National Transportation Safety Board
Washington, DC 20594

Office of the Chairman

December 5, 2019

US Department of Transportation
Docket Management System
West Building, Ground Floor, Room W12-140
Routing Symbol M-30
1200 New Jersey Ave., SE
Washington, DC 20590-0001

Attention: Docket No. PHMSA–2018–0025 (HM–264)

Dear Sir or Madam:

The National Transportation Safety Board (NTSB) has reviewed the Pipeline and Hazardous Materials Safety Administration's (PHMSA) October 24, 2019, notice of proposed rulemaking (NPRM), *Hazardous Materials: Liquefied Natural Gas by Rail*.[1] In this notice, PHMSA, in coordination with the Federal Railroad Administration (FRA), is proposing changes to the Hazardous Materials Regulations (HMR) to allow for the bulk transport of Methane, refrigerated liquid, commonly known as liquefied natural gas (LNG), in rail tank cars. The NPRM responds to the April 10, 2019, Presidential Executive Order on Promoting Energy Infrastructure and Economic Growth which directed the Secretary of Transportation to propose for notice and comment a rule, no later than 100 days after the date of the order, that would treat LNG the same as other cryogenic liquids and permit LNG to be transported in approved rail tank cars.[2]

In this NPRM, PHMSA solicits public comment on potential HMR changes that would authorize the transportation of LNG by rail in the DOT-113C120W specification rail tank car.[3] PHMSA states this action is needed to facilitate the transportation of natural gas to markets where pipeline transportation is limited or unavailable.

The NTSB notes that existing federal regulations do not authorize the bulk transport of LNG in rail tank cars and that currently, LNG may only be transported via rail in accordance with the conditions of a PHMSA special permit or in a portable tank pursuant to the conditions of an FRA approval. While the NPRM does not provide a safety reason why DOT-113 tank cars are not a currently authorized package, the Association for American Railroads (AAR) states in petition for rulemaking P-1697 they believe the DOT-113 tank car was not previously authorized simply because of a lack of demand in the market.[4] However, the AAR petition states that current and

[1] *Federal Register* (*FR*) 84, no 206 (October 24, 2019): 56966.

[2] For additional information, see "Executive Order on Promoting Energy Infrastructure and Economic Growth." Accessed October 31, 2019. https://www.whitehouse.gov/presidential-actions/executive-order-promoting-energy-infrastructure-economic-growth/.

[3] Class DOT-113 tank cars are designed as a vacuum-insulated inner container (tank) enclosed within an outer shell (tank, not jacket) for the transportation of cryogenic liquids, such as liquid hydrogen, ethylene, oxygen, nitrogen, and argon. These tank cars are frequently referred to as Thermos bottle tank cars.

[4] Association for American Railroads, "Petition for Rulemaking to Allow Methane, Refrigerated Liquid to be Transportated in Rail Tank Cars," P-1697, Docket No. PHMSA-2017-0020, January 17, 2017.

expected future demand for transportation of LNG by rail warrants PHMSA's prompt authorization for transport by tank car.

This NPRM addresses tank car specifications and operational controls for rail transportation of LNG.

Tank Car Specification

PHMSA states that it has determined that the DOT-113C120W specification tank car is an acceptable package to transport LNG. Therefore, PHMSA proposes to amend the entry for "UN1972 Methane, refrigerated liquid" in the Hazardous Materials Table at Title 49 *Code of Federal Regulations* (*CFR*) 172.101, to add reference in column (8C) for the bulk packaging of cryogenic liquids in rail tank cars as provided in 49 *CFR* 173.319.[5]

PHMSA also proposes to revise 49 *CFR* 173.319(d)(2) to include a column for methane in the table for pressure control valve setting or pressure relief valve setting, specifying a pressure relief device maximum start-to-discharge pressure of 75 pounds per square inch, gauge (psig), a maximum filling density of 32.5 percent by weight, maximum pressure when offered for transportation of 15 psig, and a design service temperature of minus 260°F.[6]

Among the justifications presented in the NPRM for allowing LNG transportation by DOT-113 tank car are:

- Regional insufficiencies in natural gas pipeline infrastructure to supply domestic and international energy markets.
- Reduced public risk exposure compared to highway transportation, which is argued to present a greater risk of accident and LNG release.
- The similarity of LNG physical and chemical properties to other flammable cryogenic liquids currently transported by rail, such as ethylene.
- The hazards of transporting LNG are no different than that of flammable cryogenic liquids already authorized for bulk rail transport in accordance with the HMR.
- DOT-113 specification tank cars are constructed with a double pressure vessel design with insulated annular space under vacuum that provides increased crashworthiness when compared to single vessel tank cars and have a "demonstrated safety record."

[5] A cryogenic liquid means a refrigerated liquefied gas having a boiling point colder than -130°F at an absolute pressure of 14.7 pounds per square inch, absolute (psia). LNG has a boiling point of -260°F.

[6] According to 49 *CFR* 173.315 "Compressed gases in cargo tanks and portable tanks", maximum filling density for liquefied gases is defined as the percent ratio of the weight of the gas in the tank to the weight of the water the tank will hold.

Operational Controls

This NPRM states that PHMSA has decided not to propose additional operational controls because "there is not sufficient data about potential movements of LNG by tank car." PHMSA notes that it expects LNG will initially move in smaller quantities (i.e. a few tank cars), as part of manifest trains, and is uncertain whether LNG by rail will shift to using a unit train model of service, in which trains would be composed entirely of LNG tank cars, and if so, how quickly that shift will occur.

The NTSB would like to take this opportunity to comment on the proposed rulemaking and urges PHMSA and the FRA to consider the following before authorizing LNG rail shipment in DOT-113 tank cars.

Because unit trains of DOT-113 tank cars carrying large volumes of flammable cryogenic gases have no operational or accident performance safety history, we believe a thorough safety assessment of the tank car specification is needed. In the NPRM, PHMSA references the Energy Transport Solutions LLC draft special permit and states that it would consider information provided to the special permit docket that is pertinent only to the issue of operational controls in this rulemaking or potential future rulemakings.[7] While this docket contains an Exponent, Inc. quantitative risk analysis that attempts to assess loss of containment probability for DOT-113 tank cars in derailment scenarios, the NPRM only references anecdotal safety history of the existing small fleet of DOT-113 tank cars.[8] Nevertheless, the Exponent report points out that loss of containment probability data for LNG in DOT-113 tank cars does not exist, and there is scant accident data in the PHMSA incident reports database pertaining to these tank cars in general. Furthermore, we were unable to find any data in the PHMSA rulemaking or special permit dockets that provide a crashworthiness assessment for the DOT-113 tank car design and, in particular, the specification DOT-113C120W tank car which PHMSA proposes to authorize for LNG transportation. We believe that relying on data for the accident history of similar hazardous materials transported in the small fleet of DOT-113 tank cars (as stated in the NPRM) or making engineering assumptions based on the performance of pressure tank cars with completely different features and operating parameters (as was done in the Exponent report), does not provide a statistically significant or valid safety assessment and calls into question how PHMSA determined the specification DOT-113C120W tank car is an acceptable package to transport LNG.

The Universal Machine Language Equipment Register (UMLER) database currently lists only 405 Class DOT-113 tank cars in the North American railcar fleet, while only 67 of these tank cars are specification DOT-113C120W which PHMSA is considering in this NPRM for LNG transportation.[9] Furthermore, the only hazardous material presently required by federal regulations to be transported in specification DOT-113C120W tank cars is ethylene, and this commodity does not appear on the AAR list of the Top 125 hazardous materials transported by rail.[10] We believe

---

[7] Docket No. PHMSA-2019-0100.

[8] Exponent, Inc., *ETS Movement of LNG in DOT-113 Tank Cars by Rail, Quantitative Risk Analysis (QRA) Considering DOT-113 Tank Car Position in Train and Train Speed.* Project No. 1705991.000 (Warrenville, Illinois: Exponent, Inc., 2017).

[9] The UMLER database, maintained by Railinc, is used by railroads, rolling stock owners, and repair shops for railcar equipment management and reporting.

[10] Railinc. Top 125 hazardous materials transported by rail.

that given the small number of DOT-113 tank cars in use, the documented 14 incidents referenced in the NPRM in which three shell breaches occurred between 1980 and 2017 is not a compelling "demonstrated safety record." Therefore, we urge PHMSA to conduct a comprehensive review of the DOT-113 specification in connection with this rulemaking to consider the probability of hazardous material releases in accidents of varying train speeds. Moreover, we believe the NPRM should include a detailed evaluation of the proposed tank car's puncture resistance and resistance to thermal exposure in accident scenarios. Such knowledge is critical for assessing the risks associated with operating concentrated numbers of tank cars or unit trains of DOT-113 tank cars and could reveal the need for further protective measures and operational restrictions.

PHMSA also solicits comment in this NPRM on the reliance of existing regulations and the operational controls of the AAR requirements contained in Circular OT-55 (not incorporated by reference in the HMR), and whether additional operational controls such as train length, controls for train composition, speed restrictions, braking requirements, and routing requirements may be warranted based on an assessment of risk. As justification for not proposing operational controls in this NPRM, PHMSA stated that it initially expects small numbers of LNG shipments in manifest trains. Contrary to this assertion, the rulemaking implies a greatly increased fleet size if its stated purpose is enhancing energy growth in the United States. The urgency provided by the President's Executive Order suggests that LNG transportation by rail as a viable alternative to highway transportation is envisioned to entail greater amounts than mere incidental numbers of tank cars in manifest trains. Additionally, the August 21, 2017, ETS application for a special permit to transport methane, refrigerated liquid in DOT-113 tank cars (just one potential LNG by rail shipper), states that it anticipates operating two LNG unit trains, 50 to 100 tank cars, per day. Therefore, the NTSB disagrees with PHMSA's assertion that the number of LNG shipments would be minimal and that proposing additional operational controls in this NPRM is unnecessary.

Until such time as the risks associated with transporting large numbers of LNG tank cars in a single train are better understood, the NTSB strongly suggests that PHMSA use this rulemaking opportunity to implement operational controls similar to the protections currently in place for high-hazard flammable trains (HHFT), as provided in the requirements for the operation of HHFTs found at 49 *CFR* 174.310.[11] A gradual initial ramp-up of LNG rail transportation would likely occur because of the limited availability and high cost of DOT-113 tank cars. Nonetheless, we believe the risks of catastrophic LNG releases in accidents is too great not to have operational controls in place before large blocks of tank cars and unit trains proliferate.

The ETS special permit application states the following:

> Operational controls over the movement of LNG will be determined by choosing among the operating practices of the transporting railroads for other cryogenic materials as well as other materials that also present transportation risks when moved by rail or by truck. These requirements will include those applicable provisions of 49 *CFR* Parts 172, 173 and 174, including §173.319, which is applicable to the transport of cryogenic liquids in tank cars, and §174.310, which sets forth operational requirements for High Hazard Flammable Trains (HHFT).

[11] A *high-hazard flammable train* is defined in 49 *CFR* 171.8 as a single train transporting 20 or more loaded tank cars of a Class 3 flammable liquid in a continuous block, or a single train carrying 35 or more loaded tank cars of a Class 3 flammable liquid throughout the train consist.

> The operational controls cited for the transport of HHFT provide a strong operational framework for safe and responsible movement of large quantities of hazardous materials.
>
> Specifically, Applicant proposes to apply these operational controls to LNG trains that consist of 20 or more tank cars in a continuous block on a single train or 35 or more tank cars across an entire train. Applicant proposes that the railroads transporting the LNG in unit trains conduct a routing analysis of the rail routes consistent with the 27 safety and security factors prescribed in 49 C.F.R. §172.820 and that State and Regional Fusion Centers have access to schedules and routing for these trains. Applicant further proposes travel restrictions including that unit trains transporting LNG must not exceed 50 MPH. These procedures have been used and proven to be effective in the shipment of other potentially dangerous goods by rail such as those presenting toxic inhalation hazards.

We agree and are surprised PHMSA chose not to include such operational controls in this NPRM. Accordingly, the NTSB suggests that the rulemaking should include, at a minimum:

(1) Routing. The additional planning requirements should be required for transporting by rail in accordance with 49 *CFR* 172.820.

(2) Speed restrictions. Trains transporting large blocks of LNG tank cars should be limited to a maximum speed of 50 mph, and further limited to a maximum speed of 40 mph while operating within the limits of high-threat urban areas as defined in 49 *CFR* 1580.3.

(3) Braking. The train should be equipped and operated with either electronically controlled pneumatic (ECP) brakes, a two-way end-of-train (EOT) device as defined in 49 *CFR* 232.5, or a distributed power (DP) system as defined in 49 *CFR* 229.5.

Additionally, in response to the December 30, 2013, collision of two BNSF freight trains in Casselton, North Dakota, the NTSB issued two safety recommendations to PHMSA relative to train placement of hazardous materials;

> Evaluate the risks posed to train crews by hazardous materials transported by rail, determine the adequate separation distance between hazardous materials cars and locomotives and occupied equipment that ensures the protection of train crews during both normal operations and accident conditions, and collaborate with the Federal Railroad Administration to revise 49 *Code of Federal Regulations* 174.85 to reflect those findings. (R-17-1)
>
> This safety recommendation is currently classified “Open—Acceptable Response”.
>
> Pending completion of the risk evaluation and action in accordance with its findings prescribed in Safety Recommendation R-17-01, withdraw regulatory interpretation 06-0278 that pertains to 49 *Code of Federal Regulations* 174.85 for positioning placarded rail cars in a train and require that all trains have a minimum of five

nonplacarded cars between any locomotive or occupied equipment and the nearest placarded car transporting hazardous materials, regardless of train length and consist. (R-17-2)

This safety recommendation is currently classified "Open—Acceptable Response".

Given the potential hazards of LNG when released, as described in the Exponent, Inc. quantitative risk analysis report and the NPRM regulatory analysis as including fireballs, flash fire, and explosions from ground-level vapor clouds that may vigorously expand far beyond the point of release to an ignition source, cryogenic material thermal exposure hazards, and asphyxiation hazards for a colorless and odorless gas that lack sufficient warning properties, the NTSB urges PHMSA to implement appropriate train crew separation distance requirements, as recommended by Safety Recommendations R-17-1 and -2.[12] Crew separation from potential sources of LNG release is particularly necessary since the product is not odorized, potentially leaving train crews unaware of leaks and hazardous flammable gas accumulations unless provided with and properly trained on the operation of specialized detection equipment.

PHMSA acknowledges in the NPRM that, although rare, derailments involving DOT-113 tank cars can result in large quantities of hazardous materials being released and the consequences of such an event could be more severe than releases from cargo tank motor vehicles. Recent history with unit train shipments of ethanol and crude oil demonstrate how unprepared federal regulators were to address the spate of fiery flammable liquids accidents that occurred between 2009 and 2015 until regulations for HHFTs were published.[13]

In summary, the NTSB believes that it would be detrimental to public safety if PHMSA were to authorize the transportation of LNG by rail with unvalidated tank cars and lacking operational controls that are afforded other hazardous materials such as flammable liquids, as currently proposed in this NPRM.

The NTSB appreciates the opportunity to comment on the notice.

Sincerely,

Robert L. Sumwalt, III
Chairman

[12] Exponent, Inc., *ETS Movement of LNG in DOT-113 Tank Cars by Rail, Quantitative Risk Analysis (QRA) Considering DOT-113 Tank Car Position in Train and Train Speed.* Project No. 1705991.000 (Warrenville, Illinois: Exponent, Inc., 2017); *FR* 84, no 206 (October 24, 2019): 56966.

[13] *FR* 80, no.89 (May 8, 2015): 26644, "Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains".