidents during 2002–2013 totaled $224,442, averaging approximately $1,477 per incident (including zero-dollar damage incidents) with an incident maximum of $162,368.

Annualized total material damages are $18,704 (rounded) (= $224,442 / 12 years). Assuming that the proposed amendments eliminate material damages from non-bulk nitric acid accidents and that the period of 2002-2013 will be representative of nitric acid incidents, we estimate **$18,704 in avoided material damages from incidents (i.e., benefits) per year**.

[19] Incidents reported using footnote 15 criteria, but limited to a Commodity Long Name of "NITRIC ACID OTHER THAN RED FUMING WITH AT LEAST 65 PERCENT BUT NOT MORE THAN 70 PERCENT NITRIC ACID."

Injuries

During this period, there were approximately seven reported injuries (all involving non-hospitalized injuries) during the period from four nitric acid incidents involving fiberboard boxes and inner glass packagings, and no fatalities.

We believe that a benefit of this proposed amendment is realized from the injuries avoided due to enhanced packaging standards when shipping nitric acid contained in glass inner packagings and protected by an intermediate packaging and absorbent material. DOT OST provides estimates of the economic value of a statistical life (VSL)—societal willingness to pay to avoid one fatality involved in transportation—for analyses conducted in 2014 of $9.2 million.[20] The analysis continues to provide coefficient adjustments for various classes of injuries, according to the Abbreviated Injury Scale (AIS) and based on the VSL, which are presented in Table 6.

Table 6. Relative Disutility Factors by Injury Severity Level (AIS)

AIS Level	AIS-1	AIS-2	AIS-3	AIS-4	AIS-5	AIS-6
Severity	Minor	Moderate	Serious	Severe	Critical	Unsurvivable
Fraction of VSL	0.003	0.047	0.105	0.266	0.593	1.000
Monetized with $9.2 million VSL	$27,600	$432,400	$966,000	$2,447,200	$5,455,600	$9,200,000

Based on the narrative descriptions in the four incidents associated with the reports, we allocated AIS injury severities to the total injuries sustained. Those injury severities and their monetization are shown in Table 7.

Table 7. Injuries' Severities and Monetization of Injuries From Fire-Related Incidents Involving Non-Bulk Shipments of Nitric Acid, 2002–2013

Incident Date	AIS-1	AIS-2	AIS-3	AIS-4	AIS-5	AIS-6	Monetization of Injuries Sustained
	Minor	Moderate	Serious	Severe	Critical	Unsurvivable	
6/30/2003	4	0	0	0	0	0	$110,400
1/11/2007	0	0	1	0	0	0	$966,000
1/31/2013	1	0	0	0	0	0	$27,600
8/22/2013	1	0	0	0	0	0	$27,600
Total Incidents	**6**	**0**	**1**	**0**	**0**	**0**	**$1,131,600**

Between 2002 and 2013, two fire-related incidents involving non-bulk shipments of nitric acid resulted in seven injuries (annualized average of 0.5833 injuries). Of these seven injuries, we classified the injuries as follows: six of minor severity and one of serious severity. Monetizing the injuries according to the factors in Table 7. results in a dollar value of the total injuries sustained of $1,131,600. **Annualized total injury costs from incidents are $94,300 (= $1,131,600 / 12 years).**

[20] Office of the Secretary of Transportation, U.S. Department of Transportation, "Memorandum to Secretarial Officers and Modal Administrators, Guidance on Treatment of the Economic Value of a Statistical Life (VSL) in U.S. Department of Transportation Analyses—2014 Adjustment," (June 13, 2014) available at http://www.dot.gov/sites/dot.gov/files/docs/VSL_Guidance_2014.pdf.

Avoided Shipping Delays
Several incidents involving evacuations of facilities have occurred due to the fire incidents involving non-bulk shipments of nitric acid packaged in fiberboard boxes. *Depending on the business practices of carriers in these incidents (e.g., authorizing or not authorizing overtime to ensure a certain number of packages are shipped by a day's end)*, there may be benefits realized from avoiding delivery delays to shipments if this proposed amendment prevents any kind of work disruptions up to evacuations.

There is potential for warehouse shipping delays to result in large costs from, for example, paying employees overtime wages to finish work that has a strict deadline, but we are unsure of the likelihood of this occurring because of a fire incident. Moreover, OST guidance on the value of time to shippers or those to whom packages are shipped (i.e., the ultimate customers of the carriers experiencing fire incidents involving nitric acid) in economic analyses has not been estimated, primarily from the differences of freight categories that would be affected by any particular time saving.[21] Therefore, even if the exact number of hours of a delay could be quantified, values of such hours would be highly tentative. Nonetheless, we welcome comments that may assist in further reliably quantifying avoided shipping delays because of this rulemaking.

Costs of the Action
There will be costs to industry for complying with the standard; we estimate these costs at not more than $25,474,493 per year. There may also be indirect costs to industry associated with the training and with setting up and maintaining quality assurance procedures; these costs remain unquantified, but we request comment from industry on the likely impacts relating to training costs.

Benefits of the Action
PHMSA considered the following in its preliminary assessment of benefits:

- ***Reduced injuries and property damages:*** There have been 152 reported non-bulk nitric acid (including UN1796 and UN2031) incidents definitively involving inner glass packagings contained in fiberboard boxes between April 30, 2002, and December 31, 2013. We estimated $18,704 in avoided material damages from incidents involving fires (i.e., benefits) per year. Additionally, we estimated benefits of the injuries from nitric acid incidents that are likely to no longer occur at $94,300 per year. **Total annual quantified benefits from reduced injuries and property damages are thus estimated at $113,004.**

- ***Avoided Shipping Delays:*** Several incidents involving evacuations of facilities have occurred due to the fire incidents involving non-bulk shipments of nitric acid packaged in fiberboard boxes. *Depending on the business practices of carriers in these incidents (e.g., authorizing or not authorizing overtime to ensure a certain number of packages are*

[21] Office of the Secretary of Transportation, U.S. Department of Transportation, "Memorandum to Secretarial Officers and Modal Administrators, Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis," (July 9, 2014) available at:
http://www.dot.gov/sites/dot.gov/files/docs/USDOT%20VOT%20Guidance%202014.pdf.

shipped by a day's end), there may be benefits realized from avoiding delivery delays to shipments if this proposed amendment prevents any kind of work disruptions up to evacuations.

Breakeven Analysis and Data Observations

To determine the point at which net benefits would equal zero for this provision, we adjusted the values of three key parameters: (1) the incremental packaging costs, (2) the estimated percentage of actual incidents involving fiberboard boxes with inner glass packagings as a proportion of all incidents involving non-bulk shipments of nitric acid, and (3) the average bottles per shipment of non-bulk nitric acid. We determined that the point at which annual net benefits would become zero are for the above key parameters, respectively (1) $0.04 per package, (2) 0.09 percent of incidents involving fiberboard boxes with inner glass packagings, and (3) approximately 1,246 bottles per shipment. We believe the breakeven points for parameters (2) and (3) to be unrealistic; parameter (1) may be feasible for the largest offerors of nitric acid, but is unlikely to be so for relatively smaller offerors.

By comparing the breakeven cost per package ($0.04) to the marginal cost of compliant package ($9.25), we can also estimate the breakeven level of pre-existing compliance with the proposed regulation. This was estimated to be 99.57 percent ($0.04 ÷ $9.25). That is, for the proposed rule to break even under a marginal packaging cost of $9.25, 99.57 percent of shipments will already need to be compliant with the proposed rule *and* 100 percent of past incidents (which we have used to calculate benefits) will have to have involved packaging that would not be in compliance with the proposed rule.

In addition to this breakeven analysis, we make several observations from the incident report data revealed during the cost-benefit analysis. First, three large offerors are consistently reported in incidents involving non-bulk shipments of nitric acid. Whether this is due to them shipping a disproportionately large share of the (non-bulk shipments of) nitric acid in the United States or whether these companies may also have business practices that result in large numbers of reportable incidents cannot be conclusively determined from incident reports alone. Several large carriers, however, do not use specific enough language in their incident reports to allow one to determine the exact nature of each individual incident or to understand a shipper's role in a given incident.

Second, we noted that of the 126 incidents where "How Failed" was reported, 15 incidents (12 percent) indicated the primary manner in which failure occurred as "Burst or Ruptured," 46 incidents (37 percent) indicated the primary manner as "Cracked," and 52 incidents (41 percent) indicated the primary manner as "Leaked; Structural."

Conclusion

We cannot conclusively quantify all benefits of this proposed amendment. For example, costs of retaining carrier staff and benefits from avoided shipping delays remain unquantified here. In addition, some packages may already comply with the proposed rule. However, we estimate **quantified annual net benefits of -$25,361,489 with no pre-existing compliance.** In order for this proposed rule to break even, marginal packaging costs would have to be $0.04, or pre-existing compliance would have to be 99.57 percent.

5.5. Area 5 – Relaxation of Requalification Period for Cargo Tanks in Dedicated Propane Service

Statement of the Problem: The petitioner, NPGA, states, "Currently, the Federal HMR require that propane cargo tanks *(bobtails)* of MC 331 specifications be requalified and pressure-tested every 5 years {49 CFR 180.407} to remain in service." They further note that the testing requirement for these smaller bulk delivery trucks, called bobtails, is a burden.

Suggested Change: NPGA recommends extending the requalification period from 5 years to 10 years for MC-331 specification cargo tanks, based on results of a survey of companies that performed the 5-year hydrostatic testing and three-phase study by Battelle to determine technical feasibility of an extension. These changes would be applicable to MC-331 specification cargo tanks that meet the following requirements:

- Used in dedicated propane service.
- Have a water capacity less than 3,500 gallons.
- Constructed of one or more of the following materials:
    - Non-quenched and tempered (NQT) SA-612 steel.
    - NQT SA-202 or SA-455 steels, provided the materials have full-size equivalent (FSE) Charpy-vee notch (CVN) energy test data that demonstrate 75-percent shear-area ductility at 32 degrees F with an average of three or more samples greater than 15 ft-lb FSE, with no less than 10 ft-lb FSE.

5.5.1. Alternatives Considered

5.5.1.1. Alternative 1 – No action

This is a viable and reasonable alternative that could be selected, serves as a basis for comparison with the other alternatives, and can be defined as the continuation of the current management practices (CEQ 1981). In PHMSA's view, this provides an acceptable level of safety.

5.5.1.2. Alternative 2 – Revise the requalification period for certain cargo tanks in dedicated propane service

PHMSA's goal is to protect people and the environment from the risks of hazardous materials transportation as well as to simplify and make regulations less burdensome**.** The aim is to reduce risk toward zero deaths, injuries, environmental and property damage, and transportation disruptions. As noted above, the transportation of hazardous materials industry is relatively safe. The data generated in the Battelle study support NPGA's recommendation to extend the test period from 5 to 10 years for MC-331 cargo tanks. The petitioner does not believe that less-frequent testing will increase the risk of failure.

5.5.1.3. Analysis of costs and benefits

Cost of the Action
There appear to be no costs associated with a reduction in inspection frequency, only cost-savings, which are accounted for in the benefits.

Benefits of the Action
Benefits will accrue from the elimination of requalification and testing costs in every fifth year of a propane cargo tank's service life. However, this benefit could be reduced if propane bobtails are subject to other inspection and testing requirements outside of the HMR, particularly those in the Federal Motor Carrier Safety Regulations (FMCSR) that would require similar requalification and testing more frequently than every 10 years. We thoroughly reviewed Part 396, "Inspection, Repair, and Maintenance," of the FMCSR and searched for references to "tank vehicles" in the entire FMCSR and found no requirements similar or duplicative to § 180.407 of the HMR. Therefore, we expect that operators of propane bobtails will receive the full benefit of the proposed rule.

Benefits for each bobtail could include:

- Reducing costs for testing.
- Savings from preventing damage to bobtails during hydrostatic testing.
- Increasing revenues for the firm in the form of fewer bobtails out of service.

We do not believe that bobtail operators will experience any benefits from their bobtails being out of service less often. While the FMCSRs do not include requirements for requalification and testing of the tank portion of the vehicle, they do require all commercial motor vehicles (CMVs) to undergo regular inspection, repair, and maintenance of components that "affect safety of operation, including but not limited to, frame and frame assemblies, suspension systems, axles and attaching parts, wheels and rims, and steering systems" (§ 396.3(1)). In practice, the Federal Motor Carrier Safety Administration (FMCSA) estimates that CMV inspection, repair, and maintenance activities occur continually throughout a year.[22] For the purposes of this analysis, we have assumed that propane bobtail tank requalification and testing is occurring at one of the times when the CMV is already out of service when other major maintenance and repair activity has been scheduled. Consequently, we do not believe that there will benefits from less out-of-service time. It is important to note that this is somewhat at odds with the conclusion of the petitioner that the current requirements result in additional out-of-service times.

We can estimate the cost-savings from reducing the frequency of requalification and testing. We do not have information on the number of bobtails that are damaged during hydrostatic pressure testing, and therefore cannot estimate the benefits of reducing unintended damage to these tanks. We can, however, estimate the cost of all other activities related to requalification and testing. Required procedures include an internal visual inspection of the tank, hydrostatic pressure

[22] These assumptions are in the supporting statement that accompanies Information Collection Request 2-26-003, "Inspection, Repair, and Maintenance."
Retrieved from: http://www.reginfo.gov/public/do/DownloadDocument?documentID=335327&version=2.

testing, fully drying the cargo tank, recording the results from inspections and tests and maintaining these records, and applying a new inspection label to the cargo tank. In its original petition for this rulemaking, NPGA states that bobtails could be out of service for up to a week for requalification and testing, although we believe this out-of-service time includes idle time before and after the requalification and testing, and between the individual steps.

One firm advertises a price of $1,000 for an internal visual and hydrostatic pressure test, which includes all material, documentation and labeling.[23] This firm uses a $78 per-hour labor cost for its services. Other variable cost elements include the water used to conduct each test, the cost of electricity to operate equipment, and a small amount of equipment depreciation for each test conducted. This proposed change to the HMR could apply to cargo tanks with up to 3,500 gallons of water capacity. The Environment Protection Agency estimates that the average cost of tap water is about $2 per 1,000 gallons,[24] so the cost of water would be about $7 (3,500 ÷ 1,000 × $2). We have no information on the energy consumption of test equipment, but the retail cost per kilowatt-hour in industrial settings is about $0.073,[25] so we assume that this cost would be minimal. A blank "Tanker Test and Inspection Report" form costs between $0.50 and $0.75.[26] Cargo tank inspection marking labels cost $2.21.[27] In total, we estimate that material will cost about $10, so most of cost of inspection and testing is related to labor. The pricing information we have obtained indicates that this is a 12-to-13-hour process, which would put the bobtail out of service for at least 2 days. It seems likely that a bobtail might wait in a queue before being inspected, which might extend the typical process to result in the bobtail being out of service for 3 days. This seems to corroborate the petitioners claim that out-of-service times could extend to up to a week, which we assume would be the case if there are longer service queues.

A motor carrier will also have to drive or transport the bobtail to an inspection service firm. Travel costs would also include costs-per-mile to drive or transport the vehicle. Firms offering inspection and repair services to motor carriers are usually located near motor carrier terminals and facilities clustered in certain areas. We assume that a typical travel or transport distance would average 10 miles each way. We have used the price of $0.75 per mile for a service call cited by the inspection firm discussed above and estimate that mileage costs will amount to about $7.50 per leg traveled. Labor costs to motor carriers should include all base wages and fringe benefits. For base wages, we use the median wage of $19 per hour for "Heavy and Tractor-Trailer Truck Drivers" in the "Specialized Freight Trucking"[28] industry. We inflate this figure by about 51 percent to $29 per hour ($19 × 1.51) to account for fringe benefits that are an explicit cost to firms of using labor.[29] We assume that a truck driver will have to drop off the bobtail,

[23] Perry Maintenance and Compliance. http://www.refuelr.com/pmc.asp.
[24] United States Environmental Protection Agency (2009). "Water on Tap." Washington, DC: Author. Retrieved from: http://www.epa.gov/ogwdw/wot/pdfs/book_waterontap_full.pdf.
[25] United States Department of Energy, Energy Information Agency (2014). "Electricity Monthly Update, June 2014." Washington, DC: Author. Retrieved from: http://www.eia.gov/electricity/monthly/update/end_use.cfm.
[26] We have reviewed forms offered by J.J. Keller. See: http://www.jjkeller.com/shop/Product/Tanker-Test-and-Inspection-Report-2-Ply and http://www.jjkeller.com/shop/Product/Tanker-Test-and-Inspection-Report-3-Ply.
[27] See: http://www.jjkeller.com/shop/Product/Cargo-Tank-Inspection-Markings.
[28] Bureau of Labor Statistics (BLS) (2013), Occupational Employment Statistics. Retrieved from http://www.bls.gov/oes/current/naics4_484200.htm.
[29] Calculated from data on wages and total compensation for production workers presented in Table 9 of BLS Employer Costs for Employee Compensation (ECEC)-June 2014. Retrieved from

find other means to return to his or her carrier's facility, and then find a means to return to the inspection facility to pick up the bobtail. This might be accomplished by the truck driver being accompanied by a driver in another vehicle, or by towing the bobtail to the inspection facility. If the bobtail is towed, the time it takes to load, unload, load, and unload the vehicle will have to be accounted for. We have assumed that each delivery and pickup leg each will take 1 hour for 2 workers, or $58 per leg. Mileage costs add $7.50 per leg, bringing the cost to $65.50. If each bobtail requires four legs (delivery, return to carrier, pickup, return to carrier), the cost to carriers would be about $262. **In sum, we estimate that the economic cost of each bobtail requalification and test to be about $1,262 ($1,000 for the price of the inspection and testing, and $262 for motor carrier staff travel and labor).**

To estimate the number of propane bobtails to which this would apply, we analyzed commercial motor carrier registration from FMCSA's Motor Carrier Management Information System (MCMIS). Data were current as of December 27, 2013, and were the same as those used in FMCSA's most recent *Pocket Guide to Large Truck and Bus Statistics (October 2014 Update)*.[30] Our analysis of MCMIS data followed the following five steps:[31]

1. Include only commercial motor carriers with "recent activity" defined by FMCSA as those that have had a roadside inspection, a crash, a compliance review, a safety audit, an FMCSA Motor Carrier Identification Report (Form MCS-150) update, a vehicle registration activity, or a Unified Carrier Registration system payment activity in the past 3 years; or have current operating authority indicated in the FMCSA Licensing and Insurance database.
2. From the set of active carriers, include only those registered to haul hazardous materials.
3. From the set of active hazardous materials carriers, select those that have checked the "bulk" box in line "H" of section 25 of the MCS-150, *Motor Carrier Identification Report, Application for USDOT Number*, which corresponds to Division 2.1 Liquefied Petroleum Gas (LPG).
4. Sum the number of "Hazmat Cargo Tank Trucks" reported by these carriers in section 26 of the MCS-150.

Our analysis indicates that there are as many as 4,000 propane bobtail cargo tank motor vehicles. However, the MCS-150 does not link hazardous materials cargo tanks to specific hazardous materials commodities, nor does it allow a carrier to specify the type of cargo tank or its capacity. Therefore our analysis would likely *overestimate* the number of propane bobtails.

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http://www.bls.gov/news.release/pdf/ecec.pdf. The BLS reports wage costs in production occupations to be $17.46 per hour, and benefit costs to be $8.98; benefits therefore add 51 percent to the cost of wages ($8.98 ÷ $17.46). ECEC data do not contain a more detailed breakdown by industry or occupation.

[30] See: http://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/FMCSA%20Pocket%20Guide%20to%20Large%20Truck%20and%20Bus%20Statistics%20-%20October%2010%202014.pdf. We conducted our analysis on raw MCMIS data; the data in the *Pocket Guide* itself is insufficient for the purposes of this evaluation.

[31] The required data are stored in 4 separate tables in the MCMIS database.

We do not have information about when propane bobtails are scheduled for their inspections, but for the sake of simplicity, we have assumed that they are uniformly distributed over a 5-year period. That is, about 800 propane bobtails are requalified and tested on average each year, at a total cost of about $1 million (800 × $1,262). If these are requalified and tested half as often, average annual costs are also halved, and the cost-savings of this proposed action would be about $500,000 per year. Given that we maybe overestimating the number of propane bobtails, we believe that this represents a reasonable upper bound of benefits.

Conclusion
The proposed action represents a cost-savings to the industry that has been estimated to be at most $500,000 per year. If the petitioner's assessment is accurate and proven and there are no detrimental outcomes from reducing the requalification and testing frequency, then the proposed action should have positive net benefits.

5.6. Area 6 – Standards for Mobile Acetylene Trailers

Statement of the Problem: The petitioner and NTSB both highlight a regulatory gap. Manifolded cylinders mounted on mobile acetylene trailer systems are not securely mounted, leading to the likelihood of their ejection and their valves, and pipings and fittings are subject to multidirectional impact forces.

Suggested Change: From NTSB: Modify 49 CFR § 173.301 to clearly require (1) that cylinders be securely mounted on mobile acetylene trailers and other trailers with manifolded cylinders to reduce the likelihood of cylinders being ejected during an accident and (2) that the cylinder valves, piping, and fittings be protected from multidirectional impact forces that are likely to occur during highway accidents, including rollover. Require fail-safe equipment that ensures that operators of mobile acetylene trailers can perform unloading procedures only correctly and in sequence.

CGA requested a rulemaking change to 49 CFR §171.7 to incorporate by reference CGA G-1.6, 2011, *Standard for Mobile Acetylene Trailer Systems, Seventh Edition* (G-1.6, 2011).

5.6.1. Alternatives Considered

5.6.1.1. Alternative 1 – No Action
This is a viable and reasonable alternative that could be selected, serves as a basis for comparison with the other alternatives, and can be defined as the continuation of the current management practices.

5.6.1.2. Alternative 2 – Incorporate by Reference Compressed Gas Association Pamphlet CGA G-1.6, Standard Mobile Acetylene Trailer Systems, Seventh Edition (G-1.6, 2011)
In response to a petition for rulemaking, PHMSA is proposing to incorporate into the HMR a reference to the Compressed Gas Association pamphlet CGA G-1.6, *Standard Mobile Acetylene Trailer Systems, Seventh Edition (2011)*. The pamphlet addresses the NTSB recommendations. DOT, industry experts, and others were involved in the revision of G-1.6 (2011).

5.6.1.3. Analysis of costs and benefits

Cost of the Action

The petitioner does not include any information regarding the impact of the proposed action, including direct effects on States and other levels of government and effects on small firms. The petitioner does provide the following assessment:[32] the incorporation of G-1.6, 2011, will not preempt any State or Federal regulations. These specifications are already in use by major suppliers of acetylene.

There will be no additional regulatory burden on small businesses, small organizations, small governmental jurisdictions, or Indian tribes.

The recordkeeping requirements will be no greater than those required today by DOT and Transport Canada.

The incorporation of G-1.6, 2011, will not affect the quality of the natural and social environments, it will enhance them.

According to PHMSA, "the only direct cost of this revision would be the purchase of the $41 pamphlet, which would be borne by shippers and carriers who are subject to these applicable requirements of the HMR. Currently, there are only two known carriers that transport mobile acetylene trailers, and they are currently complying with the requirements of CGA G-1.6. Therefore, the cost of the pamphlet would only be incurred by new transporters of mobile acetylene trailers." PHMSA believes that regardless of the number of new transporters of acetylene, the cost of the pamphlet ($41) would not, by itself, be a barrier to entry to the mobile acetylene trailer market. There are currently two carriers that transport acetylene trailers, and they have been operating under the requirements of CGA G-1.6; therefore, the total cost to industry of complying with the proposed rule would be nominal.

Benefits of the Action

In 2007, there were three major incidents involving mobile acetylene trailer systems (MATS) in a 3-month period from July 25 to October 20. The NTSB published a Special Investigation Report on January 13, 2009,[33] in which it provided the results of investigations into these three accidents, a review of the incident report on a fourth accident that occurred on June 9, 2008, and reviews of reports of earlier incidents. NTSB provided estimates of damage costs and descriptions of injuries suffered in the three accidents that it investigated. However, none of these three were reported to PHMSA as hazardous materials incidents on Form 5800.1, Hazardous Materials Incident Report. The June 9, 2008, incident, however, was reported to PHMSA, and PHMSA's incident data contain at least one additional earlier incident that occurred on January 15, 2006. Since June 9, 2008, there have been no incidents reported to PHMSA involving MATS. We conducted a careful review of incident narratives to verify this. Due to actions voluntarily undertaken by industry after this run of incidents, it is possible that safety has improved such that no new incidents have occurred, and the absence of data does not a

[32] See: http://www.regulations.gov/#!docketDetail;D=PHMSA-2012-0295.
[33] http://www.ntsb.gov/doclib/safetystudies/SIR0901.pdf.

represent a failure to report by carriers or shippers. In addition to the five MATS incidents, there have been 15 other incidents involving acetylene gas from 2005 through 2013. We analyzed the costs associated with these incidents for comparison, and it is worth noting that any type of incident involving acetylene is rare.

Incident investigations and reports provide estimates of damages costs, but not injury costs. By using DOT guidance we are able to calculate the injury costs of hazardous materials incidents. Per DOT guidance, we considered the VSL (i.e., societal willingness to pay for avoiding a transportation fatality) to be $9.2 million and the injury values based on the following ratios of the VSL,[34] as shown in Table 8 below:

Table 8. Relative Disutility Factors by Injury Severity Level (AIS)

AIS Level	AIS-1	AIS-2	AIS-3	AIS-4	AIS-5	AIS-6
Severity	Minor	Moderate	Serious	Severe	Critical	Unsurvivable
Fraction of VSL	0.003	0.047	0.105	0.266	0.593	1
Monetized with $9.2 million VSL	$27,600	$432,400	$966,000	$2,447,200	$5,455,600	$9,200,000

Table 9 illustrates the reported damage costs and the monetized costs of injuries. These can be used to determine the maximum benefit of this proposed change to the HMRs. We relied on incident narratives to determine which AIS level was applicable to each reported injury. None of the incidents resulted in a fatality caused by the release or combustion of acetylene. There were, however, fatalities associated with traffic crashes that initiated some of the incidents. We did not include the monetized value of traffic fatalities in our benefits estimates because the proposed changes to the HMRs will not impact the behavior that led to these deaths.

[34] Office of the Secretary of Transportation, U.S. Department of Transportation, "Memorandum to Secretarial Officers and Modal Administrators, Guidance on Treatment of the Economic Value of a Statistical Life (VSL) in U.S. Department of Transportation Analyses—2014 Adjustment," (June 13, 2014) available at http://www.dot.gov/sites/dot.gov/files/docs/VSL_Guidance_2014.pdf.

Table 9. Costs Associated With MATS and Other Acetylene Incidents

Date	Location	Total Damages	AIS-1	AIS-2	AIS-3	AIS-4	AIS-5	HM Fatalities	Non-HM Fatalities	Cost of HM Injuries and HM Fatalities	Total HM Cost
MATS Investigated by NTSB											
10/20/07	East New Orleans, LA	$200,000	1	0	0	0	0	0	N/A	$27,600	$227,600
08/07/07	The Woodlands, TX	$40,200	0	0	0	0	0	0	N/A	$0	$40,200
07/25/07	Dallas, TX	$5,000,000	0	1	0	2	0	0	N/A	$5,326,800	$10,326,800
MATS Reviewed by NTSB and in HM Incident Data											
06/09/08	Lamar, CO	$206,441	0	0	0	0	0	0	0	$0	$206,441
MATS Only in HM Incident Data											
01/15/06	Columbia, MO	$92,000	0	0	0	0	0	0	1	$0	$92,000
Total MATS											
	Total	$5,538,641	1	1	0	2	0	0	1	$5,354,400	$10,893,041
	Average	$1,107,728	0.2	0.2	0	0.4	0	0	0.2	$1,070,880	$2,178,608
	Annual Avg., 2005–2013	$615,405	0.11	0.11	0	0.22	0	0	0.11	$594,933	$1,210,338
	Annual Avg., 2006–2008	$1,846,214	0.33	0.33	0	0.67	0	0	0.33	$1,784,800	$3,631,014
Other Acetylene Incidents in HM Data											
07/21/05	Gallman, MS	$0	0	0	0	0	0	0	1	$0	$0
07/30/05	Edwardsville, KS	$0	0	0	0	0	0	0	0	$0	$0
06/08/06	Chehalis, WA	$1,500	0	0	0	0	0	0	0	$0	$1,500
02/23/07	Cabool, MO	$110,000	0	0	0	0	0	0	1	$0	$110,000
12/13/07	Garrett, KY	$84,500	0	0	0	0	0	0	0	$0	$84,500
01/31/08	Cove, AR	$180,944	0	0	0	0	0	0	2	$0	$180,944
05/19/08	Miami, FL	$0	0	0	0	0	0	0	0	$0	$0

Date	Location	Total Damages	AIS-1	AIS-2	AIS-3	AIS-4	AIS-5	HM Fatalities	Non-HM Fatalities	Cost of HM Injuries and HM Fatalities	Total HM Cost
09/12/08	Sacramento, CA	$0	0	0	0	0	0	0	0	$0	$0
09/23/08	Ponca City, OK	$16,413	0	0	0	0	0	0	0	$0	$16,413
10/24/08	Phoenix, AZ	$0	0	0	0	0	0	0	0	$0	$0
10/21/09	Corbin, KY	$49,165	0	0	0	0	0	0	0	$0	$49,165
08/17/10	Richmond, VA	$31,450	0	0	0	0	0	0	0	$0	$31,450
04/27/11	Mesa, AZ	$15,000	0	0	0	0	0	0	1	$0	$15,000
05/08/12	Liberty, KY	$31,000	0	0	0	0	0	0	0	$0	$31,000
07/25/13	Labrange, GA	$5,000	0	0	0	0	0	0	0	$0	$5,000
	Total	$524,972	0	0	0	0	0	0	5	$0	$524,972
	Average	$34,998	0	0	0	0	0	0	0.33	$0	$34,998
	Annual Avg., 2005–2013	$58,330	0.00	0.00	0	0.00	0	0	0.56	$0	$58,330

All told, MATS incidents have resulted in $10.9 million in injury costs and damages from 2005 through 2013. The average cost of an incident was $2.2 million, but this statistic is skewed by an extremely high-cost incident that occurred on July 25, 2007, in Dallas, TX, resulting in over $10 million in injury costs and damages. The average annual cost of MATS incidents is $1.2 million from 2005 through 2013; over the 3-year period during which incidents were being reported, the annual average cost was $3.6 million. The average cost of MATS incidents is over 60 times greater than that of other acetylene incidents, and the annual average cost of MATS incidents is about 20 times greater. However, given that no MATS incident has been reported since mid-2008, likely because the industry is voluntarily operating under the proposed standards, the costs of these old incidents may not be reasonable predictors of the avoided costs (safety benefits) of the proposed changes to the HMRs. What one can state is that safety benefits cannot be larger than the costs associated with the five known MATS incidents.

Conclusion
Given the low $82 cost (2 firms × $41) to purchase the pamphlet and the relatively high costs of MATS incidents, PHMSA can expect that the benefits of the proposed action will outweigh its costs. The average cost of a MATS incident was calculated to be about $2.2 million. This proposed action would yield positive net benefits if the odds of a major MATS incident in any year were as low as 1 in 26,800 (2.2 million ÷ 82).

5.7. Area 7 – Clarification of Requirements for Pressure Relief Devices on DOT Cargo Tanks

Statement of the Problem: Wording of some sections of 49 CFR§ 180.407 can cause confusion and misinterpretation that may cause critical errors and compromise safety. Specifically, one petitioner noted: (1) in 2009, as a part of Docket No. PHMSA-2006-25910 (HM-218E), to harmonize language, the term "set-to-discharge" was removed and "start to-discharge" was substituted (see 74 Federal Register, April 9, 2009, p. 16138); (2) the code allows for continuing operation of existing cargo tanks made to older specifications in § 180.405(c) and a great many older cargo tanks continue in service. The sections of the code for these older cargo tanks are no longer published, so determining "the required set pressure" is problematic.

Suggested Change: PHMSA is proposing to revise the HMR for testing of pressure relief devices by replacing the current requirements found in §§ 180.407(d)(3) and 180.407(g)(1)(ii) with a reference to a new paragraph, § 180.407(j) which would detail the PRD test requirements.

5.7.1. Alternatives Considered

5.7.1.1. Alternative 1 – No action
This is a viable and reasonable alternative that could be selected, serves as a basis for comparison with the other alternatives, and can be defined as the continuation of the current management practices (CEQ 1981).

5.7.1.2. Analysis of costs and benefits

Cost of the Action
PHMSA does not expect this revision to create any costs, as it would create no new requirements for the regulated industry. The petitioner does not include any information regarding the impact of the proposed action, including direct effects on States and other levels of government and effects on small firms.

From our perspective, barring any additional costs to small firms and barring any adverse effects on competition, the only cost associated with this action is a cost to PHMSA for making changes to the CFR. We do not know the level of effort required for making the changes, but in our opinion the additional costs to PHMSA would be minimal and of a negligible amount.

Benefits of the Action
The proposed action is aimed at reducing confusion for the testing requirements of PRDs on DOT specification tank motor vehicles. The proposed action benefits can include eased regulatory compliance, reduced number of incidents, and reduced costs to the Agency from having to review fewer compliance actions.

PHMSA considered the following in its preliminary assessment of benefits:

- ***Reduced fatalities, injuries, and property damages:*** We do not have enough information on regulatory actions and incidents related to the requirements under consideration; however, even without that information, we believe that it is unlikely that the changes requested by the petitioner will have an impact on the potential benefits ensuing from a reduction in societal costs, since incidents related to the transportation of hazardous materials are already very low, as noted above.
- ***Reduced enforcement actions (if any) resulting from a better understanding:*** According to PHMSA data in 2012, there were 271 regulatory enforcement actions initiated by PHMSA for all kinds of regulatory infractions.[35] Depending on the time it takes PHMSA to process and close an enforcement action, the per-hour earnings of the staff member who does the work, and the number of reduced actions ensuing from the greater harmonization, there could be a positive impact on PHMSA resources. For example, assuming (1) PHMSA's regulatory case load were reduced by a modest 1 percent, or three cases per year; (2) each regulatory action takes on average 40 hours to process and close; and (3) the individual processing the action earns approximately $40 per hour (GS-13, Step 6), PHMSA's annual total savings would be approximately $4,800 (3 cases × 40 hours × $40 hourly wage rate).

Conclusion
Based on the foregoing assessment, and as long as PHMSA's costs to make the change (which are not known at this time) are less than the estimated benefits of $4,800, we believe the requested changes are likely to be beneficial.

[35] http://primis.phmsa.dot.gov/comm/reports/enforce/EnfHome.html?nocache=9870 (accessed November 18, 2013).

Aside from the quantified costs and benefits noted above, the proposal would clarify existing requirements to eliminate confusion for the testing requirements of PRDs on DOT specification cargo tank motor vehicles. PHMSA did not quantify the benefits from reduced confusion.

5.8. Area 8 – Liquefied Petroleum Gas (LPG) Odorant

Statement of the Problem: LPG is highly flammable liquid that is odorless and colorless. LPG is required to be odorized for leak detection under certain circumstances. PHMSA is aware of several incidents possibly attributed to either the under-odorization or odorant fade of LPG. Most notable of these incidents is one that occurred in Norfolk, MA, on July 30, 2010, where an explosion occurred at a residential condominium complex that was under construction. Emergency responders from 21 cities and towns deployed personnel to the accident site. The accident resulted in seven injuries and one fatality. The subsequent investigation raised questions as to whether there was a sufficient level of odorant in the LPG contained in the onsite storage tanks and was likely a major contributing factor in restricting the ability of onsite personnel to readily detect the leak prior to the explosion. Stakeholders indicated that a phenomenon known as "odor fade" may be a problem when new or recently cleaned tanks are used. New or recently cleaned tanks may adsorb the odorant into the metal shell of these tanks, thus limiting the effectiveness of the remaining odorant in the LPG. In July 2013, PHMSA issued a safety alert to notify the public of the risks associated with the under-odorization of LPGs.[36]

Suggested Change: PHMSA is proposing to require odorization for rail tank cars and cylinders in LPG service consistent with the existing requirements for cargo and portable tanks, and to add a performance standard to address the issues of "under-odorization" and "odor fade." The proposed performance standards will address "under-odorization" and "odor fade" by requiring that procedures are in place to ensure the correct amount of odorant is injected into the LPG and that a person filling these packagings would implement quality control measures to ensure that potential odorant fade is addressed. PHMSA will maintain the current exception from odorization, if such odorization would be harmful in the use or further processing of the LPG, or if odorization will serve no useful purpose as a warning agent in such use or further processing. Essentially, this exception applies to LPG being transported to industrial end users.

5.8.1. Alternatives Considered

5.8.1.1. Alternative 1 – No action

This alternative that could be selected serves as a basis for comparison with the other alternatives, and can be defined as the continuation of the current management practices (CEQ 1981).

[36] https://www.Federalregister.gov/articles/2013/07/17/2013-17120/safetyalert-safety-alert-risks-associated-with-liquid-petroleum-lp-gas-odor-fade.

5.8.1.2. Analysis of costs and benefits

Rules and Conventions Concerning LPG Odorization

There are many Federal, State, and local rules and safety advisories relevant to PHMSA's proposal requiring the use of odorizing agent in LPG. The Occupational Safety and Health Administration (OSHA) rule 1910.110(b)(1) specifies the amount of odorizing agent (ethyl mercaptan, thiophane, or amyl mercaptan) required for LPG stored in DOT cylinders. OSHA requires 1 pound of ethyl mercaptan or thiophane, or 1.4 pounds of amyl mercaptan, per 10,000 gallons of LPG. The Consumer Product Safety Commission (CPSC) has been studying odorant fade in LPG storage tanks and cylinders since at least 1985,[37] although there is no formal CPSC regulation on LPG odorants.

The National Fire Protection Association (NFPA) Liquefied Petroleum Gas Code (NFPA 58) provides guidance on the amount of odorizing agent for different points in the LPG supply chain. Section 4.2.1 of NFPA 58 says that "All LP Gases shall be odorized prior to delivery to a bulk plant by the addition of a warning agent," where a bulk plant is defined in Section 2.2.10 as "A facility that stores LP-Gases of more than 4000 gal ($15.2m^3$) water capacity." The Code of Massachusetts Fire Regulations adopts NFPA 58 standards for Liquefied Petroleum Gas Containers and Systems Installation Standards and Procedures by reference, and other city, State, and Federal governmental jurisdictions do so as well in their laws and regulations.[38] In addition, the NFPA's Regional Fire Code Development Committees comprise officials from State and local fire protection agencies, fire departments, and departments of public safety.[39] Consequently, for the baseline of this analysis, we assume that PHMSA's proposed regulations will duplicate existing Federal, State, and local regulations and guidance. The additional layer of regulation proposed by PHMSA, however, can be expected to improve compliance with these other existing safety rules. *We assume that all LPG shipped in cylinders already comply with the proposed regulations.*

Cost of the Action

Because odorization of LPG is addressed by existing Federal and State laws and regulations as well as generally accepted industry standards and practices, PHMSA anticipates only a minimal cost increase from the proposed action.

The price of ethanethiol, one of the most common odorants, (also known as ethyl mercaptan), ranges from about $0.10 per milliliter (ml) to $0.53 per ml.[40] Price differences are due to bulk pricing of the compound. The NFPA's 2001 handbook recommends that that 1 pound of ethyl mercaptan be applied for every 10,000 gallons of LPG,[41] although industry practice is to inject at

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[37] CPSC (1987). "Information on LP-Gas (Propane) Odorant." Bethesda, MD: Author. Retrieved from: http://www.cpsc.gov//PageFiles/101141/propanept1.PDF.

[38] NFPA. http://www.nfpa.org/codes-and-standards/nfpa-digital-products/nfpa-product-development-and-innovation.

[39] http://www.nfpa.org/~/media/Files/Codes%20and%20standards/Regional/RFCDCCommitteeList.pdf.

[40] http://www.alfa.com/en/catalog/22585

[41] https://www.inkling.com/read/nfpa-58-liquid-petroleum-gas-code-handbook-2011/chapter-4/4-2-lp-gas-odorization

an approximate rate of 1.51 pounds per 10,000 gallons to assist in compensating for odor fade.[42] The price for 1 pound of ethanethiol ranges from $55 to $287. Given that these will be added to large rail tank cars, we have assumed that the lowest bulk price will be applicable (see Table 10).

Table 10. Price of Odorant

	25 ml	100 ml	500 ml
Bulk Cost	$13.30	$24.50	$51.30
Per ml. cost	$0.53	$0.25	$0.10
Ethanethiol Density (g/ml)	0.84	0.84	0.84
Gram per lb.	453.59237	453.59237	453.59237
Ethanethiol ml needed to equal 1 lbs	539.99	539.99	539.99
Ethanethiol per lbs cost	$287.28	$132.30	$55.40

The HMR authorize several tank car classes to transport LPG including 105, 106, 110, 112, 114, and 120. Section 179.13 of the Hazardous Materials Regulations specify a maximum rail tank car (DOT-112) capacity of 34,500 gallons, and §173.314(c) specifies a minimum outage of 1 percent of the total capacity of the tank at a reference temperature.[43] In practice, outages may be greater than 1 percent. To determine the typical amount of LPG per rail tank car, we examined LPG rail tank car waybill data for 2012 published by the Surface Transportation Board (STB).[44] The average amount of LPG shipped per tank car was approximately 67 tons. The weight of one gallon of propane, the most common LPG, is 4.2 pounds at 60 degrees Fahrenheit.[45] Consequently, in practice, a typical rail car of LPG contains about 31,900 gallons (67 tons × 2,000 pounds ÷ 4.2 pounds).

Using guidance and best practices for LPG odorants and the amount of LPG per rail tank car, we estimated the cost to odorize a single tank car of LPG. As stated, 1 to 1.5 pounds of odorant are added to 10,000 gallons of LPG. A typical rail car holding 31,900 gallons of LPG would require 3.19 units (31,900 ÷ 10,000) of odorant, or 3.19 (3.19 × 1) to 4.785 (3.19 × 1.5) pounds. Using a cost of $55 per pound of odorant, we find that **each rail tank costs about $175 to $263 odorize with ethanethiol.** If, as a consequence of this rule, some firms increase the amount of odorant to a higher recommended level, we might anticipate that the marginal cost per tank car could increase by $88 ($263 - $175).

We are unable to estimate the exact number of LPG rail tank cars that will be affected by this rule, but we are able to estimate the number of rail tank cars hauling LPG to non-industrial end users. We begin with two sources, the 2007 Commodity Flow Survey (CFS) and STB waybill data, to estimate the total number of LPG rail tank cars shipped each year. STB waybill data

[42] Industry rates are from the *Report on DCP Midstream: Investigation Concerning Possible Unodorized or Underodorized Propane Gas Distribution in the Commonwealth.* Odor fade occurs when ethyl mercaptan or other odorizing agents wear out over time as they are absorbed into the cylinder in which the LPG is contained, leaving the LPG underodorized.

[43] Notes 9 and 10 to the table found in § 173.314(c) specifies filling limits and reference temperatures for insulated and non-insulated tank cars.

[44] http://www.stb.dot.gov/stb/industry/econ_waybill.html.

[45] National Propane Gas Association (2011). "Facts about Propane." Washington, DC: Author. Retrieved from: http://www.npga.org/files/public/Facts_About_Propane.pdf.

indicate that 169,916 DOT-112 rail tank cars and 37,444 "other" (primarily intermodal tank) shipments of LPG occurred in 2012. The other/intermodal tank shipments contained on average a comparable by slightly lower amount of LPG than rail tank cars (31,100 gallons versus 31,900 gallons). The 2007 CFS indicates that 6,490,000 tons of LPG was shipped by rail, which equates to about 96,880 typical rail tank cars (((6,490,000 × 2,000) ÷ 4.2) ÷ 31,900). Both data sources have some limitations that are worth noting. The STB waybill data examine carloads reported by large rail carriers. A particular car or quantity of LPG, however, may be transported by multiple carriers. The public use file does not contain shipper information that would allow us to eliminate double counting. The CFS data, however, are collected from shippers, but more current 2012 data have not yet been released in final form, so the data may be outdated. Last, for the purposes of this analysis, we must only consider non-industrial end users, and neither data set contains any information on end use. The NPGA has published data on total end-use demand for LPG; it estimates that consumer demand accounted for 47.7 percent of demand, that petrochemical demand accounted for 36.7 percent, and that exports claimed the remainder.[46] We have assumed that the fraction of LPG shipped by rail tank car for consumer demand is 47.7 percent—that is, that these end-use demand percentages are approximately the same for all modes of shipment. Table 11 presents a summary of our estimates of the number of rail tank cars affected by this proposed rule and upper bounds of the costs of meeting the performance standards for odorizing LPG.

Table 11. Annual Costs of Odorizing LPG

Source	DOT-112 Tank Rail Cars (or Size Equivalent to DOT-112)	Non-Industrial, Non-Export Use	Maximum Affected Rail Cars	Maximum Cost of Low Odorant ($175/car)	Maximum Cost of High Odorant ($263/car)	Maximum Marginal Cost of Low to High Odorant ($88/car)
STB Rail Tank Car	169,916	47.7%	81,050	$14,183,738	$21,316,132	$7,132,394
STB All	207,360	47.7%	98,911	$17,309,376	$26,013,519	$8,704,143
CFS	96,880	47.7%	46,212	$8,087,058	$12,153,693	$4,066,635

As shown, if we assume that consumer end-use LPG meets at least the minimum requirements for odorization, then the marginal cost of meeting performance standards to ensure against under-odorization or odor fade ranges from approximately $4.1 million to $8.7 million per year.

Benefits of the Action

PHMSA is aware of several incidents possibly attributed to either the under-odorization or odorant fade of LPG, the most notable of these incidents being the one that occurred in Norfolk, MA, on July 30, 2010, (discussed above) that resulted in seven injuries and one fatality.

[46] NPGA (2013). Propane Supply Sources and Trends. Washington, DC: Author. Retrieved from http://www.npga.org/files/ICF%20Propane%20Supply%20Sources%20and%20Trends%20April%202013.pdf.

The dollar value of fatalities, injuries, and property damages due to incidents represents societal costs. Per DOT guidance, we considered the VSL (i.e., societal willingness to pay for avoiding a transportation fatality) to be $9.2 million and the injury values based on the following ratios of the VSL, as shown in Table 12:

Table 12. Relative Disutility Factors by Injury Severity Level (AIS)

AIS Level	AIS-1	AIS-2	AIS-3	AIS-4	AIS-5	AIS-6
Severity	Minor	Moderate	Serious	Severe	Critical	Unsurvivable
Fraction of VSL	0.003	0.047	0.105	0.266	0.593	1
Monetized with $9.2 million VSL	$27,600	$432,400	$966,000	$2,447,200	$5,455,600	$9,200,000

The benefits from this rule would arise from fatalities, injuries, property damages, and other societal costs avoided by reducing accidents caused by undetected LPG gas leaks. The presence of adequate (enough to be detectable by people) amount of LPG odorant is not, however, sufficient to avoid many accidents for LPG leaks, and the root cause of these accidents would still be the event that caused a leak. Nevertheless, the proposed action may lead to some LPG leaks being detected before a serious accident occurs, or lead to lower consequences for those that do occur. We are not able to calculate magnitude of these benefits with any significant level of confidence.

Conclusion

We were able to quantify the upper bound for the costs of the proposed action, but not the benefits. The costs are estimated to range from $4.1 million to $8.7 million per year. The $9.2 million VSL provided by DOT indicates that this rule will break even if one fatality is avoided every 1 to 2 years. Given the high consequences of LPG leaks that go undetected due to under-odorization or odor fade, PHMSA believes that this proposed rule will provide at least these levels of benefits.