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NOT YET SCHEDULED FOR ORAL ARGUMENT

No. 20-1317 (consolidated with Nos. 20-1318, 20-1431, & 21-1009)

IN THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

SIERRA CLUB, et al.,

Petitioners,

v.

U.S. DEPARTMENT OF TRANSPORTATION, et al.,

Respondents.

On Petition for Review of Final Action of the Pipeline and Hazardous Materials Safety Administration

INITIAL OPENING BRIEF OF STATE PETITIONERS

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CERTIFICATE AS TO PARTIES, RULINGS, AND RELATED CASES

Pursuant to Circuit Rule 28(a)(1), the undersigned counsel of record certifies as follows:

A. Parties

Petitioners

The following parties appear in these cases as petitioners:

Petitioners in Case No. 20-1317, filed August 18, 2020, are the Sierra Club, Center for Biological Diversity, Clean Air Council, Delaware Riverkeeper Network, Environmental Confederation of Southwest Florida, and Mountain Watershed Association. Petitioners in case number 20-1317 have no parent companies and have never issued stock.

Petitioners in Case No. 20-1318, filed August 18, 2020, are the State of Maryland, State of New York, State of California, State of Delaware, District of Columbia, State of Illinois, Commonwealth of Massachusetts, People of the State of Michigan, State of Minnesota, State of New Jersey, State of Oregon, Commonwealth of Pennsylvania, State of Rhode Island, State of Vermont, and State of Washington.

Petitioner in Case Nos. 20-1431 and 21-1009 is the Puyallup Tribe of Indians, a sovereign Indian tribe whose government is recognized by the United States.

Respondents

Respondents are the Pipeline and Hazardous Materials Safety Administration; Tristan Brown, in his official capacity as Administrator of the Pipeline and Hazardous Safety Administration; the United States Department of Transportation; Pete Buttigieg, in his official capacity as Secretary of Transportation; and the United States of America.

B. Ruling Under Review

Petitioners seek review of a final rule issued by the Pipeline and Hazardous Materials Safety Administration entitled "Hazardous Materials: Liquefied Natural Gas by Rail," published at 85 Fed. Reg. 44,994 (July 24, 2020).

a. Related Cases

The rule at issue has not been previously reviewed in this or any other court. Petitioners are aware of three additional petitions challenging the same final rule (noted above). *See Sierra Club v. U.S. Department of Transportation*, D.C. Cir. No. 20-1317; *Puyallup Tribe of Indians v. U.S. Department of Transportation*, D.C. Cir. Nos. 20-1431 and 21-1009; and *Damascus v. U.S. Department of Transportation*, D.C. Cir. No. 20-1387. All of the above cases were consolidated with this one. Case No. 20-1387 has been dismissed.

> <u>/s/ Joshua M. Segal</u> Joshua M. Segal

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GLOSSARY

120W tank car	DOT113C120W tank car	
140W tank car	DOT113C140W tank car	
Earthjustice Comments	Comments of Earthjustice, PHMSA-2018-0025-0440	
EIS	Environmental impact statement	
J.A.	Joint Appendix	
LNG	Liquefied natural gas	
LNG Rule	Hazardous Materials: Liquefied Natural Gas by Rail, 85 Fed. Reg. 44,994 (July 24, 2020)	
PHMSA	The U.S. Pipeline and Hazardous Materials Safety Administration	
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Tribe Comments

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W9 tank car

DOT113C120W9 tank car

PRELIMINARY STATEMENT

In 2020, the U.S. Pipeline and Hazardous Materials Safety Administration ("PHMSA") issued a final rule that authorized the shipment of refrigerated methane, also known as liquefied natural gas (LNG), a hazardous cargo, in untested rail tank cars across our nation's extensive railroad network. *See* Hazardous Materials: Liquefied Natural Gas by Rail, 85 Fed. Reg. 44,994 (July 24, 2020) (the "LNG Rule"). This was a transformative change from previous regulations, which generally prohibited the shipment of LNG in rail tank cars. A coalition of 14 states and the District of Columbia ("the States") sought review of the LNG Rule in this Court.

Under the National Environmental Policy Act (NEPA), PHMSA was required to assess the environmental impacts of the LNG Rule before finalizing it. But rather than prepare an environmental impact statement, which NEPA requires for any federal action with the potential to cause significant environmental impacts, PHMSA prepared an environmental assessment and finding of no significant impact. That decision contravened NEPA and its implementing regulations. Moreover, the environmental assessment that PHMSA did complete was both procedurally and substantively flawed. This court should vacate the LNG Rule as unlawful.

JURISDICTIONAL STATEMENT

The LNG Rule was signed on June 19, 2020 and published on July 24, 2020. State Petitioners filed their petition for review in this Court on August 18, 2020. This Court has jurisdiction to review the LNG Rule pursuant to 49 U.S.C. §§ 5127(a) and 20114(c) and the Administrative Orders Review Act, 28 U.S.C. §§ 2341-2351, because the petition for review was filed within sixty days after the LNG Rule became final.

STATUTES AND REGULATIONS

Pertinent statutes and regulations are contained in the addendum at the end of this brief.

ISSUES PRESENTED FOR REVIEW

1. Did PHMSA violate NEPA's public participation requirements by introducing an unforeseeable selected alternative in its final environmental assessment without providing opportunity for public comment on that alternative?

2. Was PHMSA's failure to prepare an environmental impact statement arbitrary, capricious, and contrary to law, where the LNG Rule presented acute risks to public safety, involved unique unknown hazards, and generated substantial controversy?

3. Did PHMSA fail to take a hard look at the environmental impacts of allowing LNG to be shipped in rail tank cars, where its final environment assessment

ignored important safety aspects of the LNG Rule, did not consider the Rule's impact on greenhouse gas emissions, and failed to assess the Rule's impact on environmental justice communities?

STATEMENT OF THE CASE

The States adopt the Statement of the Case set forth in Environmental Petitioners' brief but add the following to emphasize several areas relevant to our argument.

A. Statutory Background

Under NEPA, a federal agency must prepare an environmental impact statement ("EIS")—i.e., a "detailed statement" of the action's reasonably foreseeable environmental effects—before undertaking any "major Federal action[] significantly affecting the quality of the human environment." 42 U.S.C. § 4332(C). Before preparing an EIS, an agency may first prepare an environmental assessment, "a concise public document" that provides the agency's "analysis for determining whether to prepare an [EIS] or a finding of no significant impact" and that should "facilitate preparation of an [EIS] when one is necessary." 40 C.F.R. § 1508.9 (2019).¹

¹ NEPA's implementing regulations have since been amended. *See* Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, 85 Fed. Reg. 43,304 (Jul. 16, 2020) (final rule effective Sept. 14, 2020).

However, "if *any* significant environmental impacts might result from the proposed agency action," then the agency must prepare an EIS "*before* agency action is taken." *Standing Rock Sioux Tribe v. United States Army Corps of Eng'rs*, 985 F.3d 1032, 1039 (D.C. Cir. 2021) (quoting *Grand Canyon Trust v. FAA*, 290 F.3d 339, 340 (D.C. Cir. 2002)) (emphasis in original). An environmental assessment "is intended to help an agency decide if an EIS is warranted" in the first place; it "is not meant to replace or substitute for an EIS." *Environmental Defense Ctr. v. Bureau of Ocean Energy Mgmt.*, 36 F.4th 850, 872 (9th Cir. 2022) (citation omitted).

The NEPA implementing regulations that were in effect when PHMSA developed the LNG Rule provide that an agency must consider the "context" and "intensity" of the impacts in determining their significance. 40 C.F.R. § 1508.27 (2019). The regulations specify ten factors that "should be considered" in assessing the "intensity" of an environmental impact; implicating any of the factors may be enough to require an EIS. *Id.*; *see also National Parks Conservation Ass'n v. Semonite*, 916 F.3d 1075, 1082 (D.C. Cir. 2019). Among these are "[t]he degree to which the proposed action affects public health or safety"; "[t]he degree to which the effects on the quality of the human environment are likely to be highly controversial"; and "[t]he degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks." 40 C.F.R. § 1508.27(2), (4), (5) (2019).

B. Factual Background

PHMSA is the entity within the Department of Transportation tasked with issuing regulations for the safe transportation of hazardous materials in interstate commerce. 49 U.S.C. § 108; 49 C.F.R. § 1.97(b)(3).

In October 2019, PHMSA published a notice of proposed rulemaking to authorize the shipment of LNG in rail tank cars. Hazardous Materials: Liquefied Natural Gas by Rail, 84 Fed. Reg. 56,964 (proposed Oct. 24, 2019) ("the Proposal"). The Proposal responded to a 2017 petition from the American Association of Railroads ("the Association"), as well as Executive Order 13868: Promoting Energy Infrastructure and Economic Growth (issued by then-President Trump in April 2019), which directed the Department of Transportation to undertake such a rulemaking within 100 days and to finalize the resulting regulations within thirteen months. *Id.* at 56,965 & n.1.

PHMSA proposed authorizing the shipment of LNG in 120W tank cars, which are double-walled tank cars with a 30,000-gallon capacity, designed to transport other refrigerated gases. *Id.* at 56,966-67 & n.8. PHMSA claimed that 120W tank cars had a history of safely transporting a different hazardous cargo, cryogenic ethylene, even though only a limited number of such cars had been built or used. *Id.* at 56,967. PHMSA did not propose to require any operational controls—i.e., regulatory limits on train operations that are intended to improve

safety—relying instead on voluntary compliance with non-binding industry standards. *Id.* at 56,968-69.

The Proposal included a draft environmental assessment and proposed finding of no significant impact. Id. at 56,970-75. The draft assessment considered three alternatives. It determined that the first, a "no action" alternative that would have continued to bar LNG from shipment in tank cars, "fail[ed] to comply with" Executive Order 13868 and "would not address" the Association's petition or other stakeholder comments.² Id. at 56,971. The second alternative would have granted the Association's petition in full by allowing LNG shipments in both 120W and 140W tank cars. Id. The draft assessment found that "a complete engineering review" and "more research and supporting data [were] needed" to support using 140W tank cars to transport LNG, and therefore did not further examine that alternative's impacts. Id. Third, PHMSA's "proposed action" alternative would have authorized transporting LNG in only 120W tank cars without any further operational controls. Id. The Proposal drew significant public concern, including from the State, Environmental, and Tribal Petitioners, the National Transportation Safety Board, and various groups of emergency responders.

² The referenced stakeholder comments comprised a single comment letter supporting the transport of LNG by rail in response to a general notification of regulatory review of PHMSA's programs. *See* 84 Fed. Reg. at 56,965 n.8.

The final LNG Rule sharply departed from the Proposal. Rather than authorize the shipment of LNG in the existing fleet of 120W tank cars, the Rule created an entirely new tank car specification—the W9 tank car—with an increased maximum filling density. 85 Fed. Reg. at 44,994, 44,996. PHMSA specified that the outer shell of the W9 tank car would be one-eighth of an inch thicker than the 120W tank car and made of higher-grade steel. *Id.* at 45,004-05. Importantly, 120W tank cars cannot be retrofitted to meet these requirements, so tank cars will have to be built from scratch to comply with the LNG Rule. *Id.* at 44,996, 45,003. The LNG Rule also prescribed certain operational controls for braking, monitoring, and route analysis based on the number of LNG cars in a train. *See id.* at 44,995.

PHMSA prepared a final environmental assessment to accompany the LNG Rule. That assessment again ruled out the 140W alternative without further analysis. (Final Environmental Assessment 4-6, J.A. XXXX-XXXX.) PHMSA's preferred alternative now included the changes to tank car design and operational controls that would be codified through the LNG Rule. (Final Environmental Assessment 6-9, J.A. XXXX-XXXX.) The final assessment acknowledged the dangers of an LNG derailment but dismissed them as "low probability," given the additional features required by the LNG Rule. (Final Environmental Assessment 22, J.A. XXXX.) It also acknowledged that the LNG Rule would influence the upstream production and downstream use of natural gas but declined to assess those impacts due to "multiple economic and practical unknowns," focusing instead on a comparison of the emission profiles of truck and rail transportation of LNG. (Final Environmental Assessment 35, J.A. XXXX.) PHMSA concluded that the LNG Rule would not have significant environmental impacts and that a full environmental impact statement was therefore unnecessary. (Final Environmental Assessment 62, J.A. XXXX.)

C. This Proceeding

The States petitioned for review of the LNG Rule in this Court on August 18, 2020. At PHMSA's request, this Court placed the case in abeyance on March 16, 2021. (Doc. *#* 1890143.) In November 2021, PHMSA issued a notice of proposed rulemaking to temporarily suspend the LNG Rule. Hazardous Materials: Suspension of HMR Amendments Authorizing Transportation of Liquefied Natural Gas by Rail, 86 Fed. Reg. 61,731 (proposed Nov. 8, 2021).

In May 2023, with PHMSA having yet to finalize the proposed temporary suspension of the LNG Rule, petitioners moved to lift the abeyance. (Doc. # 1999694.) Over PHMSA's objection, this Court lifted the abeyance in July 2023. (Doc. # 2008381.)

In September 2023, PHMSA published a final rule temporarily suspending the LNG Rule until the earlier of June 30, 2025 or the completion of a "rulemaking evaluating potential modifications to requirements governing rail tank car transportation of LNG." Hazardous Materials: Suspension of HMR Amendments Authorizing Transportation of Liquefied Natural Gas by Rail, 88 Fed. Reg. 60,356 (Sept. 1, 2023). The suspension rule recognized that the LNG Rule "could lead to indirect environmental impacts of increased methane emissions released during production, loading and unloading, or at other times during its life cycle." *Id.* at 60,372. It also observed that, due to subsequently completed studies, "[u]ncertainty regarding whether the [LNG Rule] ensures adequate protection of public safety has only increased" *id.* at 60,363, and that suspending the LNG Rule would allow PHMSA to "further consider whether the transportation of LNG could pose disproportionately high or adverse effects on minority and low income communities," *id.* at 60,371.

To date, PHMSA has not proposed any modifications to the LNG Rule itself, much less provided any assurance that such modifications will address the LNG Rule's serious deficiencies. Therefore, as this Court implicitly recognized when it lifted the abeyance, this case is ripe for judicial review.

SUMMARY OF ARGUMENT

PHMSA violated NEPA's public participation requirements when it modified the proposed LNG Rule to require a novel and untested tank car design whose details were previously unknown to the public. Had the States been able to comment on the use of the new W9 design, they would have raised concerns about whether it carried additional risks, different from the 120W tank cars specified in the Proposal, and the potential to include additional safety features given that all W9 tank cars would have to be built from scratch.

Additionally, PHMSA's decision to prepare an environmental assessment rather than an EIS for the LNG Rule rested on an arbitrary conclusion that the rule did not implicate any of the ten "intensity" factors specified by NEPA's implementing regulations. 40 C.F.R. § 1508.27(b) (2019). But the LNG Rule clearly "affects public health or safety," *id.* § 1508.27(b)(2) (2019), it "involves unique or unknown risks," *id.* § 1508.27(b)(5) (2019), and its effects were "likely to be highly controversial," *id.* § 1508.27(b)(4) (2019). As this Court has noted, "implicating any one of the factors may be sufficient to require development of an EIS." *National Parks Conservation Ass'n*, 916 F.3d at 1082 (citation omitted).

Even if an environmental assessment was appropriate under these circumstances, PHMSA's analysis was arbitrary and capricious, as it failed to take a "hard look" at the LNG Rule's effects on public safety, indirect greenhouse gas emissions, and environmental justice communities. Indeed, PHMSA rushed to finalize the rule on a record lacking safety studies regarding how either LNG or the W9 tank car would act during derailment; arbitrarily dismissed the rule's indirect impacts on greenhouse gas emissions as too complicated; and offered no attempt to

assess the composition of the communities along the routes that will carry LNG trains.

STANDING

State Petitioners have standing to bring this challenge, as the LNG Rule directly threatens their communities and the environment.

A. Proprietary Injury

The threat of LNG being shipped by rail in unproven and untested tank cars constitutes an injury-in-fact sufficient to establish standing. State Petitioners are financially injured by the LNG Rule because they must train personnel to respond to the potentially catastrophic consequences should an LNG train derail in one of our jurisdictions, and to assemble plans and equipment necessary to respond to such incidents. (Declaration of New York State Fire Administrator James B. Cable dated October 12, 2023 ("Cable Declaration"), ¶¶ 22-32; State Comments 14-15, J.A. XXXX-XXXX.) Those injuries are directly traceable to the LNG Rule, and a favorable court decision vacating or remanding the Rule will redress those injuries. *See Air Alliance Houston v. EPA*, 906 F.3d 1049, 1059-1060 (D.C. Cir. 2018).

B. Injury to Quasi-Sovereign Interests

In addition, State Petitioners face injuries to their quasi-sovereign interests in protecting their natural resources and the health and safety of their residents. By authorizing the transportation of LNG through the States, without any further review or approval by PHMSA, the LNG Rule removed a regulatory safeguard essential to protecting our residents, resources, and property from this dangerous activity. (*See* Cable Declaration ¶ 20-21; State Comments 1, J.A. XXXX.) The LNG Rule increases the risk of a catastrophic accident that could harm public health and the environment. (*See* Cable Declaration ¶¶ 9-15; State Comments at 6-15, J.A. XXXX-XXX.) In addition, the Rule is likely to result in a substantial increase in greenhouse gas emissions from the combustion of LNG, further exacerbating climate change harms that our States are experiencing. (*See* State Comments 16-17, J.A. XXXX-XXXX.) Vacating the LNG Rule, or remanding the Rule for the agency to prepare an EIS, would redress those harms. *See Massachusetts v. EPA*, 549 U.S. 497, 519-20 (2007).

C. Procedural Injury

Finally, by failing to provide an opportunity to comment on the significant changes to the LNG Rule, PHMSA deprived State Petitioners of their procedural rights under NEPA. "When a litigant is vested with a procedural right, that litigant has standing if there is some possibility that the requested relief will prompt the injury-causing party to reconsider the decision that allegedly harmed the litigant." *Massachusetts*, 549 U.S. at 518. Thus, State Petitioners have established Article III standing.

ARGUMENT³

I. THIS COURT REVIEWS PHMSA'S ACTION FOR WHETHER IT IS ARBITRARY AND CAPRICIOUS OR CONTRARY TO LAW.

Challenges to an agency's compliance with NEPA are subject to the standard of review provided by the Administrative Procedure Act (APA). Sierra Club v. Federal Energy Regulatory Comm'n, 867 F.3d 1357, 1367 (D.C. Cir. 2017). Under the APA, a "reviewing court shall . . . hold unlawful and set aside" an agency action found contrary to law or arbitrary and capricious. 5 U.S.C. § 706(2)(A). A rule is arbitrary and capricious if the agency fails to "examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made." Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mutual Automobile Ins. Co., 463 U.S. 29, 43 (1983) (quotations and citation omitted).

In the NEPA context, this standard means that an agency must take a "hard look" at the environmental consequences of its actions. Sierra Club, 867 F.3d at 1367. Thus, a court should hold an agency's NEPA analysis "deficient, and the agency action it undergirds [] arbitrary and capricious, if the [analysis] does not contain sufficient discussion of the relevant issues and opposing viewpoints or if it

³ In addition to the arguments below, State Petitioners incorporate by reference Environmental Petitioners' arguments that the LNG Rule was promulgated in violation of the Hazardous Materials Transportation Act's safety requirements and the Administrative Procedure Act's procedural requirements.

does not demonstrate reasoned decisionmaking." *Id.* (quotation marks and citation omitted).

II. PHMSA VIOLATED NEPA'S PUBLIC PARTICIPATION REQUIREMENTS BY ADOPTING A FINAL RULE THAT SIGNIFICANTLY DEPARTED FROM ITS PROPOSAL.

Public participation is critical to NEPA's proper operation. Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 349 (1989); see also Baltimore Gas & Electric v. NRDC, 462 U.S. 87, 97 (1983) (explaining that NEPA "ensures that the agency will inform the public that it has indeed considered environmental concerns in its decisionmaking process"). Because "public scrutiny [is] essential to implementing NEPA," the statute's implementing regulations instruct that "high quality" environmental information must be made available the to public before decisions are made. 40 C.F.R. § 1500.1(b) (2019). An agency conducting an environmental assessment also "shall involve ... the public, to the extent practicable," id. § 1501.4(b) (2019), a duty that includes "[m]ak[ing] diligent efforts to involve the public," id. § 1506.6(a) (2019), and "[s]olicit[ing] appropriate information from the public," id. § 1506.6(d) (2019). See also Marsh v. Oregon Natural Res. Council, 490 U.S. 360, 371 (1989) ("NEPA ensures that [an] agency will not act on incomplete information.").

Where a final rule takes an unforeseeable turn from the proposal, NEPA requires an agency to provide additional opportunities for public participation. *Cf.*

40 C.F.R. § 1502.9(c)(1)(i) (2019) (providing that an agency "shall" supplement a draft or final EIS if it "makes substantial changes in the proposed action that are relevant to environmental concerns"). Failure to do so violates NEPA. *See Oregon Natural Desert Ass 'n. v. Rose*, 921 F.3d 1185, 1192 (9th Cir. 2019); *Citizens for Better Forestry v. U.S. Dep't of Agriculture*, 341 F.3d 961, 970 (9th Cir. 2003).

PHMSA's selection of an entirely new tank car design in the LNG Rule presented just such a substantial change. The Proposal never mentioned the W9 tank car. Indeed, PHMSA provided no notice that it would consider requiring an entirely new tank car that would have to be built from scratch, rather than the existing models discussed in the Proposal. Thus, this is not a case where the ultimately selected alternative was an option of which the public should have been aware. Cf. Stand Up for California! v. U.S. Dep't of the Interior, 994 F.3d 616, 629-30 (D.C. Cir. 2021) (holding supplemental EIS was not required where the selected alternative was a proposed alternative in the draft EIS). Indeed, PHMSA "eliminated from full consideration" an alternative allowing LNG shipments in 140W tank cars precisely because it lacked sufficient information about those tank cars—reasoning that would apply with even more force to an entirely new design. (Final Environmental Assessment 6, J.A. XXXX.) Consequently, it was impossible to predict that PHMSA would choose a final tank car design that had never been tested or fabricated, and that lacked any safety history.

PHMSA was therefore obligated to provide additional opportunities for public comment on the environmental assessment. Had it done so, State Petitioners would have raised additional concerns about the W9 tank car's increased weight and advocated for a bottom-up review of the car's safety features.

III. AN EIS WAS REQUIRED TO FULLY ASSESS THE LNG RULE'S ENVIRONMENTAL IMPACTS.

Whether the effects of an agency action are "significant" and therefore trigger the requirement to prepare an EIS turns on the "intensity" of a project's impacts within the appropriate "context." 40 C.F.R. § 1508.27 (2019). Here, PHMSA concluded that the LNG Rule triggered none of the intensity factors specified by NEPA's implementing regulations. (Final Environmental Assessment 57-60, J.A. XXXX-XXXX.) That conclusion was arbitrary because the LNG Rule squarely implicated three of the factors.

First, the extreme danger inherent in transporting LNG by rail warranted an EIS. NEPA's regulations instruct that "the degree to which the proposed action affects public health or safety" can indicate that an EIS is necessary. 40 C.F.R. § 1508.27(b)(2) (2019). In the final environmental assessment, PHMSA admitted that "derailment followed by [tank] failure poses a risk to public safety," but largely dismissed those risks based on "the existing safety history of the DOT-113 tank car." (Final Environmental Assessment 58, J.A. XXXX.) But the relative infrequency of past derailments does not absolve PHMSA's obligation to prepare an EIS. *Standing*

Rock Sioux Tribe, 985 F.3d at 1049-50 ("Under NEPA, an agency must look at both the probabilities of potentially harmful events and the consequences if those events come to pass." (citation omitted)). The extreme danger posed by the release of even a single carload of LNG is too great to dismiss.⁴ *See id*. ("[T]he government is not in the business of approving ... facilities that have any material prospect of catastrophic failure.").

Second, the unique and unknown nature of the hazards presented by the LNG Rule independently warranted an EIS. An EIS is required if the effects of an action are "highly uncertain or involve unique or unknown risks." 40 C.F.R. § 1508.27(b)(5) (2019); *see Environmental Defense Ctr.*, 36 F.4th at 880-82 (noting need for EIS when proposed action contains "significant data gaps"); *see also WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41, 83-84 (D.D.C. 2019) (collecting cases). That was true here. The LNG Rule approved the shipment of unprecedented quantities of LNG, in untested railcars, with significant uncertainties about how LNG would behave during derailment. (*See* State Comments 12, J.A. XXXX

⁴ (*See* State Comments 15, J.A. XXXX (release of single car of LNG would create vapor cloud capable of covering 2.5 million cubic feet); Earthjustice Comments 14, J.A. XXXX (discussing the risk of LNG vapor cloud entering confined space such as sewer or subway tunnel); Tribe Comments 11, J.A. XXXX (same).)

(describing missing safety studies).) In the face of such uncertainty, an EIS was required. *See Environmental Defense Ctr.*, 36 F.4th at 882.

Third, the substantial controversy generated by the Proposal indicated that an EIS was necessary. NEPA's implementing regulations instruct that "the degree to which the effects . . . are likely to be highly controversial" indicates whether an EIS must be prepared. 40 C.F.R. § 1508.27(b)(4) (2019). This Court has clarified that "highly controversial" turns on whether a "substantial dispute exists as to the size, nature, or effect of the major federal action." *Standing Rock Sioux Tribe*, 985 F.3d at 1042 (internal quotation marks and citation omitted).

In deciding whether an agency action is highly controversial, courts have looked to whether commenters articulated "flaws in the methods or data relied upon by the agency in reaching its conclusions," particularly when those commenters are government entities. *National Parks Conservation Ass'n*, 916 F.3d at 1083. Thus, in *National Parks Conservation Association*, this Court found it relevant that the Advisory Council on Historic Preservation, the National Park Service, and the Virginia Department of Historic Resources objected to the methods used for evaluating the impacts of a proposed power line. *See* 916 F.3d at 1084-85. And in *Standing Rock Sioux Tribe*, this Court found the construction of a pipeline under a culturally significant waterbody highly controversial based on objections raised by Tribal agencies. *See* 985 F.3d at 1044.

The comments here fit that pattern. Comments from state governments, emergency responders (International Association of Fire Fighters Comments 4, J.A. XXXX; National Association of State Fire Marshals Comments 1, J.A. XXXX), the Puyallup Tribe (Tribe Comments 9-11, J.A. XXXX-XXXX), and the National Transportation Safety Board (Safety Board Comments 3, J.A. XXXX) all stressed the absence of *any* studies showing that LNG can be safely moved in rail cars. The States, for example, expressed concern that the Proposal's safety assessment was "based on untested assumptions" and that it "downplay[ed] or overlook[ed] major risks." (State Comments 7-8, J.A. XXXX-XXXX.)

The National Transportation Safety Board, the independent federal authority that investigates transportation accidents and issues safety recommendations, voiced similar concerns. The Board stressed that the docket lacked "any data ... that provide a crashworthiness assessment for the [120W] tank car design." (Safety Board Comments 3, J.A. XXXX.) The Board also rejected PHMSA's approach of "relying on data for the accident history of similar hazardous materials transported in the small fleet of [120W] tank cars (as stated in the [Proposal]) or making engineering assumptions based on the performance of pressure tank cars with completely different features and operating parameters." (Safety Board Comments 3, J.A. XXXX.) That information, the Board continued, "does not provide a statistically significant or valid safety assessment and calls into question how

[PHMSA] determined the [120W] tank car is an acceptable package to transport LNG." (Safety Board Comments 3, J.A. XXXX.)

The final environmental assessment failed to resolve these controversies. Rather than grapple with commenters' concerns, PHMSA made a series of modifications to the Proposal and claimed that those changes, along with historical derailment data and a comparison of rail and truck safety, adequately addressed them. (Final Environmental Assessment 39, J.A. XXXX.) But repeating the same assertions to which commenters objected did not resolve the conflict. *See National Parks Conservation Ass'n*, 916 F.3d at 1085-86. Rather, PHMSA should have acknowledged the criticisms around its analysis and proceeded to develop an EIS that resolved these controversies. *See Standing Rock Sioux Tribe*, 985 F.3d at 1043 ("Indeed, an EIS is perhaps especially warranted where an agency explanation confronts but fails to resolve serious outside criticism, leaving a project's effects uncertain.").

IV. PHMSA FAILED TO TAKE A "HARD LOOK" AT THE LNG RULE'S IMPACTS ON PUBLIC SAFETY, THE ENVIRONMENT, AND ENVIRONMENTAL JUSTICE COMMUNITIES, RENDERING ITS FINDING OF NO SIGNIFICANT IMPACT ARBITRARY AND CAPRICIOUS.

Even if an environmental assessment was appropriate under these circumstances, PHMSA's analysis failed to take a "hard look" at the LNG Rule's effects on public safety, indirect greenhouse-gas emissions, and overburdened communities. *See Grand Canyon Trust*, 290 F.3d at 340-341 (stating that finding of

no significant impact can be upheld only if an agency has, among other things, "taken a hard look at the problem in preparing the [environmental assessment]"). PHMSA's finding of no significant impact was therefore arbitrary and capricious and should be vacated.

A. PHMSA's Analysis of the LNG Rule's Impacts on Public Safety Was Arbitrary and Capricious.

PHMSA's analysis of the LNG Rule's public safety impacts was flawed in multiple ways. Most fundamentally, PHMSA concluded that the W9 tank car sufficiently reduced the risk of catastrophic accidents without any safety studies to support such claims. Commenters articulated the need for such testing *before* PHMSA authorized the shipment of LNG in rail tank cars. (*See, e.g.*, State Comments 12, J.A. XXXX; Safety Board Comments 3, J.A. XXXX; Earthjustice Comments 19, J.A. XXXX; Tribe Comments 2, J.A. XXXX.) PHMSA disagreed, relying instead on historical data concerning the performance of 120W tank cars transporting a different substance (ethylene) in manifest trains,⁵ and the performance of an altogether different type of tank car used to transport ethanol and crude oil. (Final Environmental Assessment 42-45, J.A. XXXX-XXXX.) As explained below,

⁵ "A manifest train is made up of mixed rail cars. A unit train is a train in which all cars carry the same commodity and are shipped from the same origin to the same destination." (Final Environmental Assessment 24 n.10, J.A. XXXX.)

however, the use of historical derailment data in place of actual testing of the W9 tank car did not constitute the "hard look" required by NEPA.

1. There is no "established track record of safety" for shipping large quantities of LNG in 120W tank cars.

The regulatory docket brims with PHMSA's statements to the effect that the 120W tank car has "an established track record of safety." 85 Fed. Reg. at 44,994; *see, e.g., id.* at 45,012 ("The safety history of [120W] tank cars is sufficient to draw a conclusion that these tank cars are appropriate for the bulk transportation of LNG."). Indeed, the final environmental assessment asserted that "the safety history of the [120W] tank car" meant that "the risk of a tank car failure and ignition is low." (Final Environmental Assessment 25, J.A. XXXX.) In fact, not only is derailment data on 120W tank cars scarce—likely because that model has only seen limited commercial use—but the information that PHMSA did provide does not support its conclusion.

PHMSA highlighted two sets of non-W9 derailments in support of the safety of the W9 tank car. The first included derailments in Kansas and Louisiana. 85 Fed. Reg. at 45,005. The Kansas derailment involved three cars filled with liquid ethylene. (Final Environmental Assessment 14-15, J.A. XXXX-XXXX.) Upon derailing, two of the three cars breached (i.e., spilled their contents) and caught fire. (Final Environmental Assessment 14-15, J.A. XXXX-XXXX.) The third vented gaseous ethylene, which also caught fire. (Final Environmental Assessment 14-15, J.A. XXXX-XXXX.) All three cars' contents were lost, and authorities ordered a one-mile evacuation. (Final Environmental Assessment 14-15, J.A. XXXX-XXX.) The Louisiana incident involved the derailment of two cars carrying non-flammable liquid argon; both cars breached. (Final Environmental Assessment 15, J.A. XXXX.) Thus, in this first set of derailments on which PHMSA relied, four out of five tank cars (i.e., 80%) breached and lost their cargo.

The second set of derailments involved trains carrying ethanol or crude oil in DOT111 and DOT117 tank cars.⁶ PHMSA introduced these examples to show that the W9 car's thicker outer shell would minimize the risk of tank puncture, but the data again does not support that conclusion. 85 Fed. Reg. at 45,006. In the two accidents involving DOT111 cars, a total of 49 of 52 derailed cars breached. *Id.* In the accident involving the thicker-shelled DOT117 cars, 8 of 32 cars breached. *Id.* While the DOT117 thus fared better by comparison, a significant number of those cars still breached. PHMSA's experience with thicker-shelled tank cars therefore does not support the conclusion that the W9 car's thicker outer shell will eliminate the risk of derailment-induced punctures. Moreover, breaching even a smaller proportion of LNG cars would significantly threaten public safety due to the unique

 $^{^6}$ The DOT111 has a single 7/16-inch-thick shell, while the DOT117 has a single 9/16-inch-thick shell.

hazards of an LNG release, as discussed below. (*See, e.g.*, State Comments 15, J.A. XXXX.)

2. PHMSA ignored the unique hazards of shipping bulk quantities of LNG in dozens of rail cars within a single train.

The final environmental assessment repeatedly ignored the unique risks of transporting LNG in blocks of tank cars within a single train. First, it arbitrarily dismissed the possibility that the extremely low temperatures of escaped LNG could cause neighboring tank cars to fail. (Final Environmental Assessment 7-8, J.A. XXXX-XXXX.) The final assessment acknowledged that the stronger steel specified for the outer tank of a W9 tank car "does not maintain the same strength and ductility" when exposed to extremely low temperatures. (Final Environmental Assessment 7-8, J.A. XXXX-XXXX.) Still, it concluded that this was not a safety concern because non-cold-resistant steel has been used in existing tank cars to transport ethylene without incident. (Final Environmental Assessment 7-8, J.A. XXXX-XXXX.) That conclusion, however, inexplicably focused on the threat of failure from the intrusion of LNG into "the void space between the inner and outer tanks" of a single car and ignored the risk that escaped LNG could compromise neighboring cars. (Final Environmental Assessment 7-8, J.A. XXXX-XXXX.)

That conclusion was even more confounding given PHMSA's acknowledgement that "large spills of the liquid onto metal structures that are not

designed to withstand cryogenic [i.e., extremely low] temperatures can cause embrittlement and fracturing." (Final Environmental Assessment 13, J.A. XXXX.) PHMSA did not explain why the outer shell of an adjacent tank car—which is also made of metal not designed to withstand extremely low temperatures—would not be at risk of embrittlement and fracturing from escaped LNG. (Final Environmental Assessment 13, J.A. XXXX.)

Additionally, the risk is much greater under the LNG Rule than has historically been the case for ethylene because of projected differences in how those commodities are transported. While ethylene is shipped in one to three cars per manifest train, PHMSA expects that dozens of rail cars of LNG will be shipped together in either manifest or unit train configurations. (*See* State Comments 8, J.A. XXXX.)

Second, PHMSA's reasoning for ignoring the risk of a vapor explosion, which can result when a liquid held in a confined space expands into a gas, does not pass muster. PHMSA considered the risk of a vapor explosion during derailment to be highly unlikely under four scenarios involving varying levels of damage to the shells of the tank car. (Final Environmental Assessment 21, J.A. XXXX.) But PHMSA failed to assess how a tank car with intact shells, but damaged or malfunctioning pressure relief valves, would fare during derailment. Those are the conditions where

a vapor explosion would be most likely, since the LNG cargo would rapidly expand without any way of escaping the inner tank. (State Comments at 3, J.A. XXXX.)

B. PHMSA Failed to Assess the LNG Rule's Impact on Upstream and Downstream Greenhouse Gas Emissions.

A reviewing agency must assess both the direct and indirect effects of its actions. 40 C.F.R. § 1502.16(b) (2019). Indirect effects are those that "are caused by the action and are later in time or farther removed in distance, but still reasonably foreseeable results of the action." *Id.* § 1508.8(b) (2019). In the NEPA context, a matter is reasonably foreseeable if it is "sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision." *EarthReports, Inc. v. FERC*, 828 F.3d 949, 955 (D.C. Cir. 2016) (citations omitted). Thus, this Court has repeatedly held that the upstream development and downstream use of natural gas can be indirect effects of agency action. *See, e.g., Sierra Club*, 867 F.3d at 1374; *Vecinos para el Beinestar de la Comunidad Costera v. FERC*, 6 F.4th 1321, 1329 (D.C. Cir. 2021); *Eagle County, Colo. v. Surface Transp. Bd.*, No. 22-1019, 2023 WL 5313815, *12-15 (D.C. Cir. Aug. 18, 2023).

Here, PHMSA issued the LNG Rule to spur "development of our Nation's vast energy resources." 85 Fed. Reg. at 44,998. The final environmental assessment, though, did not attempt to quantify the LNG Rule's effects on upstream or downstream emissions because, according to PHMSA, a series of "unknowns frustrate meaningful predictions." (Final Environmental Assessment 35, J.A.
XXXX.) That lack of analysis falls short of the required "hard look" and is yet another reason why the finding of no significant impact is arbitrary and capricious.

Indeed, in circumstances like these, where a nationally applicable rule could have a transformative effect on an aspect of the human environment, it is particularly important that the agency consider its actions' indirect effects. *See Foundation on Economic Trends v. Heckler*, 756 F.2d 143 (D.C. Cir. 1985) (finding environmental assessment insufficient where agency failed to consider risk of dispersion of genetically modified organisms). Here, though, PHMSA ignored the LNG Rule's impact on upstream gas development and downstream fuel use because it found that "multiple economic and practical unknowns frustrate meaningful predictions." (Final Environmental Assessment 35, J.A. XXXX.) Surely an agency cannot throw its hands up and refuse to assess an important and foreseeable impact because it lacks certainty, especially when those same impacts provide the justification for the action in the first place.

It is particularly important that such effects are considered now, because shipping LNG pursuant to the LNG Rule requires no further approval by PHMSA. As the Ninth Circuit has stated, "the critical inquiry in considering the adequacy of an EIS prepared for a large scale, multi-step project is not whether the project's sitespecific impact should be evaluated in detail, but when such detailed evaluation should occur." *State of California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982). Here, there is no later step at which PHMSA could assess the LNG Rule's foreseeable impacts on greenhouse-gas emissions.⁷

C. PHMSA Failed to Assess the LNG Rule's Impact on Environmental Justice Communities.

Executive Order 12898 requires federal agencies to consider the effects of their actions on environmental justice communities. Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 59 Fed. Reg. 7,629 (Feb. 16, 1994). To comply with this directive, agencies "should consider the composition of the affected area, to determine whether minority populations, low-income populations, or Indian tribes are present in the area affected by the proposed action, and if so whether there may be disproportionately high and adverse human health or environmental effects on [those populations]." Standing Rock Sioux Tribe v. U.S. Army Corps of Engineers, 255 F. Supp. 3d 101, 136 (D.D.C. 2017) (quoting Council on Environmental Quality, Environmental Justice Guidance Under the National Environmental Policy Act (Dec. 10, 1997)). This Court reviews an agency's environmental justice analysis to determine whether the agency took a "hard look" at the appropriate issues. Sierra Club, 867 F.3d at 1368.

⁷ PHMSA subsequently acknowledged the LNG Rule's potential impact on upstream and downstream greenhouse gas emissions. *See* discussion above at page 9.

Sierra Club illustrates what constitutes a "hard look." There, this Court found an agency's analysis of a pipeline's impact on environmental justice communities sufficient because the agency assessed the proposed pipeline's proximity to environmental justice communities and compared such impacts across alternatives. *Id.* at 1369. At the same time, this Court acknowledged that "perhaps [petitioners] would have a stronger claim if the agency had refused entirely to discuss the demographics of the populations that will feel the pipelines' effects, and had justified this refusal by pointing to the limited intensity, extent, and duration of those effects." *Id.*

PHMSA refused to engage in precisely that discussion here. The final environmental assessment conceded that it is "possible" that the "rulemaking will facilitate the transportation of LNG through environmental justice communities." (Final Environmental Assessment 42, J.A. XXXX.) Yet the assessment included no analysis of the composition of communities along rail lines likely to support LNG traffic. Instead, PHMSA opined that the rule may reduce LNG transportation by highway and thereby decrease burdens on environmental justice communities bordering highways. (Final Environmental Assessment 42, J.A. XXXX.) Such analysis falls far short of the "hard look" required and is yet another reason why the court should vacate the LNG Rule. *See Standing Rock Sioux Tribe*, 255 F. Supp. 3d

at 136 (holding Army Corps' NEPA analysis arbitrary and capricious when it ignored impacts on nearby tribe).⁸

CONCLUSION

The petition for review should be granted and the Court should vacate the

LNG Rule.

Dated: October 13, 2023

Respectfully submitted,

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⁸ PHMSA subsequently acknowledged the need to further evaluate the LNG Rule's impact on environmental justice communities. *See* discussion above at page 9.

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CERTIFICATE OF COMPLIANCE

1. This brief complies with the type-volume limitations of the briefing order established in this case, and Federal Rule of Appellate Procedure 32(a)(7)(B), because this brief contains 6,540 words, Environmental Petitioners brief includes 8,990 words, and the Petitioner Tribe's brief includes 10,319 words excluding the parts of the briefs exempted by Rule 32(f). Thus, petitioners' briefs comprise a total of 25,849 words.

2. This brief complies with the typeface requirements of Federal Rule of Appellate Procedure 32(a)(5) and the type style requirements of Rule 32(a)(6) because this brief has been prepared in a proportionally spaced typeface using Microsoft Word in Fourteen point, Times New Roman.

> <u>/s/ Joshua M. Segal</u> Joshua M. Segal

CERTIFICATE OF SERVICE

I certify that, on this 13th day of October, 2023, this Initial Opening Brief of State Petitioners was filed electronically via the Court's CM/ECF system, which will effect service on all counsel of record who are registered CM/ECF users.

> /s/ Joshua M. Segal Joshua M. Segal

No. 20-1317 (consolidated with Nos. 20-1318, 20-1431, & 21-1009)

IN THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

SIERRA CLUB, et al.,

Petitioners,

v.

U.S. DEPARTMENT OF TRANSPORTATION, et al.,

Respondents.

DECLARATION PROVIDING ADDITIONAL SUPPORT FOR STATE PETITIONERS' STANDING

No. 20-1317 (consolidated with Nos. 20-1318, 20-1431, & 21-1009)

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Respondents.

DECLARATION OF JAMES B. CABLE OF THE NEW YORK STATE DIVISION OF HOMELAND SECURITY AND EMERGENCY SERVICES

DECLARATION OF JAMES B. CABLE

I, JAMES B. CABLE, declare under penalty of perjury that the following is true and correct:

1. I am employed by the New York State Division of Homeland Security and Emergency Services, in the Office of Fire Prevention and Control ("State Fire Office"). My title is State Fire Administrator, and I have held that title since October 2021, when I was appointed to that position by the Governor of New York State. As State Fire Administrator, I lead the State Fire Office.

2. I am also a member of the New York State Disaster Preparedness Commission and the State Fire Prevention and Building Code Council, and I chair the Advisory Council for Fire Prevention and Control, which, among things, advises the State's leadership on federal and state policies and programs related to fire prevention, fire control and training.

3. I submit this declaration in support of the petition for review by the State of New York and other petitioners challenging the U.S. Pipeline and Hazardous Materials Safety Administration's final rule, *Hazardous Materials: Liquefied Natural Gas by Rail*, 85 Fed. Reg. 44,994 (July 24, 2020) (the "LNG Rule"). This declaration is based on personal knowledge, discussions with colleagues at the New York State Division of Homeland Security and Emergency Services, review of the Record in this case and documents previously submitted to the Court in this case, review of publications by the National

Academy of Sciences pertaining to transport of LNG by rail and other publications pertaining to transport of LNG, review of information maintained by the New York State Department of Transportation, and other information in the possession of the State Fire Office.

Background

4. I have a Bachelor of Arts degree in History from Bates College, Lewiston, Maine, which I obtained in 1992.

5. I was an active volunteer firefighter between 1987 and 2020. In the years 1987 to 1995, and 1998 to 2020, I was with the Onesquethaw Volunteer Fire Company in Albany County, New York, and served as Assistant Chief between 1998 and 2003. In the years 1995 to 1998, I was with the Wynantskill Fire Department in Rensselaer County, New York.

 Additionally, I was an Emergency Medical Technician from 1994-2003.

7. I began working for the State Fire Office as a Fire Protection Specialist in 1997. Between 1997 and June 2021, I worked in the Hazardous Materials and Transportation Bureau, the Arson Bureau (as a fire investigator and Accelerant Detection K-9 handler), then as the Deputy Chief of the Standards Unit, then as the Branch Chief of Special Operations (responsible for both Hazardous Materials and Technical Rescue Training and Response programs), and eventually as a Deputy State Fire Administrator overseeing

Response. Between June 2021 and October 2021, I served as Acting State Fire Administrator upon the retirement of my predecessor until being appointed as State Fire Administrator in October 2021.

8. The State Fire Office develops and delivers comprehensive training, response and technical assistance programs to New York's emergency responders, localities and residents. As State Fire Administrator, I oversee the six branches of the State Fire Office: the Hazardous Materials Branch; the Fire Training and Education Branch; the Fire and Life Safety Branch; the Operational Support Branch; the Technical Rescue Branch; and the Investigations Branch.

<u>Unique Hazards Involved in Releases of Liquefied Natural Gas</u>

9. Liquefied natural gas (LNG) is comprised primarily of methane and trace amounts of several other gases.

10. Liquefaction involves compressing and cooling natural gas to a temperature at or below -260°F. In this liquid state, the commodity takes up roughly 1/600th of the space as it does as a gas. These unique qualities of LNG—intense compression and extreme cold—pose distinct safety hazards for transporting LNG in bulk by rail, as contemplated by the LNG Rule.

11. One unique challenge of an LNG release for emergency responders is the lack of visibility of the vapor cloud that eventually results. As a cryogenic (extremely cold) commodity, when LNG is released it will initially form a visible

vapor cloud as the vapor cloud contacts with moisture in the air, but as the product warms, the visible vapor cloud will dissipate, leaving a cloud of flammable natural gas vapor that is invisible to the public and emergency responders.

12. A second unique challenge of an LNG release as a cryogenic material is the ground-hugging behavior of the vapor cloud due to its extremely cold temperature, making it denser and heavier than air, which contrasts with the behavior of natural gas in its most common form as a compressed natural gas. In its vapor state at ambient temperatures, natural gas is lighter than air and will rise upwards in the air when released. But as a liquid that is heavier than air, LNG behaves in the opposite fashion when released, and importantly, differently than most fire departments expect natural gas to behave: it will typically hug the ground until the point when it warms to ambient air temperature. The ground-hugging quality and density of an LNG vapor cloud will displace ambient air and also pose an asphyxiation hazard to both the public and responders, a particular concern given the proximity of freight rail lines to populated areas of the State.

13. A third unique challenge of LNG for firefighters and other emergency responders is that, without proper protective equipment, contact with a cryogenic liquid, cold surfaces or cold vapor can cause cold burns or frostbite, while breathing in cold vapor can damage lung tissue. Cryogenic

liquids have very low viscosity, meaning they can easily penetrate skin pores and clothing. It is essential that fire departments and first responders be provided with specialized meters which allow detection of the vapor cloud of an LNG release from a distance. And because LNG is cryogenic, LNG contact with certain materials, such as carbon steel, can lead to embrittlement (loss of ductility) of the material, and material failure.

14. Additionally, LNG is odorless and is typically shipped (i.e., via truck or tanker vessel) without the addition of mercaptan, an odorant that is added to other commodities to give them a pungent and unpleasant sulfur-like smell to make it easier to detect if a leak or release should occur. An LNG release will be odorless, making it more difficult for emergency responders to detect and delineate the exact locations of the escaping LNG vapor.

15. The State Fire Office must work with fire departments and emergency responders throughout the State in order to help them become more prepared for these unique hazards and challenges associated with an LNG release in a derailment scenario.

<u>The LNG Rule and Associated Risks to New York Communities Near</u> <u>Rail Lines</u>

16. According to the New York State Department of Transportation, there are approximately 4,500 miles of rail lines crisscrossing New York State, with an active rail line in nearly all of the State's 62 counties.¹

17. There are approximately 60 municipalities in the State of New York with an estimated population exceeding 34,000 people, and a great majority of them are located along active rail lines.² Many of the freight rail lines in New York State pass in close proximity to homes and businesses.

18. Attached hereto as Exhibit A is a true and correct copy of a map prepared in December 2022 by the New York State Department of Transportation and labeled "Railroads in New York – 2023," depicting the many freight railroad routes through the State.³

¹ https://www.dot.ny.gov/divisions/operating/opdm/passenger-rail/freight-railservice-in-new-york-state (last accessed Oct. 12, 2023). This figure includes "trackage rights," where the owner of a railroad grants another railroad the right to use its tracks.

² https://www.dot.ny.gov/divisions/operating/opdm/passenger-rail/freight-railservice-in-new-york-state (last accessed Oct. 12, 2023);

https://www.newyorkdemographics.com/cities_by_population (last accessed Oct. 12, 2023).

³ The map is also available on the website of the New York State Department of Transportation at https://www.dot.ny.gov/divisions/operating/opdm/passenger-rail/passenger-rail-repository/2023%20NYS%20Rail%20Map.pdf (last accessed Oct. 12, 2023).

19. Presently, a very limited volume of flammable cryogenic commodities (i.e., cryogenic liquid ethylene) pass through New York State by rail.

20.The State Fire Office anticipates that if the LNG Rule is implemented, then beginning as early as the second half of 2025, there could be large volumes of LNG cargo travelling along freight rail lines in New York in DOT-113C120W9 rail tank cars ("W9 tank cars"). I understand from reading the June 6, 2023 declaration submitted in this case by William S. Schoonover, the Associate Administrator for Hazardous Materials Safety at the U.S. Pipeline and Hazardous Materials Safety Administration ("Schoonover Declaration"), that at least one rail tank car manufacturer has received an order for 25 W9 tank cars, the tank car specification under the LNG Rule, and has begun manufacturing W9 tank cars in fulfillment of this order.⁴ That order was ostensibly placed for transport of cryogenic ethylene.⁵ According to Associate Administrator Schoonover, W9 tank cars previously used for transport of cryogenic ethylene can be mechanically converted so they can be used for transport of LNG cargo, and such mechanical conversion can take several months or longer.⁶ If the LNG Rule comes back into full effect after June 30,

 $^{^4}$ Schoonover Declaration, Document #2002428, ¶ 10.

⁵ *Id*.

⁶ *Id.* ¶ 11.

2025, then W9 tank cars that have already been in service for transport of cryogenic ethylene could be converted for LNG service by the end of 2025. And additional W9 tank cars could certainly be ordered by companies looking to ship LNG by rail.

21. Additionally, it can be anticipated that if the LNG Rule is implemented, trains carrying LNG will pass through New York State. Multiple freight rail lines connect regions of the country with abundant natural gas production (i.e., Pennsylvania, West Virginia, Ohio) with the New England region, and those rail lines pass through New York. It can be reasonably anticipated that industry will be looking to service the New England natural gas market with LNG delivered by rail if the 2020 LNG Rule is implemented. This will in turn entail transporting LNG by rail through New York State.

<u>Anticipated Expenditures by New York State to Train and Equip</u> <u>Emergency Responders for Hazards Flowing from the LNG Rule</u>

22. Given that under the LNG Rule we anticipate LNG cargos passing through New York State by rail within several years, in close proximity to densely-populated residential areas, the State Fire Office will be working to develop and deliver LNG-focused training, and evaluating options to assist with procuring specialized equipment for fire service organizations, hazardous materials professionals, and other emergency management and responders in many localities in the State.

23. The training will be focused on how to prepare the fire service and other emergency responders for response protocols in the event of a train derailment involving LNG cargo and/or LNG release, and protocols for evacuations of communities in the vicinity of such a derailment site.

24. For example, the State of Massachusetts Firefighting Academy has long partnered with a natural gas industry organization (the Northeast Gas Association) in developing an LNG-focused training program for firefighters and other emergency responders that has included the use of LNG for productspecific live fire training.⁷ Historically, the investment of resources in such LNG-focused training by the State of Massachusetts has been spurred by the presence of LNG import facilities in Massachusetts, and the resulting transit of LNG on trucks to destinations throughout New England.

25. In August 2015 and November 2018, New York State's Fire Safety Office sent a combined total of 18 staff persons to the Massachusetts Firefighting Academy for participation in their LNG-focused training program. The total cost of that training was approximately \$1,600/person, or about \$29,000 in total for all training participants from the New York State Fire

⁷ See National Academies of Sciences, Engineering, and Medicine 2022. Preparing for LNG by Rail Tank Car: A Readiness Review. Washington, DC: The National Academies Press, at 77, available at https://doi.org/10.17226/ 26719 ("National Academies 2022 Report"). A true and correct copy of this publication in full is attached hereto as **Exhibit B**. See also Northeast Gas Association, https://www.northeastgas.org/pdf/2023_fire_academy.pdf (last accessed Oct. 12, 2023).

Office. A portion of those expenses was paid with State of New York funds, and other expenses were covered by use of federal grant monies.

26. We would anticipate that the rail industry and the natural gas industry, as proponents of bulk transport of LNG by rail, would be contributing substantial funds to finance the development and delivery of LNG-focused training programs for emergency responders throughout New York State (and other states).

27. But New York State would still incur public expenditures to support such new training programs. For example, the State Fire Office anticipates that it would need to hire additional new full-time professionals (as Fire Protection Specialists) in the coming years to support a statewide LNGspecific training program, even if this program were in partnership with industry and potentially with the U.S. Department of Transportation. Based on estimates for State of New York fiscal years 2024 and 2025, the cost in compensation, benefits and personal gear and equipment to the State of New York of employing just a single full-time employee with the requisite educational background and professional experience for the Fire Protection Specialist role is estimated to exceed \$250,000 for the initial year, and over \$160,000 for each year thereafter.

28. Additionally, State funds would be contributed towards the State Fire Office's development and maintenance of an appropriate facility within

New York State for LNG-specific training, one that would potentially be set up for controlled use of LNG for product-specific live training and also potentially use of a cryogenic tank car for training purposes.

29. Besides LNG-focused training, if the LNG Rule is implemented then efforts will need to be undertaken to equip local fire departments and hazardous materials teams in New York State with specialized equipment capable of detecting methane at a relatively safe distance. Such methanespecific detection equipment can cost in excess of \$10,000 per device.⁸

30. Additionally, many fire departments in New York State may need to procure bulk quantities of high-expansion foam, potassium bicarbonate dry chemical, or other specialized product and equipment that is required to extinguish a large LNG pool fire that may result from a derailment of a train carrying LNG, and release of the LNG product.⁹

31. Again, we would expect that the natural gas and/or rail industry, would be contributing funding to municipal fire departments in New York State for procurement of specialized methane detection and firefighting chemicals to effectively deal with derailments of trains transporting LNG through our State under the LNG Rule. At the same time, we anticipate that the State Fire Office

⁸ See, e.g. https://fire-end.com/products/gas-track-lz-30 (last accessed Oct. 12, 2023).

⁹ See Exhibit B, National Academies 2022 Report, at 72.

will be involved in any efforts to provide State funding for procurement of such specialized equipment to municipal fire departments serving communities located along rail lines in the State where LNG is likely to travel under the LNG Rule.

32. To summarize, because of the unique hazards presented by an LNG release in a derailment scenario, hazards that are predictable under the LNG Rule but that many municipal fire departments in New York State are presently underprepared to manage, the State's Office of Fire Prevention and Control will need to spend State monies and engage State personnel to develop, implement and oversee LNG-focused training programs for firefighters and local emergency managers, and also assist with procurement of specialized equipment for local first responders to effectively respond to derailments involving LNG cargo.

Dated this 12th of October, 2023 at Albany, New York.

Mun B. bble

JAMES B. CABLE

EXHIBIT A TO **DECLARATION OF JAMES B. CABLE OF THE NEW YORK STATE DIVISION OF HOMELAND SECURITY AND EMERGENCY SERVICES**

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EXHIBIT B TO **DECLARATION OF JAMES B. CABLE OF THE NEW YORK STATE DIVISION OF HOMELAND SECURITY AND EMERGENCY SERVICES**



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A Readiness Review

Committee for a Study on the Safe Transportation of Liquefied Natural Gas by Railroad Tank Car

Transportation Research Board

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Consensus Study Report

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Consensus Study Reports published by the National Academies of Sciences, Engineering, and Medicine document the evidence-based consensus on the study's statement of task by an authoring committee of experts. Reports typically include findings, conclusions, and recommendations based on information gathered by the committee and the committee's deliberations. Each report has been subjected to a rigorous and independent peer-review process and it represents the position of the National Academies on the statement of task.

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COMMITTEE FOR A STUDY ON THE SAFE TRANSPORTATION OF LIQUEFIED NATURAL GAS BY RAILROAD TANK CAR

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NOTE: See Appendix C, Disclosure of Unavoidable Conflicts of Interest.

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Preface

Natural gas production in the United States has increased dramatically over the past two decades. While the nation's transmission pipelines are generally the most efficient means of transporting natural gas over long distances, compressed natural gas and liquefied natural gas (LNG) have been transported by marine vessel and truck for decades. In 2017, U.S. freight railroads petitioned the U.S. Department of Transportation's (U.S. DOT's) Pipeline and Hazardous Materials Safety Administration (PHMSA) to transport LNG by rail in tank cars. In response, PHMSA initiated a rulemaking in 2019 to allow bulk transportation of LNG by an existing type of tank car used for cryogenic liquids, the DOT-113. In July 2020, PHMSA issued a final rule allowing these movements. The rule contained several safety requirements, including enhancements to the steel used in the outer tank of the DOT-113, remote monitoring of the pressure and location of the tank car, and risk assessments to evaluate safety and security.

In the Further Consolidated Appropriations Act of 2020, Congress directed PHMSA to commission a study by the Transportation Research Board (TRB) of the National Academies of Sciences, Engineering, and Medicine to examine the safety of transporting LNG by rail. To conduct the study, TRB convened a committee of experts whose fields include railroad engineering, safety, and operations; railway simulation; track and equipment failure analysis; accident investigation; heavy equipment fullscale testing; hazardous materials safety regulation; hazardous materials transportation, packaging, and safe handling; LNG behavior; state and local emergency management; and risk analysis. Biographical information

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on the 12 committee members, who served uncompensated in the public interest, appears at the end of the report.

The study was divided into two phases, each producing a report. In the first phase, the committee reviewed the work and plans of an interagency task force of PHMSA and the Federal Railroad Administration that was charged with conducting research, gathering data, and undertaking testing to gain a better understanding of the risks of transporting LNG by rail and options for mitigating them. The findings from the first phase of the study were reported in June 2021 in *Preparing for LNG by Rail Tank Car: A Review of a U.S. DOT Safety Research, Testing, and Analysis Initiative.*¹

This report presents the results of the study's second phase in which the committee was charged with conducting a broader review of the hazard characteristics of LNG and the safety record of LNG shipments when transported by other modes. The goal of this phase was to identify areas where additional investigation, analysis, and monitoring may be warranted so that industry and regulators can better assess LNG's risks in rail transportation and make choices about how best to manage those risks. The full study charge is presented and discussed in Chapter 1.

ACKNOWLEDGMENTS

The committee thanks the many individuals who contributed to its work. The PHMSA liaison for the study was Michael Klem, who provided contract oversight and handled information requests from the committee. The committee was briefed by or received information from the following: William S. Schoonover and Eamonn Patrick, PHMSA; Larry Jantzen, City of Austin Fire Department; Gregory Milewski, Consultant; Michael Ratner, Congressional Research Service; Samer Mosis, Global LNG Analytics, S&P Global Platts; Pedro Santos, CNGmotive; Scott Nason, Rail & ISO Markets, Chart Industries; A. D. McKisic, Trinity Rail; Jeff Moller and Robert Fronczak, AAR; Paul Bomgardner, Federal Motor Carrier Safety Administration; Bill Reese, Commercial Vehicle Safety Alliance; Dan Wright, Kenan Advantage Group; CAPT Daniel Cost, U.S. Coast Guard Headquarters; Aditya Aggarwal, ABS Global Gas Solutions; Andrew Kohout, Federal Energy Regulatory Commission; Paul Ruesch, U.S. Environmental Protection Agency, Region 5; Ron Hassan, International Association of Fire Fighters; Tim Gablehouse, NASTTPO; Thomas Farmer, Association of American Railroads; Trey Morrison and Ryan Hart, Exponent; Andrew Kohout, Federal Energy Regulatory Commission; Ashley T. Madray, LNG Refrigerants,

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¹ National Academies of Sciences, Engineering, and Medicine, *Preparing for LNG by Rail Tank Car: A Review of a U.S. DOT Safety Research, Testing, and Analysis Initiative* (Washington, DC: The National Academies Press, 2021), https://doi.org/10.17226/26221.

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Gas Innovations; Todd Treichel, Association of American Railroads Tank Car Safety Project; John Tunna, Federal Railroad Administration Office of Research, Development and Technology (retired); Dave Anderson, Elbow River Marketing; Michael Iden, Tier 5 Locomotive LLC; Erica Bernstein, TRANSCAER; Manuel "Manny" Ehrlich, RESPONDER, LLC; and Fred Millar, independent consultant.

Micah D. Himmel directed the study and assisted the study committee in the preparation of this report along with Brittany Bishop, Sarah Jo Peterson, and David O. Willauer. Thomas R. Menzies, Jr., provided oversight management and Timothy B. Marflak and Claudia Sauls provided administrative and logistical support in addition to assisting with preparing the report for publication.

The report was reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise. The purpose of this independent review is to provide candid and critical comments that will assist the National Academies in making each published report as sound as possible and to ensure that it meets the institutional standards for quality, objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. Karen Febey managed the review process.

The committee thanks the following individuals for their review of this report: Grady Cothen, Federal Railroad Administration (retired); Eric Gebhardt, Wabtec Corporation; Bo Barker Jørgensen, Aarhus University; Melvin Kanninen, MFK Consulting Services; John Samuels, Revenue Variable Engineering, LLC; Jo Strang, American Short Line and Regional Railroad Association; Todd Treichel, Railway Supply Institute-American Association of Railroads; and Katherine Turnbull, Texas A&M Transportation Institute.

Although the reviewers listed above provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations of this report, nor did they see the final draft before its release. The review of this report was overseen by Chris T. Hendrickson (National Academy of Engineering), Carnegie Mellon University (emeritus), Pittsburgh, Pennsylvania, and Roger McCarthy (National Academy of Engineering), McCarthy Engineering, Palo Alto, California. They were responsible for making certain that an independent examination of this report was carried out in accordance with the standards of the National Academies and that all review comments were carefully considered. Responsibility for the final content rests entirely with the authoring committee and the National Academies.

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Executive Summary

As the domestic production of natural gas and demand from export markets has grown over the past decade, so too has demand for producing and transporting liquefied natural gas (LNG). LNG is regulated as a hazardous material when transported because it is a cryogenic liquid and flammable when released as a gas. In July 2020, the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) and Federal Railroad Administration (FRA) issued a rule authorizing the transportation of LNG by rail tank car for the first time. Shipments are authorized in an upgraded version of a common cryogenic tank car, the DOT-113C120W9. As of July 2022, LNG had yet to be shipped by tank car, and no upgraded tank cars had been produced for the in-service cryogenic fleet.

This study's purpose is to identify areas where additional investigation, analysis, and monitoring may be warranted so that industry and regulators can better assess LNG's risks in rail transportation and make choices about how best to manage those risks. To do so, the expert committee charged with conducting the study reviewed the hazards associated with LNG's cryogenic and flammable properties, the experience with shipping LNG by truck and ship, the safety assurance frameworks established for ensuring that LNG and other hazardous materials shipments are transported without incident, and the state of emergency response planning and preparation for hazardous materials incidents in general and for LNG in particular. The committee also reviewed results from fire testing of a cryogenic portable tank that shares some of the DOT-113 tank car's design features and impact testing of the upgraded DOT-113 tank car.

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A Case #20-1318 Document #2021804 Filed: 10/13/2023 Page 33 o 2 PREPARING FOR LNG BY RAIL TANK CAR

On the basis of this review, the committee finds that LNG has a long history of safe transportation in other modes and that PHMSA, FRA, and industry have started to take precautions to ensure the safe transportation of LNG by rail tank car. However, more than 18 months after PHMSA's authorization of these movements little has changed with regard to the shipment of LNG by rail, and there remains a great deal of uncertainty about how much LNG will be transported, when, and over which routes. In the committee's view, this lull provides an opportunity to further assess these precautions and prepare for an effective response to incidents and emergencies that may arise. Furthermore, in having reviewed the results of the recent impact and fire tests, the committee believes that further investigation and analyses of the DOT-113C120W9 tank car are warranted to ascertain its resistance to overheating and a high-pressure release arising from LNG's distinctive cryogenic and flammable properties. For these purposes, the committee offers the following recommendations.

Recommendation 1: PHMSA and FRA should plan an LNG safety assurance initiative that would be launched before LNG tank cars are put in service. The safety assurance initiative would actively monitor initial plans for and early patterns of LNG traffic activity, including the locations and routes of shipments, the number and configuration of tank cars in trains, and reports of incidents involving a tank car or train carrying LNG. The initiative would enable the more timely and targeted development and dissemination of resources, direction, and guidance, with interventions as necessary, to ensure that

- Emergency responders in communities expected to have high levels of LNG rail traffic activity have the needed guidance, training, and specialized resources to respond to potential incidents;
- Personnel engaged in the transfer and transportation of LNG by rail are qualified and properly trained for safe shipment handling, operations, and emergency actions;
- Protocols for train makeup, handling, and operations are suited to LNG shipping patterns, such as in single cars, large blocks, or unit trains, for instance, as informed by the results of longitudinal train dynamics and operation simulation software;
- Track inspection protocols are appropriate for, and targeted to, routes with significant LNG traffic; and
- The risk assessment and management analyses required by regulation (49 CFR 172.820, Additional planning requirements for transportation by rail) are comprehensive and well informed.

While the surveillance and monitoring of anticipated and actual traffic activity will need to wait until more firm plans are made for LNG's

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transportation by tank car, the many preoperational aspects of this safety assurance initiative (e.g., the development of emergency response guidance) would need to commence well in advance of when those plans are executed.

Recommendation 2: PHMSA and FRA should review the DOT-113C120W9 tank car specification to ensure that it adequately accounts for the cryogenic and thermal properties of LNG that could contribute to a tank release and cascading impacts. In particular, the agencies should obtain data needed to assess

- The capacity of the pressure relief devices to vent sufficient LNG when the tank car is engulfed in an LNG fire, taking into account derailment conditions, such as a rollover, that could degrade this capacity;
- The effects of adding more and different types of insulation in the annular space to ensure sufficient performance of the multilayer insulation system when the tank car is exposed to heat flux and direct flame impingement from an LNG fire; and
- The potential for the outer tank to experience cryogenic brittle failure and loss of vacuum insulation when exposed to an LNG pool.

The outcomes of this recommended review, should they raise concerns, could affect the design specifications for pressure relief devices, insulation, and the type of outer tank steel, as well as have further implications for other design features such as shell thickness and head protection.

In November 2021, PHMSA proposed amending its earlier rule to temporarily suspend the authorization of tank car movements of LNG, pointing to the importance of completing additional tank car testing and analyses and responding to a mandate in Executive Order 13990 for PHMSA to review recent actions that could be obstacles to federal policies promoting public health and safety, the environment, and climate change mitigation. The committee did not assess this proposal to suspend the rule, nor was it tasked with examining and reaching conclusions about the risk and desirability of transporting LNG by rail. The measures recommended in this report are intended to inform follow-on risk assessments and choices about how best to ensure the safe transportation of LNG by rail tank car in the manner demonstrated by marine vessels and trucks for many decades.

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1

Introduction

Natural gas production in the United States has increased dramatically since the beginning of the twenty-first century, owing to advances in extraction technology. Consisting of methane and other hydrocarbon gases, extracted natural gas is processed to meet a minimum standard for methane content for transportation by pipeline.¹ A network of gas transmission pipelines spans the continental United States to undergird the long-distance transportation from upstream extraction and processing sites to local utilities, manufacturers, and other end users.² The pipeline network is especially critical for natural gas shipments because of its efficiency in transporting pressurized gases when compared with other modes. However, pipeline networks do not reach across oceans, and their scope is limited in certain domestic regions.

In regions where the gas transmission pipeline network lacks sufficient capacity and connectivity between producers and end users, natural gas is shipped as a cryogenic liquid. Liquefied natural gas (LNG; also known as refrigerated liquid methane) is produced by super-cooling natural gas to -260° F (-162° C). The resulting dense liquid is economical to store and ship by transportation modes other than pipelines. LNG is valued by gas utilities for its compact storage and ability to be regasified at peak-shaving plants

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 $^{^1}$ 40 CFR § 72.2, "Pipeline natural gas." "[P]ipeline natural gas must either be composed of at least 70 percent methane by volume or have a gross calorific value between 950 and 1100 Btu per standard cubic foot."

² There are approximately 300,000 miles of transmission pipeline. Pipeline Mileage and Facilities, https://www.phmsa.dot.gov/data-and-statistics/pipeline/pipeline-mileage-and-facilities.

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to meet surges in the demand for heating fuel during winter months. For decades, LNG has been imported into the United States as a peak-shaving fuel, especially in New England, where the transmission pipeline network is limited. Thus, the domestic demand for LNG has depended in large part on the extent of the natural gas pipeline network.

Although a long-time importer of LNG, the United States recently transitioned from a net importer to a net exporter.³ This transition followed the large increase in domestic natural gas production that began with the maturation of horizontal drilling and hydraulic fracturing.⁴ While LNG can be expensive to produce⁵ and transport,⁶ U.S. gas producers have benefited from the growing demand for overseas exports in ships that can hold tens of millions of gallons of product. Shippers also move smaller quantities of LNG by truck and marine vessel in intermodal containers able to hold up to about 10,000 gallons. LNG thus serves an important role in the global energy market. Because of its portability, LNG can be traded to respond to geographic and seasonal variations in fuel demand, thereby smoothing out international fuel price differentials.⁷

Significantly, railroads have only recently been used to transport LNG within the United States, and even then, in limited quantities using cryogenic intermodal containers. Responsibility for regulating the movement of LNG, including the modes and containers used, rests with the U.S. Department of Transportation (U.S. DOT). In implementing the U.S. DOT's Hazardous Materials Regulations (HMR), the Pipeline and Hazardous Materials Safety Administration (PHMSA) has long had the authority to allow LNG to be shipped in these intermodal containers, but it had been mainly transported by marine vessel and truck. Starting in 2015, the Federal Railroad Administration (FRA) issued letters of approval for intermodal containers laden with LNG to be transported by rail. Shortly thereafter, in

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³ U.S. Energy Information Administration, "Liquefied Natural Gas," July 15, 2020, https:// www.eia.gov/energyexplained/natural-gas/liquefied-natural-gas.php.

⁴ E. Russell Braziel, The Domino Effect (Arlington, VA: NTA Press, 2016), p. 11.

⁵ Although the cost varies, the estimate for liquefaction was reported as ranging \$4 to \$5 per million Btu, which at the time of the presentation to the committee was about double the unit cost of natural gas. Pedro Santos, "Information Presentation: LNG Logistics," committee presentation, September 21, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/Santos CNGmotiveIncAlternativeRailEnergy092021.pdf.

⁶ For reference, based on the 156 LNG cargoes exported by cryogenic intermodal container in 2021, the price for LNG exports was double the price of exports by vessel (i.e., LNG tanker). Michael Ratner, "U.S. Natural Gas: A Catalyst for Change," committee presentation, September 21, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/RatnerCSSLNG Perspective92021.pdf.

⁷ Samir Mosis, "Global LNG Market Overview and Outlook," committee presentation, September 21, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/SandPGlobalSameretal GlobalLNGMarket092021.pdf.

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2017, the Association of American Railroads (AAR) petitioned PHMSA to amend the HMR to authorize LNG's transportation in DOT-113C120W and DOT-113C140W cryogenic tank cars.⁸ These tank cars, which are fabricated with inner and outer tanks for thermal insulation and impact protection, had already been approved by PHMSA to ship other cryogenic liquids such as argon, ethylene, nitrogen, and oxygen. The AAR petition contends that LNG had been omitted from the list of commodities approved for transport in DOT-113 tank cars because there had been no market demand for the commodity's shipment at the time of the approvals. AAR further maintained that the DOT-113 tank car should be approved for LNG because its properties are comparable to those of other cryogenic liquids that are approved.

During its consideration of the AAR petition, PHMSA issued a special permit in December 2019 for rail shipments of LNG in the DOT-113C120W tank car on a route from Wyalusing, Pennsylvania, to Gibbstown, New Jersey.⁹ The route would originate at an LNG production facility in the gas-rich shale play in the Marcellus Formation. It would end at an export terminal along the New Jersey coast that remains subject to permitting approval.¹⁰

Responding to Executive Order 13868,¹¹ PHMSA published a notice of proposed rulemaking (NPRM) to authorize LNG shipments by rail tank car in October 2019. In July 2020, PHMSA issued a final rule, in coordination with FRA, to authorize transportation of LNG in a newly specified DOT-113 tank car, the DOT-113C120W9 tank car. The new "W9" specification differs from the DOT-113C120W in that it requires an outer tank made of a thicker plate of a more puncture-resistant steel. The final rule also included requirements for train operational controls and safety and security route planning comparable to those that have been in place for hazardous material shipments that are explosive or poisonous when inhaled.

On November 8, 2021, PHMSA issued another NPRM to suspend the final rule's authorization of LNG transportation in the DOT-113C120W9

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⁸ Association of American Railroads, "Petition for Rulemaking to Allow Methane, Refrigerated Liquid to Be Transported in Rail Tank Cars," January 13, 2017, https://www.regulations. gov/document/PHMSA-2017-0020-0002.

⁹ Pipeline and Hazardous Materials Safety Administration, "Special Permit DOT-SP 20534, Granted to Energy Transport Solutions, LLC," December 5, 2019, https://www.phmsa.dot. gov/sites/phmsa.dot.gov/files/docs/safe-transportation-energy-products/72906/dot-20534.pdf.

¹⁰ Michael Rubinkam, "East Coast Natural Gas Plant on Hold After Legal Challenge," AP News, March 21, 2022, https://apnews.com/article/business-environment-pennsylvaniaenvironment-philadelphia-8b44e0a365b8ba075b81b4c4f57cfa35.

¹¹ Executive Office of the President, "Executive Order 13868, Promoting Energy Infrastructure and Economic Growth," Federal Register, 84 FR 15495, April 15, 2019, https://www. federalregister.gov/documents/2019/04/15/2019-07656/promoting-energy-infrastructure-andeconomic-growth.

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tank car.¹² In the notice, PHMSA pointed to the importance of completing the planned tank car testing and analyses and responding to a mandate in Executive Order 13990 calling for agencies to review recent actions that could be obstacles to federal policies promoting public health and safety, the environment, and climate change mitigation. In this latest NPRM, the agency proposed that it would consider further regulatory action during the suspension, possibly to include maintaining the final rule or modifying it to authorize only ad hoc movements of LNG as had been done before the 2020 final rule. The notice states that decisions would be made on the basis of the best available science and data, including the findings from this congressionally requested study.

STUDY ORIGIN

Following AAR's petition in 2017, concerns were raised about the safety of transporting LNG by rail tank car, owing to the potential of ignition of LNG if released in a train derailment.¹³ Thus, during their review of the petition and to inform their proposed rulemaking, PHMSA and FRA formed an LNG-by-rail task force (Task Force) to better understand, predict, and reduce the risks associated with derailment of a train transporting LNG. The Task Force pursued 15 tasks that covered topics such as a survey of international LNG transportation, a quantitative risk assessment, worst-case scenario modeling, fire testing of a UN-T75 cryogenic portable tank that shares some of the design features of the DOT-113, and consultations with emergency responders.

While the Task Force's work proceeded, and prior to when PHMSA issued its final rule approving the movement of LNG by the DOT-113C120W9 tank car in July 2020, Congress directed PHMSA to commission a study by the Transportation Research Board of the National Academies of Sciences, Engineering, and Medicine (the National Academies) on the safe transportation of LNG by rail tank car.¹⁴ As explained in the Preface, the National Academies convened a committee of independent experts to conduct the

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¹² Pipeline and Hazardous Materials Safety Administration, "Hazardous Materials: Suspension of HMR Amendments Authorizing Transportation of Liquefied Natural Gas by Rail," *Federal Register*, 86 FR 61731 (2021), https://www.govinfo.gov/content/pkg/FR-2021-11-08/ pdf/2021-23132.pdf.

¹³ Pipeline and Hazardous Materials Safety Administration, "Hazardous Materials: Liquefied Natural Gas by Rail—Final Rule," 85 FR § 44994, 2020, https://www.federalregister. gov/documents/2020/07/24/2020-13604/hazardous-materials-liquefied-natural-gas-by-rail. See page 45022, "Comments of General Opposition."

¹⁴ Further Consolidated Appropriations Act of 2020: Committee Print of the Committee on Appropriations, U.S. House of Representatives, P.L. 116-94, January 2020, https://www.govinfo.gov/content/pkg/CPRT-116HPRT38679/pdf/CPRT-116HPRT38679.pdf.

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study in two phases to produce two reports. The first phase would provide near-term feedback regarding the work and plans of the Task Force. The findings from the first phase of the study were reported in June 2021 in Preparing for LNG by Rail Tank Car: A Review of a U.S. DOT Safety Research, Testing, and Analysis Initiative.¹⁵ In the second phase, the committee is charged with reviewing the experience of transporting LNG in bulk shipments by other modes, what is known about the effectiveness of the kinds of regulatory and industry measures put in place to ensure the safe transportation of LNG by rail tank car, and the state of emergency response preparedness for rail incidents involving LNG shipments. Informed by this review, the committee is asked to consider any actions, both near and long term, that are warranted to improve understanding of the risks associated with transporting LNG by rail, mitigate risks, and prevent and prepare for potential incidents. The full Statement of Task for the two phases is provided in Box 1-1.

BOX 1-1 Statement of Task

An ad hoc committee appointed by the National Academies of Sciences, Engineering, and Medicine will review, per request of Congress, current U.S. Department of Transportation (U.S. DOT) plans and activities to inform government and industry decisions about the transportation of liquefied natural gas (LNG) by rail and consider ways to ensure the continued safety of these shipments over the longer term. The committee's review will be carried out in two phases, each producing a report with findings and recommendations as appropriate.

Phase 1

The committee will review ongoing and planned U.S. DOT efforts, as documented and reported by the Pipeline and Hazardous Materials Safety Administration (PHMSA) and the Federal Railroad Administration (FRA), that are intended to inform pending decisions about whether and how bulk shipments of LNG can be safely transported by rail tank car. The review will focus specifically on the plans and progress of the PHMSA-FRA LNG Task Force, which has developed and begun executing a multitask program of research, data gathering, analysis, testing, modeling, and risk assessment. Based on the expert judgment of its members, and drawing largely on the Task Force's reports of results, ongoing and planned tasks, and other relevant information, the committee will produce a report with findings on specific tasks and the program overall with regard to quality, completeness, and relevance to the agencies' near-term decision-making needs. The committee may make recommendations in this first report that can be acted on quickly to strengthen the program.

continued

¹⁵ National Academies of Sciences, Engineering, and Medicine, Preparing for LNG by Rail Tank Car: A Review of a U.S. DOT Safety Research, Testing, and Analysis Initiative (Washington, DC: The National Academies Press, 2021), https://doi.org/10.17226/26221.

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BOX 1-1 Continued

Phase 2

The committee will engage in information gathering and analysis to conduct an in-depth study of topics relevant to ensuring the safe movement of LNG by rail if allowed by special permit or regulatory authorization. At a minimum, the committee will examine

- The experience of transporting LNG in bulk shipments by other modes, including by water and truck, to identify basic principles applied for safety assurance that can inform measures taken by government and industry to ensure the safe movement of LNG by rail;
- What is known about the effectiveness of special regulatory and industry measures intended to ensure the safe transportation of other relevant bulk rail shipments of hazardous materials, especially any routing, speed, and other operational controls applied to high-hazard flammable trains and accompanying enhanced track inspection regimes; and
- The applicability to bulk rail transportation of LNG of current emergency response plans, protocols, and guides for responding to LNG transportation incidents, such as in PHMSA's Emergency Response Guidebook.

In carrying out its review of these topics, the committee may determine that there are other topics directly relevant to the safe transportation of LNG by rail that warrant examination, and it may elect to do so. Based on findings from the study, the committee will issue a second report containing recommendations as appropriate to Congress, PHMSA, FRA, industry, emergency responders, and other relevant parties on actions, both nearer and longer term, that are warranted to improve understanding of the risks associated with transporting LNG by rail, mitigate risks, and prevent and prepare for potential incidents.

PHASE 2 STUDY APPROACH

In the first phase, the committee evaluated the Task Force's work plan and found it to be largely comprehensive and well designed. While the committee made several recommendations for the Task Force to improve the description and documentation of its work, the Task Force's limited lifespan presented few opportunities for the committee to advise on future work, apart from improvements to testing and analyses that were planned but delayed during the COVID-19 pandemic. Notably, the committee observed that a second phase of portable tank fire testing was still being planned and that opportunities existed to modify the testing plan to improve the quality of the data quality and analysis. The actions recommended included using LNG (rather than propane) as the pool fire fuel, modifying the pool fire by increasing its size and making it circular, placing the portable tank in a

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rollover orientation where the pressure relief valve will vent liquid, evaluating an LNG fireball and tank fragmentation in the event of overheating and high-pressure release to prepare emergency response personnel, and assessing the potential for cryogenic damage cascading to adjacent tanks by evaluating the topography surrounding the rail tracks that could support pool formation. For reasons that are explained more fully in this report, these recommendations stemmed from concern over the high heat flux that can be created from an LNG pool fire and the potential for releases of cryogenic LNG to cause embrittlement of the outer tank steel.

To build on information gleaned during the first phase, the committee held a series of public data-gathering sessions, inviting dozens of subjectmatter experts to present on topics relevant to the study charge. Experts presented on the LNG market outlook; rail operations, safety, and security; hazardous materials transportation; means of ensuring the safety of LNG shipments in the maritime and trucking modes; risk management at LNG liquefaction facilities and terminals; potential consequences of a release of LNG; and the state of emergency preparedness and response to LNG incidents. The presenters are acknowledged in the Preface.

Informed by this data gathering, the committee considered potential hazards arising from an incident involving a release of LNG during railcar loading and unloading and during a derailment and collision.¹⁶ The committee decided to focus its attention on derailments of multiple tank cars as a candidate pathway for the double-walled cryogenic tank car to be compromised and for released LNG vapor to catch fire. The recent history of tank cars carrying crude oil and ethanol catching fire after being punctured during a derailment reinforced the decision to focus on such highly kinetic events.

The committee's ability to assess the likelihood of risks was hampered by uncertainty about the future of LNG transportation by rail, including whether shipments will be made at all, much less in trains carrying multiple LNG tank cars. As of the preparation of this report during the summer of 2022, railroads had not transported LNG by tank car, nor were there indications about when such service would commence because no upgraded DOT-113 tank cars had entered the fleet. Still, the experience with crude oil and ethanol bears keeping in mind, as rail shipments of these flammable liquids grew rapidly before industry and regulators were fully aware of and able to manage their risks.

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¹⁶ While other conceivable hazards—such as acts of terrorism—warrant attention, the longstanding programs and regulatory framework for preventing a deliberate act or the outcome of such an act are identical to those required for all hazardous materials, including materials toxic by inhalation (e.g., chlorine and anhydrous ammonia) and high-hazard flammable trains carrying crude oil or ethanol.

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Thus, with the future role of rail in transporting LNG being uncertain, the second phase of the study is intended to inform the decisions that lie ahead for PHMSA and FRA as they consider additional steps to ensure safety. The committee set out to identify those areas where additional investigation, analysis, and monitoring may be warranted so that industry and regulators can better assess and manage LNG's risks in rail transportation. To develop its report, the committee reviewed the experience with and safety measures used by other modes when transporting LNG; the regulatory and industry-based framework of guidance and rules to ensure the safe transportation of hazardous materials such as LNG; and the applicability of current emergency preparedness and response guidance and plans such as AAR's Recommended Railroad Operating Practices for Transportation of Hazardous Materials (Circular No. OT-55) and PHMSA's Emergency Response Guidebook. The committee thus exercised judgment in considering data and applying lessons from sectors with a track record of safely handling and transporting LNG such as liquefaction facilities, marine vessels, and motor carriers.

REPORT ORGANIZATION

The remainder of the report consists of six chapters. The next chapter (Chapter 2) provides an overview of the LNG facilities where these shipments originate and terminate and discusses the types of containers used to move the shipments by truck, train, and ship. It then considers the potential future demand for shipping LNG by rail. Chapter 3 describes the composition of LNG and the hazards associated with its cryogenic and flammable properties. The chapter then compares the properties of LNG to those of other cryogenic and flammable materials that are transported by rail in tank cars in the United States.

Chapter 4 provides an overview of the key design features of common cryogenic containers, including the DOT-113 tank car and its upgraded specification for LNG. The discussion then considers hazard scenarios for LNG in a tank car involved in a derailment. Chapter 5 describes the regulations and industry practices regarding movement of LNG and other hazardous materials by rail, such as high-hazard flammable trains. The chapter reviews the safety record of transporting LNG and other cryogenic and flammable materials, as well as the history of moving LNG by rail in Japan. Chapter 6 describes emergency preparedness and response planning for moving LNG and other hazardous materials by all modes of transportation, with a focus on rail. Consideration is given to the challenges that LNG presents for emergency response, emergency planning and preparedness, and LNG training. Chapter 7 contains a summary of the study findings and the committee's recommendations in fulfillment of the Statement of Task.

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2

Background on Liquefied Natural Gas Shipping and Facilities

Natural gas has been shipped as liquefied natural gas (LNG) by marine vessel and cargo tank motor vehicles for decades. This chapter provides an overview of the LNG facilities where these shipments originate and terminate and discusses the types of containers used to move the shipments by truck, train, and ship. It concludes with an overview of natural gas and LNG commodity flows in the United States and considers the potential future demand for shipping LNG by rail.

OVERVIEW OF LNG FACILITIES

Natural gas is primarily transported by pressurized pipelines in the United States. The gas pipeline network is vast, consisting of hundreds of thousands of miles of gathering lines from field wells to gas production facilities, transmission lines used for long-distance transportation, and distribution systems used to serve end users. However, a relatively small portion of the natural gas produced is also super-cooled to a liquid for storage and transportation by ship, truck, and train. When liquefied, natural gas is reduced to 1/600 of its original gaseous volume and to half the weight of water, enabling the other modes to transport shipments economically between locations lacking connecting transmission pipelines. Figure 2-1 shows the extent of the natural gas transmission pipeline network in the continental United States. Note that the network is densest in the Midwest and Gulf of Mexico regions. New England stands out as a heavily populated area having few pipelines, and thus it is more dependent on gas shipments by truck and ship in the form of LNG.

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FIGURE 2-1 U.S. natural gas transmission pipeline system. SOURCE: Pipeline and Hazardous Materials Safety Administration.¹

LNG transportation typically starts or ends at an LNG facility, where gas is liquefied for storage and transportation or where LNG is regasified for use. The three main facility types are peak-shaver plants, import/export terminals, and mobile and satellite facilities. See Figure 2-2 for a map of the location of these facilities in the continental United States as of August 2021.²

Peak-shaving plants store LNG in preparation for times of peak gas demand, such as for heating during winter or air conditioning during summer. In general, these plants are small-scale liquefaction facilities that receive natural gas by pipeline, liquefy it to LNG, and store the liquid until needed. When demand requires, the LNG is regasified to distribute through the pipeline network or the LNG transported by truck for regasification onsite by end users. These plants are capable of producing about 100,000 gallons of LNG per day and storing up to 2 million gallons. They are the most common type of LNG facility; there are 69 plants in 26 states.

The largest LNG facilities in the United States are the 12 import/export terminals that are located mostly on the Gulf Coast. With the large increase

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¹ Pipeline and Hazardous Materials Safety Administration, National Pipeline Mapping System, "Data Visualization Overview," https://www.phmsa.dot.gov/data-and-statistics/pipeline/ data-visualization-overview.

² Annual Reports to PHMSA for in-service and retired plants and the National Pipeline Mapping System as of August 2021, https://www.phmsa.dot.gov/data-and-statistics/pipeline/ source-data.

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BACKGROUND ON LNG SHIPPING AND FACILITIES



FIGURE 2-2 U.S. LNG facilities (August 2021). SOURCE: Pipeline and Hazardous Materials Safety Administration.³

in domestic natural gas production over the past decade, many of these coastal facilities that were once used for imports have been repurposed for export trade to Asia and Europe. Export terminals depend on pipelines to supply natural gas for liquefaction. Large-scale facilities can store up to 205 million gallons of LNG.⁴ It merits noting that terminals in New England and Puerto Rico lack access to pipelines and are used exclusively for receiving LNG.

Smaller satellite (e.g., merchant plants) and mobile facilities are the third most common type of LNG facility. They receive the LNG by truck, temporarily store it, and regasify it for local distribution. Some remote industries such as mining and agriculture depend on service from satellite facilities because they lack access to pipelines. LNG from these facilities can be a temporary solution for new businesses that are waiting to connect to a pipeline network or for a utility to keep serving customers when a line is being repaired or maintained. In addition, commercial and industrial

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³ Pipeline and Hazardous Materials Safety Administration, "Gas Distribution, Gas Gathering, Gas Transmission, Hazardous Liquids, Liquefied Natural Gas (LNG), and Underground Natural Gas Storage (UNGS) Annual Report Data," https://www.phmsa.dot.gov/data-andstatistics/pipeline/gas-distribution-gas-gathering-gas-transmission-hazardous-liquids.

⁴ Cheniere Energy, "Sabine Pass LNG Facility Currently Stores 17 Bcfe in 5 Tanks," https:// www.cheniere.com/where-we-work/sabine-pass.

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users may depend on such stored LNG as a backup fuel source for power generation. Finally, LNG storage facilities provide transportation fuel for some gas-powered trucks, locomotives, and ships. Because they receive LNG by truck, satellite and mobile facilities are often located along main highways. In August 2021, there were 38 satellite facilities in 16 states, with approximately half in New England. Of the 39 mobile facilities, 25 were in California and 12 in Massachusetts.⁵

EXPERIENCE SHIPPING LNG BY RAIL

To date in the United States, two railroads have received authorization to transport LNG by intermodal portable tanks, and one shipper has received a special permit to transport LNG in a rail tank car. Internationally, several countries have also tested or approved moving LNG by rail, but only Japan has had a long-standing commercial application of LNG by rail.

Domestic Shipping of LNG by Rail

The first U.S. railroad to receive approval to transport LNG was the Alaska Railroad Corporation (ARRC), as part of a demonstration project. In 2015, the Federal Railroad Administration (FRA) approved the railroad's request to move LNG in UN-T75 portable tanks, a type of cryogenic intermodal container. LNG demonstration tests began the following year with two 40-foot portable tanks of this type. Shipments along a 350-mile route between Anchorage and Fairbanks were made without incident; however, the service ended when the demonstration project period expired in 2017.⁶ In June 2021, FRA extended approval of ARRC's LNG service through December 31, 2022.⁷

The Florida East Coast Railway (FEC) received approval from FRA in 2017 to use LNG for fuel and to transport it as cargo in UN-T75 portable tanks between Miami and Port Everglades. With approval from FRA, FEC subsequently expanded the service between Jacksonville and Port Canaveral, Jacksonville and Fort Lauderdale, Miami and Port Canaveral, and Miami and Port of Palm. The rail service, which remains in operation, is used to supply LNG to markets in the Caribbean islands.⁸

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⁵ Pipeline and Hazardous Materials Safety Administration LNG Facility Siting, https://www.phmsa.dot.gov/pipeline/liquified-natural-gas/lng-facility-siting.

⁶ Alaska LNG Demonstration Project, https://www.alaskarailroad.com/sites/default/files/ communications/2016_LNG_Transport_Demo_Project.pdf.

⁷ Federal Railroad Administration to ARRC, "Letter of Approval," June 21, 2021, https://downloads.regulations.gov/FRA-2021-0064-0001/attachment_1.pdf.

⁸ Federal Railroad Administration to Florida East Coast Railway, "Letter of Approval," May 1, 2018.

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BACKGROUND ON LNG SHIPPING AND FACILITIES

In December 2019, the Pipeline and Hazardous Materials Safety Administration (PHMSA) issued a special permit to Energy Transport Solutions (ETS) to ship LNG in the DOT-113C120W, a design variant in the DOT-113 family of cryogenic tanks cars. The special permit allowed ETS to ship LNG by tank car from Wyalusing, Pennsylvania, to Gibbstown, New Jersey. However, the permit expired on November 30, 2021, before any movements commenced.⁹

International Shipping of LNG by Rail

In 2001, Japan was the first country where LNG was transported by rail. The country is one of the largest importers and users of LNG in the world.¹⁰ It imports LNG by tanker ship at two ports, where the product is unloaded into storage tanks, transferred to coastal vessels to supply other ports, or regasified for pipeline distribution. Shipments are also transported by rail and truck to remote locations not served by pipelines.

Transport Canada authorized shipping LNG by rail in 2014, while several countries in Europe have also conducted tests and trial runs of LNG rail service. In 2018, Transport Canada approved the TC-113C120W cryogenic tank car (which is the same as the DOT-113C120W) for LNG.¹¹ However, as of June 2022, there was no demand for the service.¹² Enagás, which operates an LNG terminal in Spain, led a pilot project in 2018 that arranged to transport LNG portable tanks by truck, rail, and ship between Huelva and Melilla.¹³ While Enagás has not transported LNG by rail since 2018, it plans to do so in the future as it is building an LNG bunkering facility for ships at the Port of Algeciras to serve the Strait of Gibraltar shipping lanes.¹⁴ In 2021, several companies in France and Germany also

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⁹ Special Permit 20534, https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/safe-transportation-energy-products/72911/environmental-assessment.pdf.

¹⁰ International Trade Administration, "Liquefied Natural Gas," January 7, 2022, https://www. trade.gov/country-commercial-guides/japan-liquefied-natural-gas-lng; International Energy Agency, https://iea.blob.core.windows.net/assets/3470b395-cfdd-44a9-9184-0537cf069c3d/ Japan2021_EnergyPolicyReview.pdf.

¹¹ Transport Canada, "Containers for Transport of Dangerous Goods by Rail, a Transport Canada Standard," January 2018, https://tc.canada.ca/sites/default/files/2021-06/tp14877_en.pdf.

¹² Transport Canada, "Containers for Transport of Dangerous Goods by Rail," TP14877E, January 2018, https:/tc.canada.ca/sites/default/files/2021-06/tp14877_en.pdf; Call with Transport Canada staff, Dangerous Goods Division, December 2021.

¹³ Offshore Energy, https://www.offshore-energy.biz/spain-pilots-lng-supply-by-road-rail-and-sea._

¹⁴ "Spain's Enagás signs joint venture deal for building and charter of LNG bunkering vessel at Algeciras Port," LNG Journal, accessed June 2022, https://lngjournal.com/index.php/latest-news-mainmenu-47/item/103178-spain-s-enagas-signs-joint-venture-deal-for-building-and-charter-of-lng-bunkering-vessel-at-algeciras-port.

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began testing the transportation of LNG by rail, including a trial run by Elengy that is transporting LNG between southern France and Milan, Italy.¹⁵ In January 2022, Elengy signed an agreement with Rubis Terminal to supply LNG to a satellite storage facility near Strasbourg, France, by using rail service from the company's Fos sur Mer LNG terminals on the Mediterranean coast.¹⁶

LNG CONTAINERS

Table 2-1 summarizes the main types of cryogenic containers used (or approved) for transportation by the different modes. Ocean-going ships, called gas carriers, transport LNG in much larger volumes than rail and truck, whose containers (shown in Figure 2-3) have greater commonality in terms of capacity and cost. In the sections that follow, an overview is provided of the containers applicable to each mode. A more detailed discussion of their safety features is provided in Chapter 4.

	Marine Vessel	Truck	Rail	Intermodal (All Three Modes)
Туре	Independent tanks Membrane tanks	MC-338 cargo tank trailers	DOT 113C120W9 tank car	UN-T75 portable tank on truck, rail, or ship
Container Cost	~\$180 million	~\$150,000	~\$750,000	\$10,000 (20 ft) \$52,000 (40 ft) ¹⁹
LNG Capacity	~35–55 million gal	12,700 gal	30,700 gal	5,000 gal (20 ft) 11,000 gal (40 ft) ²⁰

TABLE 2-1 Containers	Used	for LNG	Shipments	by	Mode ^{17,1}	18
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¹⁵ Natural Gas Intelligence, https://www.naturalgasintel.com; LNG Industry, https://www. lngindustry.com/liquid-natural-gas/06042021/lng-transported-from-france-to-italy-by-rail.

¹⁶ Elengy Press Release, January 29, 2022, https://www.elengy.com/en/news/news/press-releases/441-signature-agreement-customer-reichstett.html.

¹⁷ Pedro Santos, "Alternative Energy for Railroads," September 21, 2021, http://onlinepubs. trb.org/onlinepubs/C4rail/SantosCNGmotiveIncAlternativeRailEnergy092021.pdf.

¹⁸ "Hazardous Materials: Liquefied Natural Gas by Rail—Final Rule," *Federal Register*, 85 FR 44994, p. 45026, July 24, 2020.

¹⁹ Container Exchange, "All Around the LNG ISO Tank with Dimensions, Features, and Costs," https://www.container-xchange.com/blog/lng-iso-tank. ISO Containers range from \$10,000 to \$52,000.

²⁰ Scott Nason, "DOT-113 Tank Cars for LNG," September 21, 2021, http://onlinepubs. trb.org/onlinepubs/C4rail/NasonChartDOT113TankCars092121.pdf.

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BACKGROUND ON LNG SHIPPING AND FACILITIES



FIGURE 2-3 LNG cryogenic containers. SOURCE: Chart Industries.

DOT-113 Tank Car

While versions of the DOT-113 tank car have been used to transport cryogenic commodities other than LNG for decades, the main specification used for cryogenic service today is the DOT-113C120W, which entered service in the 1960s. These vacuum-insulated cars, which do not have any refrigeration equipment, are used mainly to transport argon and ethylene. The DOT-113 can hold about 30,000 gallons of LNG.²¹

UN-T75 Portable Tanks

As noted above, the UN-T75 portable tank is used to transport cryogenic bulk cargo, including LNG. These portable tanks can be carried by ship, truck, and rail. They can be permanently affixed to a platform or temporarily mounted to allow for movement between modes.²² The tanks are vacuum insulated and, like the DOT-113, they do not provide refrigeration. They can maintain the cargo at cryogenic temperatures for weeks, ranging from 44 to 65 days for LNG.²³ Depending on length (20 or 40 ft), the tank can hold between 5,000 and 11,000 gallons of LNG.

MC-338 Cargo Tank Trailers

LNG has been transported by truck for more than 40 years in the United States. The shipments are transported in MC-338 cargo tank trailers or in UN-T75 tanks on flatbed trailers. MC-338 cargo tanks, like the UN-T75 and DOT-113, rely on a vacuum-insulation design to maintain cryogenic

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²¹ Todd Treichel, "Research Update Related to Cryogenic Tank Cars," November 9, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/TreichelRSI-AARRail-TankSafety110921.pdf.

²² International Organization for Standardization (ISO) Standard 20421-1:2019, https://www.iso.org/standard/68589.html?browse=tc.

²³ Chart Industries (personal communication, March 24, 2022).

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temperatures.²⁴ The tank has a capacity of 13,000 gallons when carrying LNG. During 2021, there were more than 520 motor carriers that transported LNG in approximately 28,000 MC-338 cargo tanks.²⁵

Marine Gas Carriers

The first LNG cargo transported by ship was from Louisiana to Great Britain in 1959. Today, the global fleet of LNG gas carriers consists of more than 600 vessels.²⁶ A modern LNG gas carrier is shown in Figure 2-4.²⁷ The majority of ocean-going LNG carriers are designed with membrane tanks, where the tank is built into the vessel's structure. On some vessels, a portion of the LNG cargo is gasified en route and used for propulsion. Independent tank configurations are also in use. To fuel LNG vessels in port, specially designed bunker barges are used. The first LNG bunker barge built to fuel LNG vessels in the United States started service in Jacksonville, Florida, in 2018.



FIGURE 2-4 LNG gas carrier.

SOURCE: U.S. Department of Energy, Office of Fossil Energy and Carbon Management.

²⁷ LNG Carrier, Office of Fossil Energy and Carbon Management, https://www.energy.gov/ fecm/liquefied-natural-gas-lng.

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²⁴ Specification MC-338; insulated cargo tank motor vehicle, 49 CFR § 178.3381.

²⁵ Paul Bomgardner, "Transportation of LNG by Highway, Introduction and FMCSA Responsibilities," September 21, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/Bomgardner FCMCR092021.pdf.

²⁶ All LNG carriers currently operating for import and export in the United States are under foreign flags and with foreign crews. The only U.S.-flagged vessels transporting LNG are a small number of bunker barges that store and move LNG used as fuel in LNG-powered vessels.

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NATURAL GAS AND LNG COMMODITY FLOWS

In the United States, production of natural gas increased roughly 25 percent between 2016 and 2020. The U.S. Energy Information Administration tracks interstate and international border movements of natural gas, including LNG. Of the nearly 65,752,000 billion cubic feet (bcf) of natural gas transported between states in 2020, the vast majority was transported by pipeline through the transmission pipeline network shown previously in Figure 2-1. Trucks transported only an estimated 3,864 million cubic feet (mmcf)²⁸ of natural gas as LNG.²⁹ Main routes for interstate LNG truck movements are depicted in Figure 2-5. As noted previously, these movements are largely influenced by the location of merchant plants.



FIGURE 2-5 Interstate LNG movements by truck, 2019. SOURCE: Cambridge Systematics.³⁰

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²⁸ U.S. Energy Information Administration, *Natural Gas Annual* 2000, https://www.eia. gov/naturalgas/annual/pdf/nga20.pdf. "Continuation text lines" documents interstate truck shipments by company. The estimate was derived by compiling interstate LNG movements by truckload by company, as 1 mmcf is equal to approximately one truckload.

²⁹ U.S. Energy Information Administration, Natural Gas Annual 2020, https://www.eia.gov/ naturalgas/annual/pdf/nga20.pdf.

³⁰ Cambridge Systematics, PHMSA Risk Assessment of Liquefied Natural Gas, 2019, p. 42, https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/research-and-development/hazmat/ reports/71651/fr2-phmsa-hmtrns16-oncall-20mar2019-v3.pdf. Natural gas interstate movements by motor carrier were derived from the 2019 EIA Natural Gas Annual Report using state centroids as origins and destinations. CNG Motive added selected merchant plants for the presentation to the committee on September 21, 2021.

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Exports and Imports

The United States exports LNG to countries around the world by ship, with only a tiny fraction moving by truck to other countries in North America (see Figure 2-5). U.S. exports have been steadily increasing since 2016 while imports have remained relatively flat (see Figure 2-6).³¹ In general, exports of LNG to overseas customers are seasonally driven, with volumes to Asia and Europe increasing during the winter months in each region. The timing of exports, however, also depends on infrastructure. For instance, because European countries have an extensive infrastructure to store gas underground, they can purchase LNG from the United States at lower prices during the summer months when demand from Asia declines.³²



FIGURE 2-6 Annual U.S. liquefied natural gas exports, 2005–2021. NOTE: Data for U.S. LNG exports are overwhelmingly by ship; trucks transport less than 0.04 percent of exports.

SOURCE: U.S. Energy Information Administration.³³

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³¹ U.S. Energy Information Administration, "Monthly US Natural Gas Imports and Exports January 2014–December 2022," *Today in Energy*, https://www.eia.gov/todayinenergy/detail. php?id=49156.

³² Samir Mosis, "Global LNG Market Overview and Outlook," September 20, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/SandPGlobalSameretalGlobalLNGMarket092021.pdf.

³³ U.S. Energy Information Administration, "Liquefied U.S. Natural Gas Exports," https:// www.eia.gov/dnav/ng/hist/n9133us2A.htm.

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At this point in time there is great deal of uncertainty about future trends in LNG supply and demand for export trade. It is conceivable that more international competition will have a suppressive effect on LNG exports from the United States. S&P Global Platts forecasts that the liquefaction capacity coming online overseas in the next few years may result in a decline in the global competitiveness of U.S. product over the next decade.³⁴ However, the LNG landscape has changed since Russia invaded Ukraine on February 24, 2022; European countries are seeking alternatives to Russian sources for natural gas.³⁵ In response, the United States had diverted 74 percent of total U.S. LNG export cargoes from Asia to Europe during the first four months of 2022 when this report was being written.³⁶ Additionally, demand for LNG over the longer term is uncertain inasmuch as may be influenced by public policies aimed at reducing the use of fossil fuels that contribute to greenhouse gas buildup.

FACTORS INFLUENCING THE FUTURE DEMAND FOR LNG BY TANK CAR

Factors that affect the current and prospective demand for rail transportation of LNG in the United States include the extent and capacity of the competing natural gas pipeline network; the ubiquity of the highway network and capacity of cargo tank motor vehicles; and the volumes of product handled at different LNG facilities, including import/export terminals. A simple comparison of tank capacities suggests that a rail tank car has an advantage over a truck for long-haul movements over land, because the former can carry three times as much product. Moreover, this advantage is multiplied when considering that dozens of tank cars can be moved in a single train, creating cost efficiencies and other benefits such as reduced greenhouse gas emissions due to lower fuel consumption per volume shipped.³⁷

However, the substitution of tank cars for trucks for long-haul LNG shipping would require rail access at origins and destinations, as well as sufficient demand for the larger LNG volumes carried by tank cars. At least in

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³⁴ Samir Mosis, "Global LNG Market Overview and Outlook," September 20, 2021, http:// onlinepubs.trb.org/onlinepubs/C4rail/SandPGlobalSameretalGlobalLNGMarket092021.pdf.

³⁵ Wobble Bond Dickerson, "Ukraine Crisis Changes Equation in Global LNG Market as Nations Look to Reduce Dependence on Russian Gas," April 22, 2022, https://www. womblebonddickinson.com/us/insights/articles-and-briefings/ukraine-crisis-changes-equationglobal-lng-market-nations-look.

³⁶ U.S. Energy Information Administration, EIA Short Term Energy Outlook, June 7, 2022, https://www.eia.gov/outlooks/steo.

³⁷ Federal Railroad Administration, "Rail vs. Truck Fuel Efficiency: The Relative Fuel Efficiency of Truck Competitive Rail Freight and Truck Operations Compared in a Range of Corridors," May 1991, https://railroads.dot.gov/elibrary/rail-vs-truck-fuel-efficiency-relative-fuel-efficiency-truck-competitive-rail-freight-and.

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the short term, this demand would be affected by the capacity of the origin and receiving facilities to accommodate the larger quantities transported by rail. In the longer term, one would expect the facilities will have time to adapt to the mode that is most economical. That adaptation could include additions to the gas pipeline network, which would have its own capacity and cost advantages over rail and LNG service. LNG liquefaction and storage facilities adjacent to railroads would be the likely origins of any LNG by tank car service. Import facilities at ports with rail access could also be an origin.

Some satellite plants that are far from pipeline terminals may have enough demand for LNG to seek supplies by rail. Several LNG satellite facilities are located at seaports with rail access, such as in Jacksonville and Miami, Florida. Opportunities for LNG by rail may also emerge in situations where natural gas production exceeds pipeline takeaway capacity, in addition to remote regions that are not served by pipelines.³⁸

The following section reviews the industries and regions where the prospects for LNG service by railroad tank car may be most promising.

Service to Merchant Plants

For LNG merchant plants that serve large commercial users in remote locations, LNG shipments by rail could help supply the large volumes of fuel needed for high consumption uses, such as for powering the high-horsepower engines for oil and gas drilling. Table 2-2 illustrates a selection of small-scale merchant plants that are currently supplied with LNG by truck that are also proximate to freight rail lines that could be access points for LNG shipments by tank car. This includes a merchant plant in Mexico in response to increased demand for LNG.

I NG Merchant Facility	Rail Service
	Rail Bervice
Pivotal Energy, Wyalusing, PA	NS
Pivotal LNG Plant, Trussville, AL	CSX
Okra Energy LNG Plant, McIntosh, AL	CSX
American LNG Marketing, Hialeah, FL	FEC
JAX LNG, Jacksonville, FL	FEC
Stablis Energy Plant, George West, TX	UP
Stablis Energy LNG Hub, Monterrey, Mexico	KCS

TABLE 2-2 Selected LNG Merchant Plants with Rail Access³⁹

³⁸ E. Russell Braziel, The Domino Effect (Arlington, VA: NTA Press, 2016).

³⁹ Aberdeen, Carolina and Western Railway, "Freight Rail Map of Class I Carriers in North America," https://www.acwr.com/economic-development/rail-maps/class-i-freight-carriers.

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Service to Maritime Fuel Bunkering

LNG is being used increasingly for marine fuel. This development is due in part to new international requirements for the use of cleaner fuels for ocean shipping.⁴⁰ As of 2020, there were 175 LNG-propelled ships in international trade, and the global demand for LNG-powered vessels is expected to increase further in the coming years.⁴¹

Service to New England

The supply of natural gas in New England is constrained by the absence of gas processing facilities and limited access to interstate transmission pipelines. To meet demand, LNG has been imported to the region by ship for more than 50 years and transported by trucks to satellite and peak-shaving facilities throughout the six states. LNG is imported into New England via the Everett LNG onshore terminal located near Boston, Massachusetts; the Northeast Gateway, an offshore terminal also near Boston; and the Saint John LNG onshore terminal in New Brunswick, Canada.⁴²

Since 2018, annual LNG import shipments during the peak winter months in New England have been delivered on 11 to 14 LNG gas carriers.⁴³ It is conceivable, therefore, that some of this demand could met by land shipments by rail, such as from gas production facilities in the Pennsylvania shale plays.⁴⁴ An analysis conducted for PHMSA in 2019 examined candidate movements of LNG in rail tank car, cargo tank motor vehicle, and intermodal portable tank from Pennsylvania to Massachusetts to determine which method of transportation would be the most economical. That study found that portable tanks are the most versatile container for transportation, but that rail tank car service was the most economical when considering only direct costs. The study acknowledged that the cost estimate did not include external costs, such as those associated with changes in greenhouse gas emissions.⁴⁵

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⁴⁰ International Maritime Organization, "IMO 2020 – Cutting Sulphur Oxide Emissions," https://www.imo.org/en/MediaCentre/HotTopics/Pages/Sulphur-2020.aspx.

⁴¹ Offshore Energy, "SEALNG: 175 LNG-Fueled Ships in Operation, 203 on Order," https:// www.offshore-energy.biz/sealng-175-lng-fueled-ships-in-operation-203-on-order.

⁴² Technically, the New Brunswick facility regasifies LNG and delivers the natural gas via pipeline to New England. Maritimes & Northeast Pipeline FAQs, https://mnpp.com/canada/faqs.

⁴³ U.S. Energy Information Administration, *Natural Gas Weekly Update*, January 19, 2022, https://www.eia.gov/naturalgas/weekly/archivenew_ngwu/2022/01_20.

⁴⁴ Shale gas can be found within the layers of shale formations and is extracted by the process of horizontal drilling. These areas are referred to as "geologic, or shale plays." (https:// www.eia.gov/analysis/studies/usshalegas.)

⁴⁵ Cambridge Systematics, "Risk Assessment of Surface Transport of Liquid Natural Gas," March 20, 2019, https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/research-and-development/hazmat/reports/71651/fr2-phmsa-hmtrns16-oncall-20mar2019-v3.pdf.

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SUMMARY

Natural gas has been safely shipped as LNG by ship and truck for decades. These shipments meet demand in locations lacking access to natural gas shipments through pipelines, including markets overseas. Decades of transporting LNG by ship for import and export markets and by truck to fill gaps in the pipeline network have shaped the location and capacity of the country's LNG facilities. The prospects for significant future demand from these and other LNG facilities for shipments by rail tank car remain unclear.

A possible advantage of using tank car over portable tanks and cargo tank motor vehicles is the added cargo capacity, which is about three times greater for a tank car. For this advantage to be exploited, however, the origin and destination of the LNG shipments would need rail access. Because rail access has not been a priority for the siting of LNG export and import terminals and peak-shaving plants, this pattern would need to change. Nevertheless, the U.S. freight rail network is extensive. Other possibilities for rail demand include service to regions that lack significant gas pipeline capacity, industries that are in remote locations but need natural gas, and the growing market for LNG as a bunker fuel for marine vessels. In the absence of more information about this future demand profile, it is not possible to know whether and to what degree trains will transport LNG in shipments consisting of large or small blocks of tank cars and on a welldefined or more dispersed set of routes.

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Liquefied Natural Gas's Hazardous Cryogenic and Flammable Properties

Although the prospect of shipping liquefied natural gas (LNG) by rail tank car is a new development, other commodities that are regulated as hazardous because of their cryogenic and flammable properties have been shipped in tank cars for decades. This chapter describes the composition of LNG and the hazards associated with its cryogenic and flammable properties. The chapter then compares the properties of LNG to those of other cryogenic and flammable materials that are transported by rail in tank cars in the United States.

WHAT IS LIQUEFIED NATURAL GAS?

Natural gas is transported by the non-pipeline modes as a liquid because LNG takes up about 1/600 of the volume of natural gas uncompressed, making LNG advantageous when containment capacity is limited. In comparison, compressed natural gas (as transported by pipeline) takes up about 1/200 to 1/250 of the volume of natural gas uncompressed.

Natural gas is primarily composed of methane and ethane, plus small amounts of propane, butanes, carbon dioxide, and nitrogen. Before purification for shipping, raw natural gas often contains additional impurities, including sulfur compounds, mercury, heavier hydrocarbons, water vapor, and oxygen.¹ To create LNG, natural gas goes through a liquefaction

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¹ Penn State College of Earth and Mineral Sciences, "National Gas Composition and Specifications," n.d., https://www.e-education.psu.edu/fsc432/content/natural-gas-composition-and-specifications.

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process that removes impurities that can result in corrosion and freezing problems during transportation and storage.

A natural gas liquefaction plant, such as the peak-shaving plants and export facilities discussed in Chapter 2, performs four main processes: pretreatment, acid gas removal and dehydration, heavy hydrocarbon separation, and finally liquefaction.² Pretreatment removes the first set of impurities, including dust, sulfur compounds, mercury, and slug, which is a combination of water and low-density hydrocarbon liquids. The next process uses an amine absorber and an adsorbent to remove carbon dioxide and water, which prevents ice from forming during liquefaction. Heavy hydrocarbons—pentane or heavier—are then separated from the remaining natural gas. During the liquefaction process, natural gas passes through a heat exchanger, where it is liquefied and cooled to approximately –260°F (–162.2°C).

After purification and liquefaction, LNG is composed primarily of methane and ethane. The molecular composition of natural gas, and thus LNG, typically varies by origin. For example, in 2012, the average molecular composition (i.e., molar content³) of LNG from the North West Shelf of Australia consisted of 87.33 percent methane, 8.33 percent ethane, 3.33 percent propane, 0.97 percent butanes, and 0.04 percent nitrogen, while the average composition of LNG from Alaska consisted of 99.71 percent methane, 0.09 percent ethane, 0.03 percent propane, 0.01 percent butanes, and 0.17 percent nitrogen.⁴ Based on the average composition of LNG reported by different locations, Table 3-1 shows the minimum and maximum molar content of each component in LNG.

Component	Minimum Molar Content	Maximum Molar Content
Methane	87%	>99%
Ethane	<1%	10%
Propane	<1%	5%
Butanes	<1%	1.5%
Nitrogen	<0.1%	1%

TABLE 3-1 Typical Content Limits of LNG Components^{5,6}

² Cameron LNG, "LNG and Liquefaction," n.d., https://cameronlng.com/lng-facility/lng-and-liquefaction.

³ In this context, the molar content, or molarity, is a measure of the number of molecules of a chemical species in a mixture. For example, on the Northwest Shelf of Australia, an average 87.33% of molecules in the LNG were methane.

⁴ International Group of Liquefied Natural Gas Importers, "The LNG Industry: GIIGNL Annual Report 2018," 2018, https://giignl.org/wp-content/uploads/2021/08/rapportannuel-2018pdf.pdf. ⁵ Ibid.

⁶ S. Kuczyński, M. Łaciak, A. Szurlej, and T. Włodek, "Impact of Liquefied Natural Gas Composition Changes on Methane Number as a Fuel Quality Requirement," *Energies*, vol. 13, no. 19, 2020, 5060, http://dx.doi.org/10.3390/en13195060.

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This variation in LNG composition will affect the material's chemical and physical properties, including density, liquid-to-gas expansion ratio, and gas gross caloric value (GCV)—the energy content and quantity of heat released during the combustion of a unit volume of gas. Table 3-2 lists the minimum and maximum values of these physical properties based on the differences in LNG composition across origins. These variations primarily correspond to the percentage of methane in the LNG, with higher methane content resulting in a lower density, higher expansion ratio, and a lower gas GCV (MJ/m³).^{7,8,9}

LNG PROPERTIES THAT CREATE HAZARDS

The cryogenic and flammable properties of LNG can create hazards during transportation and storage. Among all cryogenic and flammable materials¹⁰ carried by rail, only ethylene and LNG are regulated as both types of hazards. The relevance of different cryogenic and flammable properties to particular hazard concerns is summarized in Table 3-3.

LNG's cryogenic temperatures can mean that the material's inadvertent release from containment can be in the form of a very cold liquid. Exposure to the liquid can cause the embrittlement of materials. In cases where a small amount of the liquid is released, it will usually vaporize immediately. However, when released in sufficient volumes, the liquid state may be maintained, and the product may pool. Upon evaporation, a dense vapor

Minimum Value	Maximum Value	
421.4	467.35	
0.72	0.83	
562.46	585.75	
39.91	45.32	
	Minimum Value 421.4 0.72 562.46 39.91	Minimum ValueMaximum Value421.4467.350.720.83562.46585.7539.9145.32

TABLE 3-2 Select Chemical and Physical Properties of LNG¹¹

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⁷ International Group of Liquefied Natural Gas Importers, "The LNG Industry: GIIGNL Annual Report 2018," 2018, https://giignl.org/wp-content/uploads/2021/08/rapportannuel-2018pdf.pdf.

⁸ S. Kuczyński, M. Łaciak, A. Szurlej, and T. Włodek, "Impact of Liquefied Natural Gas Composition Changes on Methane Number as a Fuel Quality Requirement," *Energies*, vol. 13, no. 19, 2020, 5060, http://dx.doi.org/10.3390/en13195060.

⁹ If you convert the gas GCV to MJ/kg, higher methane content will result in a higher gas GCV. This is because methane has higher energy content by weight compared to ethane, but methane has a lower density than ethane.

¹⁰ LNG is categorized as a hazardous gas (Hazard Class 2.1) but is transported as a cryogenic liquid. Cryogenic ethylene falls within the same category.

¹¹ International Group of Liquefied Natural Gas Importers, "The LNG Industry: GIIGNL Annual Report 2018," 2018, https://giignl.org/wp-content/uploads/2021/08/rapportannuel-2018pdf.pdf.

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TABLE 3-3	Cryogenic	and Fla	ammable	Properties	Associated	with
Hazards						

Property	Definition	Potential Hazard
Boiling Point	The boiling point (BP) is the temperature at which a liquid transitions from the liquid to vapor state.	Upon reaching its boiling point, a liquid will evaporate into a vapor and thus expand. Evaporation, if not controlled, can result in overpressurization of a container.
Cryogenic Liquid	A cryogenic liquid is a liquid having a boiling point below -130°F (-90°C).	A flammable material that is cryogenic can be released as a cold liquid that potentially pools and partially vaporizes to form a dense liquid-vapor cloud that will sink until it warms and rises. Exposure to the release can result in cryogenic burns on people and embrittlement of materials. In addition, high concentrations of vapor can cause asphyxiation if enough oxygen is displaced.
Liquid-to-Gas Expansion Ratio	The expansion ratio of a liquefied and cryogenic substance is the volume of a given amount of that substance in liquid form compared to the volume of the same amount of substance in gaseous form, at room temperature and normal atmospheric pressure.	A given amount of a liquid with a higher liquid-to-gas expansion ratio will expand into a larger volume upon evaporation compared to a given amount of a liquid with a lower liquid-to-gas expansion ratio.
Adiabatic Flame Temperature	The adiabatic flame temperature is the temperature at which a material burns in open air without a loss or gain of heat from the system.	A flammable material with a higher adiabatic flame temperature will be hotter upon ignition compared to another flammable material that has a lower adiabatic flame temperature.
Auto-Ignition Temperature	The auto-ignition temperature is the lowest temperature at which a material will spontaneously ignite.	If a flammable material is heated to a point above its auto-ignition temperature, it can spontaneously combust.
Heat Flux	The heat flux is the flow of energy per unit of energy per unit of time. Heat flux is commonly measured as W/m^2 or Btu/(h × ft ²).	A flammable material that creates higher heat flux will result in greater energy transfer from the fire to surrounding materials, resulting in potentially greater thermal damage to people and property.

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LNG'S HAZARDOUS CRYOGENIC AND FLAMMABLE PROPERTIES

Property	Definition	Potential Hazard
Flash Point	The flash point is the temperature at which a flammable material will flash from an ignition source, but not necessarily continue combustion.	When a flammable material reaches its flash point, it can ignite upon contact with a source of ignition.
Lower Flammable Limit (LFL) and Upper Flammable Limit (UFL)	The lower flammable limit is the lowest concentration of a gas or vapor (percentage by volume in air) below which a flame will not spread in the presence of an ignition source. Concentrations lower than LFL are "too lean" to burn. The upper flammable limit is the highest concentration of a gas or vapor (percentage by volume in air) above which a flame will not spread in the presence of an ignition source. Concentrations higher than UFL are "too rich" to burn. These are also known as the lower and upper explosive limit (LEL and UEL).	A material at concentrations between its lower flammable limit and higher flammable limit can ignite and burn upon contact with an ignition source.

TABLE 3-3 Continued

cloud may form above the pool and initially remain concentrated near the ground until it warms. The duration of the pool can depend on factors such as the terrain, meteorological conditions, and pool size.¹² People who are exposed may suffer cryogenic burns, and, until the vapor cloud disperses, there can be a risk of asphyxiation from displaced oxygen. In addition, the vapors' presence could go undetected because the cryogenic temperature of the liquid precludes the addition of odorants in shipments. Odorants are normally added to gas transported under pressure to signal a leak.¹³

LNG vapor is flammable but does not become a combustion hazard until it reaches concentrations in air of 5 to 15 percent by volume. At

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¹² Based on experimental data of LNG by R. C. Reid and R. Wang (Cryogenics, 1978, pp. 401–404), the mass flux, in this case the boil-off rate, decreases with one over the square root of time on substrates such as concrete and soil; that is, mass flux = constant/sqrt(time). Reid and Wang determined the constant to be about 0.5 for soil. For example, an estimate for a 0.3-m-deep (1-ft-deep) LNG pool would take about 5 hours to evaporate without ignition. This rate will vary depending on the soil and the surface-area-to-volume ratio.

¹³ 49 CFR § 192.625, "Odorization of gas."
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concentrations below the lower end of this range (or flammability limit), there is not enough fuel to sustain a combustion reaction, while at concentrations above the upper end of the range, there is not enough oxygen for combustion. Indeed, these flammability limits are key factors in designating the size of flammable vapor dispersion exclusion zones,¹⁴ which are areas surrounding an LNG storage container, transfer system, or facility in which an operator or government agency legally controls all activities for safety reasons. For LNG facilities, the vapor dispersion exclusion zone is established by modeling where the vapor cloud from a leak would have a fuel concentration at 2.5 percent or higher, or half of LNG's lower flammability limit (5 percent concentration). While a spark or flame is needed to ignite LNG vapor in concentrations between its lower and upper flammability limits, concentrations of LNG vapor will not disperse as quickly as releases of natural gas, increasing the potential for the concentrations to spread and encounter an ignition source.¹⁵

Once ignited to create a pool fire, LNG has a high flame temperature and high heat flux. The latter is defined as the thermal energy transferred between a fire and any surrounding materials.

PROPERTIES IN COMPARISON WITH OTHER FLAMMABLE AND CRYOGENIC MATERIALS TRANSPORTED BY RAIL

Table 3-4 compares LNG's flammable properties with those of other flammable materials transported by tank car. The properties of ethylene are provided along with those of the main components of LNG and liquid petroleum gas (LPG). Methane and propane are the predominant components of LNG and LPG, respectively. However, because small amounts of ethane are in LNG and small amounts of butane are LPG, their properties are also shown. Note that these properties are not absolute quantities, as heat and mass transfer depends on the scale, geometric configuration, and atmospheric conditions.

When compared to propane, methane has a lower boiling point and higher liquid-to-gas expansion ratio. This means that LPG will evaporate and expand less rapidly upon heating than LNG. With regard to these two properties, LNG is most similar to ethylene. Ethylene's boiling point and liquid-to-gas expansion ratio are between those of methane and ethane, the two dominant components of LNG.

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¹⁴ 49 CFR § 193.2059, "Flammable vapor-gas dispersion protection."

¹⁵ National Transportation Safety Board, "Pipeline Accident Report: Columbia Liquefied Natural Gas Corporation Explosion and Fire, Cove Point, Maryland, October 6, 1979." Washington, DC: National Transportation Safety Board, April 16, 1980, https://ntrl.ntis.gov/ NTRL/dashboard/searchResults/titleDetail/PB80185721.xhtml.

LNG'S HAZARDOUS CRYOGENIC AND FLAMMABLE PROPERTIES

	Ethylene ^{18,19}	Methane ^{20,21,22}	Ethane ^{23,24,25}	Propane ^{26,27}	Butane ^{28,29}
Boiling Point in °F (°C) at 1 atm	-155.5 (-104.2)	-258.7 (-161.5)	-127.5 (-88.6)	-43.8 (-42.1)	31.1 (-0.5)
Flash Point in °F (°C)	-213 (-136.1)	-306 (-187.8)	-211 (-135)	-156 (-104.4)	-76 (-60)
Auto-ignition Temperature in °F (°C)	914 (490)	1004 (540)	940 (504.4)	842 (450)	550 (287.8)
Adiabatic Flame Temperature in Air in °F (°C)	3815 (2102)	3565 (1963)	3580 (1971)	3590 (1977)	3587 (1975)

TABLE 3-4 Chemical and Physical Properties of Ethylene and Hydrocarbons Present in LNG and LPG^{16,17}

¹⁶ W. M. Havnes, D. R. Lide, and T. J. Bruno, CRC Handbook of Chemistry and Physics:

A Ready-Reference Book of Chemical and Physical Data, 97th Edition (Boca Raton, FL: CRC Press, 2016), pp. 15–49.

¹⁷ National Fire Chiefs Council, "Liquefied Petroleum Gas (LPG)," n.d., https://www.ukfrs. com/guidance/search/liquefied-petroleum-gas-lpg.

¹⁸ Airgas, "Material Safety Data Sheet: Ethylene," February 2004, https://terpconnect.umd. edu/~choi/MSDS/Airgas/ETHYLENE.pdf.

¹⁹ National Institute of Standards and Technology, "Ethylene," NIST Chemistry WebBook, SRD 69, n.d., https://webbook.nist.gov/cgi/cbook.cgi?ID=C74851&Mask=4.

²⁰ National Oceanic and Atmospheric Administration, "Chemical Datasheet: Methane," CAMEO Chemicals, n.d., https://cameochemicals.noaa.gov/chemical/8823.

²¹ Princeton University, "Cryogenic Liquids," n.d., https://ehs.princeton.edu/book/export/ html/184.

²² National Institute of Standards and Technology, "Methane," NIST Chemistry WebBook, SRD 69, n.d., https://webbook.nist.gov/cgi/cbook.cgi?ID=C74828&Units=SI&Mask=4.

²³ National Oceanic and Atmospheric Administration, "Chemical Datasheet: Ethane," CAMEO Chemicals, n.d., https://cameochemicals.noaa.gov/chemical/8619.

²⁴ Airgas, "Material Safety Data Sheet: Ethane," February 2004, https://www.mandtsystems. com/documents/MSDS_Ethane.pdf.

²⁵ National Institute of Standards and Technology, "Ethane," NIST Chemistry WebBook, SRD 69, n.d., https://webbook.nist.gov/cgi/cbook.cgi?ID=C74840&Units=SI&Mask=4.

²⁶ National Oceanic and Atmospheric Administration, "Chemical Datasheet: Propane," CAMEO Chemicals, n.d., https://cameochemicals.noaa.gov/chemical/9018.

²⁷ National Institute of Standards and Technology, "Propane," NIST Chemistry WebBook, SRD 69, n.d., https://webbook.nist.gov/cgi/cbook.cgi?ID=C74986&Units=SI&Mask=4.

²⁸ National Oceanic and Atmospheric Administration, "Chemical Datasheet: Butane," CAMEO Chemicals, n.d., https://cameochemicals.noaa.gov/chemical/5668.

²⁹ National Institute of Standards and Technology, "Butane," NIST Chemistry WebBook, SRD 69, n.d., https://webbook.nist.gov/cgi/cbook.cgi?ID=C106978&Units=SI&Mask=4.

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	Ethylene	Methane	Ethane	Propane	Butane
Lower Flammability Limit (LFL)	2.75%	5%	2.9%	2.1%	1.9%
Upper Flammability Limit (UFL)	28.6%	15%	13%	9.5%	8.5%
Liquid-to-Gas Expansion Ratio	489	650	437	274	233

 TABLE 3-4 Continued

While LNG (methane and ethane) has a lower flash point than LPG (propane and butane), its lower flammability limit is higher, thereby reducing the risk of ignition. Ethylene has a lower flash point than methane and one that is similar to ethane. However, the higher auto-ignition temperatures of methane and ethane decrease the chance (relative to LPG) of an LNG fire given a source of heat. Another flammability property, the adiabatic flame temperature,³⁰ indicates the temperature of the combustion products if no heat is lost to the surrounding environment. LPG's propane and butane components have higher adiabatic flame temperatures than LNG's methane and ethane components. Based on this value, one might expect more thermal damage from an LPG fire; however, a material's actual flame temperature will be the temperature after heat is lost to the environment and is typically significantly lower than the adiabatic flame temperature.

Compared to LPG's propane and butane, LNG's methane and ethane have a wider range in their flammability limits—a larger difference between their lower and upper flammability limits. This suggests a higher potential for LNG to be in concentrations that will catch fire if exposed to an ignition source. When compared with ethylene, however, LNG's upper and lower flammability limits are not as wide.

When considering the radiative heat flux generated by a pool fire, LNG's average experimental surface emissive power (SEP)—the amount of heat radiated outward from a flame per unit surface area—is three to five times higher than that of many other commonly transported hydrocarbons. Hydrocarbons with lower SEPs include LPG, diesel, gasoline, kerosene,

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³⁰ Adiabatic indicates a situation in which heat does not enter or leave a system. The adiabatic flame temperature is thus the temperature during a combustion reaction in which no heat is gained from or lost to the surrounding environment.

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and crude oil.^{31,32,33,34,35,36,37} Due to its much higher SEP, an LNG fire will result in a larger region of thermal damage at any given time. Using average SEP values, a solid flame model³⁸ can be used to predict the heat flux from a pool fire of LNG or LPG. Based on this model, the thermal radiation protection zone (where thermal damage to property and people can occur) of an LNG pool fire is approximately three times greater than that of LPG.³⁹ While it would also be of interest to compare the SEP of LNG with that of ethylene (the only other cryogenic and flammable commodity transported by rail), comparable data for an ethylene pool fire could not be found.

Table 3-5 compares LNG's cryogenic properties with those of other cryogenic liquids transported by tank car. These cryogens—argon, nitrogen, and oxygen—all have a lower boiling point and higher liquid-to-gas expansion ratio than LNG. Because of their lower boiling points, they are more likely than LNG to evaporate rapidly upon heating. Moreover, their higher liquid-to-gas expansion ratios indicate that the product will expand into a larger volume upon evaporation. In addition, a lower boiling point indicates that the cryogenic liquid will be transported at a lower temperature, increasing the risk for cryogenic burns or damage if inadvertently released to cause exposure.

³⁸ K. Mudan, "Thermal Radiation Hazards from Hydrocarbon Pool Fires," *Progress in Energy and Combustion Science*, vol. 10, pp. 59–80, 1984.

³⁹ For example, the heat flux of LPG and LNG can be compared as a function of distance from the center of a 50-m-diameter pool fire using a solid flame model for different values of average SEP. A SEP of 50 kW/m² and 280 kW/m² reflect values representative of an LPG and LNG pool fire, respectively. Using the solid flame model, the LNG pool fire results in a heat flux of 35 kW/m² at a distance approximately three times greater than that of LPG.

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³¹ LPG, diesel, gasoline, kerosene, and crude oil have surface emissive powers between 40 and 80 kW/m². LNG is reported to have a surface emissive power ranging between 150 and 290 kW/m².

³² M. Munoz, E. Planas, F. Ferrero, and J. Casal, "Predicting the Emissive Power of Hydrocarbon Pool Fires," *Journal of Hazardous Materials*, vol. 144, pp. 725–729, 2007.

³³ A. Luketa, B. Blanchat, D. Lord, J. Hogge, A. Cruz-Cabrera, and R. Allen, "Pool Fire and Fireball Experiments in Support of the US DOE/DOT/TC Crude Oil Characterization Research Study," Sandia National Laboratories, Albuquerque, NM, SAND2019-9189, 2019.

³⁴ G. Mizner and J. A. Eyre, "Large-Scale LNG and LPG pool fires," EFCE Publication Series (European Federation of Chemical Engineering) 25, pp. 147–163, 1982.

³⁵ T. Blanchat, P. Helmick, R. Jensen, A. Luketa, R. Deola, J. Suo-Anttila, J. Mercier, T. Miller, A. Ricks, R. Simpson, B. Demosthenous, S. Tieszen, and M. Hightower, "The Phoenix Series Large Scale LNG Pool Fire Experiments," SAND2010-8676, 2011.

³⁶ D. Nedelka, J. Moorhouse, and R. Tucker, "The Montoir 35 m Diameter LNG Pool Fire Experiments," in Proceedings of LNG IX, 9th International Conference & Exp on LNG, Nice, France, 1989.

³⁷ P. K. Raj et al., "Experiments Involving Pool and Vapor Fires from Spills of Liquefied Natural Gas on Water," ADA 077073, Arthur D. Little, June 1979.

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TABLE 3-5 Chemical and Physical Properties of Nonflammable

 Cryogenic Liquids⁴⁰

	Nitrogen ⁴¹	Argon ⁴²	Oxygen ⁴³
Boiling Point in °F (°C) at 1 atm	-321 (-196.1)	-303 (-186.1)	-297 (-182.8)
Liquid-to-Gas Expansion Ratio	710	860	875

SUMMARY POINTS

Unlike all cryogenic commodities commonly transported in bulk by rail in the United States, with the exception of ethylene,⁴⁴ LNG combines the hazards of a cryogen with the hazards of a flammable gas. Being flammable, LNG vapor may ignite when released to reach concentrations in air of 5 to 15 percent. In addition, LNG's combustion in a pool fire will create high flame temperatures and high heat flux to surrounding materials. LNG's heat flux is three to five times higher than that of other commonly transported hydrocarbons, including LPG; hence, its combustion will result in a larger region of thermal damage.

LNG's cryogenic temperatures can mean that the material's inadvertent release from containment can be in the form of a very cold liquid, exposure to which can cause the embrittlement of materials. When LNG is released in sufficient volume, the liquid state may be maintained to form a vaporliquid pool that can cause cryogenic burns and asphyxiation by people exposed. Because most cryogenic commodities (i.e., argon, nitrogen, and oxygen) have lower boiling points than LNG, they must be transported at even lower temperatures. As a result, these cryogens pose an elevated risk for cryogenic burns and material embrittlement if inadvertently released to cause exposure. An exception is ethylene, the only other cryogen that is also flammable. Its higher boiling point allows it to be transported at higher temperatures that pose lower risk of embrittlement to materials if released.

⁴⁰ Northeastern University Office of Environmental Health and Safety, "Cryogenic Liquids," March 2004, https://www.northeastern.edu/ehs/ehs-programs/laboratory-safety/fact-sheets/ cryogenic-liquids.

⁴¹ National Institute of Standards and Technology, "Nitrogen," NIST Chemistry WebBook, SRD 69, n.d., https://webbook.nist.gov/cgi/cbook.cgi?ID=C7727379&Units=SI&Mask=4.

⁴² National Institute of Standards and Technology, "Argon," NIST Chemistry WebBook, SRD 69, n.d., https://webbook.nist.gov/cgi/cbook.cgi?ID=C7440371&Units=SI&Mask=4.

⁴³ National Institute of Standards and Technology, "Oxygen," NIST Chemistry WebBook, SRD 69, n.d., https://webbook.nist.gov/cgi/cbook.cgi?ID=C7782447&Units=SI&Mask=4.

⁴⁴ Hydrogen is also authorized but is not currently shipped by rail in the United States.

4

Cryogenic Tank Cars and Liquefied Natural Gas Hazards

In 2020, the U.S. Department of Transportation (U.S. DOT), through the Pipeline and Hazardous Materials Safety Administration (PHMSA), approved the DOT-113C120W9 tank car as a new member of the DOT-113 family of cryogenic tank cars. It was designed and approved specifically for transporting liquefied natural gas (LNG) by rail.¹ This chapter begins with an overview of the key design features of common cryogenic containers, including the DOT-113 tank car and its upgraded specification for LNG. The discussion then considers hazard scenarios for LNG in a tank car involved in a derailment. In particular, consideration is given to the tank's resistance to puncture and brittle fracture and to the performance of the insulation and pressure relief systems.

DESIGN FEATURES OF CRYOGENIC PACKAGING AND TANK CARS

In the United States, cryogenic cargoes have been transported by rail for decades in tank cars and portable tanks. The most commonly transported cryogens are argon and ethylene, followed by nitrogen and oxygen. As discussed in Chapter 3, these commodities must be maintained at temperatures

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¹ "Hazardous Materials: Liquefied Natural Gas by Rail—Final Rule," *Federal Register*, 85 FR 44994 (July 24, 2020). The final rule authorizing LNG transportation in the DOT-113C120W9 tank car was subsequently revisited in a notice of proposed rulemaking that would suspend this authorization ("Hazardous Materials: Suspension of HMR Amendments Authorizing Transportation of Liquefied Natural Gas by Rail," *Federal Register*, 86 FR 61731 (November 8, 2021)).

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below their boiling points, which range from -155° F to -321° F (-104° C to -196° C). The low temperatures must be maintained to keep the cargo in liquid form during transportation periods that can last for many days or weeks. These materials must be shipped in tank cars designed to minimize heat input so as to limit pressure rise to 3 pounds per square inch gauge (psig) (1.2 bar) per day.² For example, ethylene is authorized to be offered for transportation at 20 psig and a corresponding temperature of -125° F (-87° C).^{3,4} Because the lading will continue to warm until delivery and the daily pressure rise of a DOT-113 tank car is 0.5 to 0.75 psig (1.05 to 1.07 bar), the temperature and pressure at the end of a 10-day trip is expected to be about -117° F (-83° C) and 27.5 psig (2.9 bar).⁵

Cryogenic packaging is therefore designed to maintain the low temperatures of the liquid and to have systems that relieve pressure upon heating and evaporation. For temperature maintenance, the inner tank containing the cargo is surrounded by an outer tank (also referred to as an outer jacket⁶) separated by annular space maintained as a vacuum after filling it with insulation. The insulation limits all forms of heat transfer between the inner and outer tanks, while the vacuum limits conductive and convective heat transfer. In addition, the vacuum allows the insulation to meet design requirements, as the insulation's thermal properties are pressure dependent and enhanced by the presence of a vacuum.⁷ The design of the support structure limits heat input through conduction. Piping and valves are installed and set (based on the commodity) to allow for loading, unloading, pressure relief, and gauging of the contents.

Cryogenic packaging is also designed to resist punctures that could release cargo during an incident. The grade and thickness of the steel used for the shell and head of the outer tank are selected in part to achieve various levels of puncture resistance, as are the protections afforded the fittings on the openings on the outer tank. The following is a summary of key design features of the UN-T75 intermodal portable tank, DOT-113 cryogenic tank car, and the upgraded DOT-113C120W9, which is approved for LNG service.

⁷ P. M. Sutheesh and Alex Chollackal, *IOP Conference Series*, *Materials Science and Engineering*, vol. 396, 2018, 012061, https://doi.org/10.1088/1757-899X/396/1/012061.

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² 49 CFR § 173.319, Cryogenic liquids in tank cars.

³ Ibid.

⁴ Carl L. Yaws and William Braker, *Mathewson Gas Data Book*, Appendix 10 (New York: McGraw-Hill Professional, 2001).

⁵ Ibid.

⁶ This report uses "outer tank" rather than "outer jacket" for the outermost section of cryogenic tanks because of the prevalence of the former term during the 2020 rulemaking and onward and by the Association of American Railroads. Although "outer jacket" is the term in common use and in regulatory text for the outermost vessel of the UN-T75 portable tank, this report uses "outer tank" for the portable tank for consistency. (See also the committee's Phase 1 report, page 13, footnote 10.)

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UN-T75 Intermodal Portable Tanks

As noted in Chapter 2, LNG has been transported for decades in the UN-T75 portable tank, a type of cryogenic intermodal container approved by PHMSA for liquefied gases and designed in accordance with international (United Nations [UN]) guidance. They are used to transport LNG by ship and truck, and these portable tanks have been used on a limited basis for rail movements of LNG in Alaska and Florida. The container consists of cryogenic packaging within a container frame, and openings fitted with pressure relief devices and other closures and devices such as gauges.⁸ The inner tank is constructed from stainless steel, while the outer tank is constructed from either stainless steel or carbon steel. The UN guidance requires tank steels having a minimum thickness in accordance with yield and tensile strength performance standards for pressure ratings and puncture resistance. Special features added to protect against impact include metal bars installed across the frame and longitudinally along the outer tank's length.⁹

DOT-113 Tank Car

The most common tank car used for hazardous liquids that are not transported under high pressure is the DOT-111. Its design consists of fewer upgraded and specialized safety features to contain pressure, resist punctures, and provide thermal protection of the cargo. Most recently the DOT-117 tank car was introduced to transport certain hazardous liquids that pose specific flammability hazards, such as ethanol and crude oil.¹⁰ For instance, these cars are insulated for thermal protection and include full-height head shields.¹¹ Table 4-1 lists tank car families with examples of their corresponding commodities that PHMSA has approved for rail transportation. While the DOT-111 and DOT-117, as well as the DOT-113, are nonpressure tank cars, the DOT-105, DOT-112, and DOT-114 tank cars carry cargo under pressure.

⁸ U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration, "Risk Assessment of Surface Transportation of Liquid Natural Gas," March 20, 2019, p. 84, https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/research-and-development/ hazmat/reports/71651/fr2-phmsa-hmtrns16-oncall-20mar2019-v3.pdf.

⁹ United Nations, ed., "Recommendations on the Transport of Dangerous Goods: Model Regulations, 22 Revised Edition, Vol. II" (New York and Geneva: United Nations, 2021), https://unece.org/sites/default/files/2021-09/ST-SG-AC10-1r22e_Vol2_WEB_0.pdf.

¹⁰ National Academies of Sciences, Engineering, and Medicine, *Ensuring Railroad Tank Car Safety: Special Report 243* (Washington, DC: The National Academies Press, 1994), p. 49, https://doi.org/10.17226/11400.

¹¹ Bureau of Transportation Statistics, "Tank Car Specifications & Terms," April 18, 2018, https://www.bts.gov/surveys/annual-tank-car-facility-survey/tank-car-specifications-terms.

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DOT-105/112/114	DOT-111 ¹³	DOT-113 ¹⁴	DOT-117 ¹⁵
Anhydrous Ammonia (flammable)	Sodium Hydroxide (corrosive)	Liquid Argon (cryogenic)	Crude Oil (flammable)
Liquefied Petroleum Gas (flammable)	Sulfuric Acid (corrosive)	Liquid Nitrogen (cryogenic)	Ethanol (flammable)
Chlorine Gas (reactive, toxic)	Phenol (toxic)	Liquid Oxygen (cryogenic)	
Ethylene Oxide (flammable)	Diesel Fuel (combustible)	Liquid Ethylene (cryogenic, flammable)	

TABLE 4-1 Examples of Rail Tank Car Families and Their PHMSA-Approved Commodities¹²

For the transportation of cryogenic cargo, PHMSA requires use of the DOT-113 family of tank cars.¹⁶ This tank car family transports cryogenic commodities, such as argon, ethylene, oxygen, and nitrogen. All of the DOT-113 tank cars have inner and outer tanks, the former wrapped with insulation to maintain the low temperature of the cryogenic cargo. The pressure relief device (PRD) system is designed and set to activate when desired temperatures are not maintained. Figure 4-1 show the key safety features of a DOT-113 tank car.

The DOT-113's inner tank is supported within the outer tank to create an annular space of 6–8 inches that maintains a vacuum. Not pictured in Figure 4-1 is the multilayer insulation (MLI) that surrounds the inner tank. The MLI consists of alternating layers of aluminum foil and a non-conducting spacer material, such as fiberglass or ceramic fiber paper.

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¹² U.S. Federal Emergency Management Agency, "Silhouettes of Rail Cars, Tank Trucks and Chemical Tanks," 2004, https://www.hsdl.org/?abstract&did=445918.

¹³ National Academies of Sciences, Engineering, and Medicine, *Ensuring Railroad Tank Car Safety: Special Report 243* (Washington, DC: The National Academies Press, 1994), p. 49, https://doi.org/10.17226/11400.

¹⁴ U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration, "Risk Assessment of Surface Transportation of Liquid Natural Gas," March 20, 2019, https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/research-and-development/hazmat/ reports/71651/fr2-phmsa-hmtrns16-oncall-20mar2019-v3.pdf.

¹⁵ U.S. Department of Transportation, Bureau of Transportation Statistics, "Fleet Composition of Rail Tank Cars Carrying Flammable Liquids: 2021 Report," Washington, DC, 2021, https://doi.org/10.21949/1523084.

¹⁶ Although it is less and less common, some of this cryogenic material ships in AAR-204W tank cars. For an overview of the specification, see p. 92 in Association of American Railroads, "2017 Field Guide to Tank Cars," February 6, 2017, https://www.aar.org/wp-content/uploads/2017/12/AAR-2017-Field-Guide-for-Tank-Cars-BOE.pdf.

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CRYOGENIC TANK CARS AND LNG HAZARDS



FIGURE 4-1 Schematic of DOT-113 tank car and some of its key safety features. SOURCE: PHMSA.

Specifically, the spacer material and the separation of the inner and outer tanks limits thermal conduction, the vacuum limits thermal conduction and convection, and the aluminum foil limits thermal radiation. Collectively, these features limit the cryogenic cargo's pressure and temperature increase.

The DOT-113 has a PRD system that consist of two types of pressure control devices. The first is a pressure relief valve sized and set to prevent the pressure in the inner tank from exceeding its test pressure¹⁷ if the vacuum is lost. The second is a frangible disc (rupture disc), or secondary relief valve, designed to prevent the pressure in the inner tank from exceeding its test pressure in the event of a fire and loss of vacuum. The industry standard for the past several decades is to have two sets of PRDs separated by a three-way valve, with only one set of the PRDs active at a time. These systems must function under high-temperature conditions in the event of an incident and must be made from materials suitable for the temperature of the cargo in liquid and vapor phases. For this purpose, the system is designed for a scenario in which the tank car is exposed to a temperature of 1200°F (648.9°C).

The selection of the steel specifications for the inner and outer tanks has protective and practical purposes. Both tanks are composed of grades of high-strength steel to prevent puncture and cracking. While there is an appendix of approved steels for the outer tank of the DOT-113 tank car, the tank car industry reports that the standard for the outer tank material has generally been AAR TC-128 Grade B (TC-128B) normalized carbon

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 $^{^{17}}$ Per 49 CFR § 178.320, the test pressure is the pressure to which a tank is subjected to determine structural integrity.

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steel plate.¹⁸ In accordance with PHMSA requirements, the inner tank is made from either ASTM A240/240M Type 304 or Type 304L high-strength stainless steel.¹⁹ These grades of stainless steel are required for the inner tank because they are more ductile than carbon steel at cryogenic temperatures.²⁰ A more complete description of a DOT-113 tank car can be found in Box 4-1.

BOX 4-1 Main Features of Cryogenic Tank Cars

The Association of American Railroads' (AAR's) *Field Guide to Tank Cars* describes cryogenic tank cars, including the DOT-113 specification, as follows:

Cryogenic liquid tank cars, Class DOT/TC-113 and Class AAR-204, are vacuuminsulated cars having an inner container (tank) and outer shell (tank, not a jacket (although referred to as an "outer jacket" in 49 CFR)). The inner tank is constructed of alloy (stainless) steel and the outer shell is constructed of carbon steel. Cryogenic tank cars are designed to transport refrigerated liquefied gases having a boiling point colder than minus 130°F [54.4°C] at atmospheric pressure; e.g., liquid hydrogen, ethylene, oxygen, nitrogen, and argon.

The annular space between the inner and outer tanks has a vacuum drawn and is equipped with an insulation system using granular perlite or an alternating wrap of multiple layers of aluminum foil and paper. These tank cars are frequently referred to as Thermos® bottle tank cars.

The insulation system (designed for the commodity being transported and meeting specified performance standards) and vacuum controls the rate of heat input for normal transportation time periods.

Specification DOT/TC-113A60W tank cars have a design service temperature of minus 423°F [217.2°C], a minimum burst pressure of 240 psig, and a tank test pressure of 60 psig.

Specification DOT/TC-113C120W tank cars have a design service temperature of minus 260°F [126.7°C], a minimum burst pressure of 300 psig, and a tank test pressure of 120 psig.

Cryogenic liquid tank cars are required to have two liquid-level gauges. One gauge measures the liquid level in the inner tank (this gauge may be a portable gauge that does not move with the car) and the other gauge, a fixed-length dip tube set, indicates the maximum allowable liquid level for the allowable filling density. In addition, the car must be equipped with a vapor-phase pressure gauge to indicate the pressure within the inner tank.

¹⁸ A. D. McKisic (personal communication), July 6, 2022, http://onlinepubs.trb.org/onlinepubs/C4rail/DOTShell13ShellSpec.pdf; Scott Nason (personal communication), July 5, 2022, http://onlinepubs.trb.org/onlinepubs/C4rail/AARTC128GrB.pdf.

¹⁹ 49 CFR § 179.400-5, Materials.

²⁰ Scott Nason, "DOT 113 Tank Cars for LNG," September 20, 2021, http://onlinepubs. trb.org/onlinepubs/C4rail/NasonChartDOT113TankCars092121.pdf.

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The cars must be equipped with various PRDs [pressure relief devices] for the protection of the tank assembly and piping system. The discharge of the PRD must be directed away from operating personnel, the car structure, trucks, and safety appliances; e.g., steps, handholds/grab irons, and handrails.

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The inner tank must be equipped with at least one PRV [pressure relief valve] and at least one safety vent (rupture disc device), which may be replaced by an alternate PRV. The car may also be equipped with a pressure control device (regulator valve) and mixing device to control the routine release of vaporized lading during transportation. The outer jacket/tank must be equipped with a system to prevent buildup of pressure within the annular space.

The loading/unloading valves and other fittings are required to be enclosed within a protective housing (not to be confused with protective housings on pressure tank cars), which appears to be a box or cabinet. The protective housing(s) is located on both sides, at one end or, in rare cases, on the top of the car. The housing(s) must be adequate to protect the fittings from direct solar radiation, mud, sand, adverse environmental exposure, and mechanical damage incident to normal operation.

The protective housings for the fittings must be equipped with precautionary instructions for the safe operation of the equipment during storage and transfer operations, and must include a diagram of the tank and piping system with the various gauges, control valves, and PRDs clearly identified, and their location indicated. In addition, all valves and gauges must be clearly identified with corrosion-resistant nameplates.

In addition to other stenciling, cryogenic liquid tank cars must be stenciled "DO NOT HUMP OR CUT OFF WHILE IN MOTION" and "VACUUM JACKETED" on both sides in lettering at least 1½ inches high.

SOURCE: Excerpt from AAR, Field Guide to Tank Cars, Third Edition, 2017, pp. 91–93.21

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²¹ Association of American Railroads, "Third Edition Field Guide to Tank Cars," February 6, 2017, pp. 91–93, https://www.aar.org/wp-content/uploads/2017/12/AAR-2017-Field-Guide-for-Tank-Cars-BOE.pdf.

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UPGRADES TO THE DOT-113 FOR LNG

PHMSA amended the design for the standard DOT-113 cryogenic tank car to account for the combined cryogenic and flammable properties of LNG. Specifically, to make the outer tank more resistant to damage, PHMSA modified the specified grade and thickness of the steel plates used to construct the DOT-113's outer tank. As shown in Table 4-2, the upgraded specification, named the DOT-113C120W9, requires that the outer tank be made of a TC-128B normalized carbon steel plate to create a thicker shell and head when compared to the DOT-113C120W. The upgraded specifications for shell and head thickness were intended to add greater protection from punctures and to reduce the severity of deformations that may occur when the tank is damaged in a derailment.

No additional changes were made to the DOT-113 with regard to the insulation or PRD systems.

HAZARD SCENARIOS WHEN TRANSPORTING LNG IN TANK CARS

Among incident types, a high-kinetic energy train derailment is generally considered to be the main scenario that would pose a risk of tank damage and a fire event sufficient to cause a loss of LNG containment from

	DOT-113C120W	DOT-113C120W9
Outer Tank Steel	Any steel listed in AAR's M-1002 Appendix M	AAR TC-128, Grade B (TC-128B) normalized carbon steel
Tank Shell, Minimum Wall Thickness	7/16 in.	9/16 in.
Tank Head, Minimum Wall Thickness	1/2 in.	9/16 in.

TABLE 4-2 Upg	graded Requirem	ents of the DOT	I-113C120W9	Rail 7	Гank
Car ^{22,23,24}					

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 $^{^{22}}$ 49 CFR § 179.400-8, Thickness of Plates.

²³ 49 CFR § 179.400-5, Materials.

²⁴ U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration, "Hazardous Materials: Liquefied Natural Gas by Rail," July 24, 2020, https://www. regulations.gov/document/PHMSA-2018-0025-0480.

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a tank car.²⁵ Although the vast majority of derailed cryogenic tank cars successfully contain their cargo during a derailment,²⁶ the means by which containment could be lost when transporting LNG need to be accounted for. While a main concern during a derailment is a puncture of a tank car's outer and inner tanks to cause the release of product, another concern is that a tank car that has successfully contained its product may be exposed to cryogenic LNG released from the PRD or other tank cars damaged in the derailment. Exposure of its outer tank to LNG could cause embrittlement of the outer tank steel and risk the occurrence of circumferentially brittle fractures of the tank. An outer tank fracture that causes a loss of vacuum and degradation of the inner tank's insulation could result in a thermal rupture or high-pressure release, especially if the tank car is exposed to fire.

Figure 4-2 depicts potential outcomes in the case of a derailment scenario in which a tank car containing LNG derails and is in close proximity to other tank cars that are on fire. Three principal mechanisms that can jeopardize the integrity of the outer tank are illustrated: damage to safety features during the derailment event, thermal softening of the tank steel from exposure to an LNG fire, and embrittlement of the tank steel from exposure to LNG. Situations that result in LNG pooling, such as the presence of trenches or a rollover resulting in release through the PRDs, may expose the outer tank to LNG and the possibility of embrittlement and brittle fracture. Brittle fractures that lead to vacuum loss and/or degradation of the insulation will allow heating of the LNG in the inner tank and result in an increase in internal pressure. If the inner tank is exposed to fire and experiences thermal weakening, its failure pressure may drop below the pressure rating of the PRDs. The potential for these outcomes would be greater in case trains having multiple LNG tank cars. As shown in the diagram, the outcomes from such scenarios could range from the venting of vapors to a thermal rupture or high-pressure release.

In considering such scenarios and informed by the result of recent testing and modeling by PHMSA and the Federal Railroad Administration (FRA), the committee took a closer look at the relevant design features of the DOT-113C120W9 that relate to survivability of a tank car in a derailment scenario: resistance to puncture and brittle fracture, PRD performance, and insulation performance.

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²⁵ National Academies of Sciences, Engineering, and Medicine, Preparing for LNG by Rail Tank Car: A Review of a U.S. DOT Safety Research, Testing, and Analysis Initiative (Washington, DC: The National Academies Press, 2021), pp. 15-16, https://doi.org/10.17226/26221. See also the discussion about the Worst-Case Scenario Model task on p. 38, as well as its related tasks such as Punctures and Derailment Simulation Modeling.

²⁶ U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration, "Incident Statistics," n.d., https://www.phmsa.dot.gov/hazmat-program-managementdata-and-statistics/data-operations/incident-statistics.

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Resistance to Puncture and Brittle Fracture

PHMSA and FRA have commissioned a series of side-impact tests on DOT-113 tank cars.²⁷ The first test conducted in 2019 using a ram car showed that the inner and outer tank of the standard DOT-113C120W punctured at 16.7 mph. Because an upgraded DOT-113C120W9 was not available in 2020 for the second test, a surrogate tank car was custom built with the thicker 9/16-inch TC-128B steel plate substituted for the outer tank of the standard DOT-113.28 When struck, the outer tank of the surrogate was deformed but not punctured when struck by a ram car moving at 17.3 mph. Using these test data, subsequent modeling of the surrogate tank car indicated that a relative impact speed of nearly 19 mph would be needed for the ram car to puncture the outer tank.²⁹

In May 2022, FRA conducted an additional side-impact test, but this time with an actual DOT-113C120W9 tank car, which was filled with liquid nitrogen, which is transported at -350°F (-196°C).³⁰ This test provided additional validation of the modeling that predicted the tank car outer shell resists puncture up to at least 19 mph, as the ram car punctured the inner and outer tanks at 22 mph.³¹

It merits noting that, following the puncture, the outer tank of the tested DOT-113C120W9 tank car experienced brittle fracture, manifest by an initiating crack at the puncture site and a large, circumferential crack caused by cryogenic damage. Additional brittle fractures occurred over the next few days as the liquid nitrogen fully dissipated.³² For brittle fracture to occur, a load and/or a crack initiator must be present on the outer tank steel, and the temperature of the steel must be below the average nil-ductility transition (NDT) temperature when steel loses ductility. After a crack initiates, the main factors effecting propagation is hoop stress-tangential

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²⁷ National Academies of Sciences, Engineering, and Medicine, Preparing for LNG by Rail Tank Car: A Review of a U.S. DOT Safety Research, Testing, and Analysis Initiative (Washington, DC: The National Academies Press, 2021), p. 31, https://doi.org/10.17226/26221. "The results from multiple tests on a range of tank car designs are used to establish the relative puncture resistance of different tank car designs. Test results also provide empirical data for the development and validation of impact and puncture finite element (FE) model capabilities. After validation, these capabilities are used to simulate the puncture resistance associated with various changes in impact conditions and tank design parameters."

²⁸ The surrogate tank car met the requirements of the 2020 regulations of a DOT-113C120W9, with 9/16-inch TC-128B steel normalized for the outer tank and filled to approximately 95% of its volume with liquid nitrogen.

²⁹ Federal Railroad Administration, Side Impact Test and Analyses of a DOT-113 Surrogate Tank Car with Water, DOT/FRA/ORD-21/35, December 2021.

³⁰ The DOT-113C120W9 was filled to approximately 97 percent of its volume with liquid nitrogen.

³¹ Federal Railroad Administration (personal communication), June 17, 2022.

³² Ibid.

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stress around the circumference of a structure due to a pressure gradient and transmission of the weight of the inner tank through the support system to the outer tank. Initiators can arise from cracks, such as those associated with dents and buckles, as well as from thinning of the tank steel from scores, gouges, and wheel burns.

The brittle fracture of the DOT-113C120W9 tank car loaded with liquid nitrogen warrants noting because LNG is transported at significantly warmer temperatures (-260° F [-162° C]) than liquid nitrogen (-320° F [-196° C]), which has a greater potential to cause embrittlement than LNG. Nevertheless, a reason to be concerned about a potential for LNG to cause brittle fracture of the DOT-113C120W9's outer tank is that the NDT temperature of its specified steel grade, normalized TC-128B, is -59.8° F (-51° C), which is higher than the temperature of transported LNG.^{33,34}

Pressure Relief Device Performance

The DOT-113C120W9 design shares the same specifications as the standard DOT-113 tank car for pressure relief devices. As discussed above, a DOT-113C120W9 tank car is required to have one set of PRDs and may have a second set serving as reserve PRDs. The primary pressure relief valves are set to discharge at 75 psi (6.2 bar); the secondary PRD could either be a pressure relief valve set to discharge at 90 psi (7.2 bar) or a rupture disc set to discharge at 120 psig (9.3 bar).³⁵ Because LNG has a liquid-to-gas expansion ratio of 600 to 1, a container is susceptible to overpressurization if the pressure release valve is faulty or upon rapid heating.

A matter that may be deserving of attention is that the PRDs on the DOT-113C120W9 have not been tested for a tank car engulfed in an LNG fire. Such testing could be valuable for assessing whether the systems are properly sized in light of an incident where the tank car heats and results in the evaporation of LNG.

Insulation Performance

The 2020 rule did not alter the DOT-113's specification for the multilayer insulation that wraps the inner tank, presumably under the premise that the insulation system would likely be satisfactory in maintaining cryogenic

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 $^{^{33}}$ Normalized TC-128B steel has an NDT of –59.8°F (–51°C), which is above the –260°F (–162.2°C) temperature of LNG.

³⁴ G. E. Hicho and J. H. Smith, "Determination of the NDT Temperature and Charpy Vnotch Impact Properties of AAR TC128 Grade B Steel and A 8XX Grade B Steel," National Institute of Standards and Technology, NISTIR 4300, Report No. 20, 1990.

³⁵ 49 CFR § 179.401-1, Individual Specification Requirements.

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temperatures in the inner tank in the aftermath of a derailment under thermal load. DOT-113 tank cars are not required to meet federal regulations (49 CFR § 179, Appendix B) that require that thermal insulation be tested under simulated conditions representing a pool fire for 100 minutes and a torch fire for 30 minutes.^{36,37} However, plate tests have been conducted in which an insulated steel plate of a representative tank car thickness is exposed to simulated fires, typically carried out with propane torches. While the specified insulation meets federal standards, it merits pointing out that the test temperatures in the standard are significantly lower than temperatures expected during an LNG pool fire or natural gas torch fire. The temperatures used during testing versus the temperatures of an LNG pool fire and natural gas torch fire can be seen in Table 4-3. It is conceivable, therefore, that the insulation may fail when subject to the intense heat flux of an LNG fire ($\sim 270 \text{ kW/m}^2$). Indeed, the use of propane as the fuel for a fire test of a UN-T75 portable tank (commissioned by PHMSA) demonstrated that a heat flux lower than LNG can degrade similar insulation.³⁸ The tests indicated that insulator performance can vary significantly with pressure or temperature changes and that maintaining the vacuum is critical to performance.

TABLE 4-3 Temperatures of	Testing	Under	Federal	Regulations	Versus
LNG and Natural Gas Fires					

	Testing Scenario	LNG ³⁹	Natural Gas ^{40,41}
Temperature of Pool	1600°F ± 100°F	2303.6°F–2912°F	_
Fire in °F (°C)	(871°C ± 55.6°C)	(1262°C–1600°C)	
Temperature of	2199°F ± 100°F	_	Up to 2732°F
Torch Fire in °F (°C)	(1204°C ± 55.6°C)		(1500°C)

³⁶ 49 CFR § 173.31, Use of tank cars.

 37 The torch fire has a velocity of 64.4 \pm 16 km/h.

 41 This temperature is for a natural gas torch fire with flowrates of 3–10 kg/s.

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³⁸ Pipeline and Hazardous Materials Safety Administration and Federal Railroad Administration, "Portable Tank Fire-Testing Task Resource," August 13, 2020, p. 67, http:// onlinepubs.trb.org/onlinepubs/dvb/LNGrail/UNT75_Fire_Test.pdf. In addition, the committee offered its advice on this study during its Phase 1 report, *Preparing for LNG by Rail Tank Car: A Review of a U.S. DOT Safety Research, Testing, and Analysis Initiative* (Washington, DC: The National Academies Press, 2021), https://doi.org/10.17226/26221.

³⁹ A. Luketa and T. Blanchat, "The Phoenix Series Large-Scale Methane Gas Burner Experiments and Liquid Methane Pool Fires Experiments on Water," *Combustion and Flame*, vol. 162, 2015, pp. 4497–4545.

⁴⁰ B. J. Lowesmith et al., "An Overview of the Nature of Hydrocarbon Jet Fire Hazards in the Oil and Gas Industry and a Simplified Approach to Assessing the Hazards," *Transactions of the Institute of Chemical Engineers, Part B*, May 2007.

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The committee is also aware of experiments performed on marine vessels to assess insulation performance when transporting LNG. In these tests, an at-scale vessel cross section was exposed to heat flux representative of an LNG fire. The test steel plate was nearly twice the thickness of the specification for the DOT-113C120W9's outer tank. The unexposed side of the tested plate reached temperatures high enough to significantly weaken the tensile strength of TC-128B steel.^{42,43} Temperatures of the tested plate reached 1832°F (1000°C), yet testing on TC-128B steel indicates that the ultimate tensile strength is reduced by about a factor of 6 when raised to a temperature of 800°C (1472°F).⁴⁴

As noted earlier, the MLI of a DOT-113 tank car consists of alternating layers of aluminum foil and a non-conducting spacer material, such as fiberglass or ceramic fiber paper.⁴⁵ Aluminum's melting temperature is 1221°F (660.3°C), while fiberglass will begin to soften and degrade around 400°F (204.4°C).⁴⁶ Both of these temperatures are below the temperature of an LNG pool fire (see Table 4-3).⁴⁷ On the other hand, there are ceramic fibers that have degradation temperatures greater than the temperatures of an LNG pool fire.⁴⁸

SUMMARY

The DOT-113 tank car family transports cryogenic commodities. All of the tank cars in this family have inner and outer tanks, the former wrapped with insulation to maintain the low temperature of its cryogenic cargo. The

⁴⁸ J. Weinstein, "An Overview of Refractory Ceramic Fibers," *Thermal Processing*, March 15, 2021, https://thermalprocessing.com/an-overview-of-refractory-ceramic-fibers.

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⁴² U.S. Department of Energy, "Liquefied Natural Gas Safety Research," Report to Congress, May 2012, https://www.energy.gov/sites/default/files/2013/03/f0/DOE_LNG_Safety_ Research_Report_To_Congre.pdf.

 $^{^{43}}$ On the unexposed side of the outer steel plate, temperatures reached 1832°F (1000°C) after approximately 20 minutes of exposure, and then subsequently increased to 2012°F (1100°C) after an additional 5 minutes.

⁴⁴ J. McKinley et al., "Strength, Creep, and Toughness of Two Tank Car Steels TC128B and A516-70," Submitted to Transport Canada, GCDOCS Workflow ID 38647561, April 2019.

⁴⁵ Pipeline and Hazardous Materials Safety Administration, "Hazardous Materials: Liquefied Natural Gas by Rail—Final Rule," *Federal Register*, 85 FR 44994 (2020), https://www. federalregister.gov/documents/2020/07/24/2020-13604/hazardous-materials-liquefied-naturalgas-by-rail.

⁴⁶ J. L. Thomason, U. Nagel, L. Yang, and D. Bryce, "A Study of the Thermal Degradation of Glass Fibre Sizings at Composite Processing Temperatures," *Composites Part A: Applied Science and Manufacturing*, vol. 121, June 2019, pp. 56–63, https://doi.org/10.1016/j.compositesa.2019.03.013.

⁴⁷ A. Luketa and T. Blanchat, "The Phoenix Series Large-Scale Methane Gas Burner Experiments and Liquid Methane Pool Fires Experiments on Water," *Combustion and Flame*, vol. 162, 2015, pp. 4497–4545.

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inner tank is constructed of stainless steel to withstand cryogenic temperatures, while the outer tank is constructed of carbon steel. The insulation around the inner tank consists of alternating layers of aluminum foil and a non-conducting spacer material, such as fiberglass or ceramic fiber paper. The annular space between the wrapped inner tank and outer tank is maintained as a vacuum, which is a key part of the insulation system. A PRD system is designed and set to activate when desired temperatures are not maintained. These systems must function under high-temperature conditions in the event of an incident and must be made from materials suitable for the temperature of the cargo in liquid and vapor phases.

In authorizing the LNG's shipment by tank car, PHMSA established new requirements for a DOT-113C120W9 tank car design that specified an outer tank made with a stronger and thicker carbon steel. The new design did not include changes to the requirements for insulation materials or the PRD system. The upgrades to the DOT-113's outer tank were intended to make it more resistant to impact damage. The results of impact tests conducted by PHMSA and FRA suggest that the DOT-113C120W9's outer tank is more resistant to puncture than the outer tank of a standard DOT-113 tank car. However, questions remain about the resistance of the outer tank's steel to brittle fracture from a potential exposure to cryogenic LNG. A matter that warrants consideration is that the temperature of cryogenic LNG is lower than the temperature at which the outer tank steel can become embrittled. Uncertainties also remain about the PRD's capacity to release sufficient product when the tank car is engulfed in a high-temperature LNG fire and whether the materials used for insulating the inner tank can withstand the intense heat flux of the fire.

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Transportation Safety Requirements and Performance

Shipments of hazardous materials have long been transported by rail, governed by regulations and shaped by industry practices that accommodate the freight rail industry's common carrier obligations. This chapter begins with an overview of the main elements of the regulatory framework established for ensuring the safe transportation of hazardous commodities generally by rail and specifically with respect to flammable and cryogenic materials. The framework includes requirements for shipment packaging (i.e., containers), shipment handling, train operations, route selection and security planning, track inspection, railroad and shipper employee training, and emergency planning and preparedness. While the focus in this chapter is on rail transportation of hazardous materials, a companion review of the safety assurance frameworks for liquefied natural gas (LNG) facilities, marine vessels, and motor carriers is provided in Appendix A.

After reviewing this general safety framework for rail hazardous materials transportation, consideration is given to the special conditions that have been applied to bulk shipments of high-hazard flammable liquids (crude oil and ethanol) and the trains that transport them (high-hazard flammable trains [HHFTs]). This discussion is relevant because many of the special conditions attached to shipping LNG by rail are similar to measures introduced to ensure the safe transportation of crude oil and ethanol by tank car. Indeed, the safety challenges experienced by railroads in transporting these two flammable liquids are likely to have been factors in the regulatory treatment of LNG by rail. The troubling early safety record of HHFTs, a fresh memory from the past decade, demonstrates the importance of being

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vigilant in monitoring the safety performance of hazardous materials new to rail shipping and in taking precautionary steps for safety assurance.

Consideration is then given to the special conditions that have been applied by regulators to shipping LNG by rail in portable tanks and in rail tank cars. While many of the conditions are similar to those that apply to HHFTs, there are some exceptions.

The chapter concludes with a summary of the safety records of LNG when transported by truck and ship and the safety records of other flammable and cryogenic commodities that are shipped by rail tank car. Because Japan is the only country with a history of shipping LNG by rail, its safety experience is also considered briefly.

OVERVIEW OF SAFETY ASSURANCE FOR RAIL TRANSPORTATION OF HAZARDOUS MATERIALS

This section reviews some of the important elements of the safety assurance system for the transportation of hazardous materials. The purpose of the discussion, which is by no means comprehensive, is to show the breadth of efforts to ensure that hazardous materials are transported safely through various regulatory requirements and railroad industry practices.

The federal government ensures the safety and security of hazardous materials shipments mainly through regulations issued by the Pipeline and Hazardous Materials Safety Administration (PHMSA) and enforced by the relevant federal modal agencies. Enforcement of regulations that apply to railroad transportation is largely the responsibility of the Federal Railroad Administration (FRA). The Federal Motor Carrier Safety Administration (FMCSA) and the U.S. Coast Guard have similar responsibility for enforcing the regulations that apply to truck and marine transportation, respectively. For their part, shippers must be sure that shipments are properly packaged, secured, labeled, and accompanied by accurate information on contents, quantities, and emergency contacts. The carriers of the shipments must provide a safe and secure operating environment in terminal areas and en route. Shippers and carriers must be sure that all hazard information is properly displayed, accurate, and available for emergency personnel.

The following is an overview some of the major elements of the regulatory requirements and relevant industry recommended safe practices.

Approved Packaging

Containers and tanks are generally considered to be forms of bulk packaging, which include those packages in excess of 119 gallons for liquids, 882

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pounds for solids, and 1,000 pounds for gases.¹ In addition to portable tanks and rail tank cars, barge tankers and cargo tank motor vehicles are types of bulk packaging. Ocean-going tank vessels that carry hazardous materials are regulated by the U.S. Coast Guard and are subject to statutory requirements different from those applying to bulk shipments by rail, barge, and truck. Because Chapter 2 discusses the requirements for the portable tanks and tank cars that are approved packaging for cryogenic and flammable materials, there is no need for additional discussion here.

Shipment Receiving, Handling, and Delivery

According to PHMSA regulation, a railroad, or other carrier, is responsible for inspecting the shipment and verifying that it is compliant with all hazardous material regulations (49 CFR § 174.9). The carrier must not accept a shipment, such as a loaded tank car, if the carrier's inspection reveals a violation of the regulations or any hazardous situation such as a leak. In the case of tank cars, railroad personnel visually inspect from ground level looking for leaks or evidence of leaks and signs of tampering. Items that are visually inspected include protective housing covers, valves, and other fittings for signs that they are securely in place. Inspections are also undertaken at other points in transit, including when the shipment is received at an interchange and when placed in a train.²

Depending on the commodity and its hazard category, shippers may also be required to follow specified procedures when handling and transporting the shipment, including unloading (49 CFR § 174.67). For cryogenic liquids shipped in tank cars, the regulations govern filling density and levels, shipment monitoring to determine the rise in average daily pressure, and additional tank car testing prerequisites (49 CFR § 173.319). For most tank car shipments, railroads will not be involved with unloading the product from the tank car upon delivery to a siding.

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¹ Transportation Research Board, Cooperative Research for Hazardous Materials Transportation: Defining the Need, Converging on Solutions (Washington, DC: Transportation Research Board, 2005), p. 21, https://doi.org/10.17226/11198.

² Association of American Railroads Hazardous Materials Committee, United States Hazardous Materials Instructions for Rail, October 18, 2021.

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Train Operations

Once the railroad accepts a tank car, it is legally liable for its safe transportation and for any damages caused by a crash or other incident en route.³ Regulations that govern switching (49 CFR § 174.83) and the position of tank cars in a train (49 CFR § 174.85) are designed to protect the crew, protect the tank car from other rail cars, and keep rail cars carrying different types of hazardous materials from interacting with each other. By way of example, a tank car carrying a Hazard Class 2 gas (which would include LNG) is prohibited from being closer than six cars from a locomotive or next to open-topped cars, certain flatcars, and other rail cars deemed hazardous to the tank car in the event of a derailment.

FRA imposes general train speed restrictions that depend on the class of the track, such as 60 mph for Class 4 and 80 mph for Class 5 track. In cases where there are additional speed restrictions for trains carrying hazardous materials, the regulations usually specify a maximum allowable speed of 50 mph. For instance, when a train is carrying one or more tank cars of material that is poisonous (or toxic) by inhalation, the maximum allowable operating speed is 50 mph (49 CFR § 174.86(b)). Train speeds are also the subject of railroad industry guidance. Notably, the Association of American Railroads (AAR) has addressed the speed of trains carrying hazardous materials in its recommended railroad operating practices for "Key Trains." According to the guidance, any train with 20 carloads or intermodal portable tank loads of any combination of hazardous material should not exceed 50 mph.

In addition, models that simulate longitudinal train dynamics and operations are tools that describe train behavior using digital representations of real-world situations and can be used to guide rail operations. The committee evaluated FRA's deployment of the Train Energy and Dynamics Simulator (TEDS) software during Phase 1 of this study and concluded that "simulation studies are essential tasks in the analysis and prediction of new or different train operations."⁴

Security Planning and Route Selection

Shippers and carriers of certain specified hazardous materials, as identified in regulation, are required to adopt a safety and security plan (40 CFR § 172,

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³ Francis P. Mulvey and Michael F. McBride, "Railroads Common Carrier Obligation: Its Legal and Economic Context," USDA Cooperative Agreement Number 19-TMTSD-MD-0007, April 2020, 10.22004/ag.econ.303739.

⁴ National Academies of Sciences, Engineering, and Medicine, *Preparing for LNG by Rail Tank Car: A Review of a U.S. DOT Safety Research, Testing, and Analysis Initiative* (Washington, DC: The National Academies Press, 2021), pp. 49–58, https://doi.org/10.17226/26221.

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Subpart I). The plan must be based on an individualized assessment of the risks that may occur during all stages of transportation, to include personnel security, unauthorized access, and en route security. As part of this planning, railroads must analyze the safety and security risks of the routes and railroad facilities used to transport these identified hazardous materials. The analysis must take into account the 27 factors listed in Box 5-1 that pertain to conditions such as the route's traffic density, maintenance, grade, and curvature that can affect the potential for a derailment. The analysis must also be conducted on any alternative viable routes, including those using interchange agreements with other carriers. FRA, which does not prescribe a specific type of analysis methodology, has authority to order the railroad to follow an alternative route if the railroad's analysis is found deficient and after consultation with the Transportation Security Administration and the Surface Transportation Board (49 CFR § 172.820(j)).⁵ Based on the results of the analysis, the railroad is expected to "select the practicable route posing the least overall safety and security risk" (49 CFR § 172.820).

The railroads and FRA conduct inspections of rail infrastructure including tracks. FRA requires railroads to conduct internal rail defect inspections for Class 4 and 5 tracks at least once every 370 days and to also inspect Class 3 track at the same interval when it meets regulatory criteria as a hazardous materials route (49 CFR § 213.237(j)). This additional inspection requirement supplements frequent and regular inspections of track components. AAR's recommended railroad operating practices establish enhanced track inspection for Key Routes, whose criteria are similar to those of the regulatory criteria. AAR recommends that inspections be conducted for rail defects and track geometry at least twice per year on Key Routes that are main track and at least once per on Key Routes that are sidings. AAR's recommendations do not define Key Route by class of track.⁶

Employee Training and Emergency Preparedness

All transportation businesses engaged in shipping of hazardous materials are required to meet regulations for the training of employees (49 CFR § 172.700–704), including training specific to the relevant mode. The business must ensure that employees have general awareness and function-specific training as well as safety training and security awareness training.

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⁵ Railroads typically choose one of two models for their analysis: the Rail Corridor Risk Management System (RCRMS) or the Hazmat Transportation Analytical Risk Model (see FRA Hazardous Material Guidance 105, January 2018).

⁶ Association of American Railroads, "Recommended Railroad Operating Practices for the Transportation of Hazardous Materials," OT-55-Q, 2018. AAR's recommendations, last updated in 2018, do not specify whether LNG in tank cars should contribute to the lower or higher threshold. LNG in portable tanks contributes to the higher threshold.

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The safety training should cover emergency response, measures to protect employees from the specific hazard, and methods and procedures for avoiding accidents (49 CFR § 172.704(a)(3)). Emergency response information should be "immediately accessible" to employees and personnel on the scene and through marking an emergency response telephone number (49 CFR § 172.600-606).

BOX 5-1

The 27 Factors to Be Considered When Analyzing the Safety and Security of Routes (49 CFR Part 172, Appendix D)

- 1. Volume of hazardous material transported;
- 2. Rail traffic density;
- 3. Trip length for route;
- 4. Presence and characteristics of railroad facilities;
- 5. Track type, class, and maintenance schedule;
- 6. Track grade and curvature;
- Presence or absence of signals and train control systems along the route ("dark" versus signaled territory);
- 8. Presence or absence of wayside hazard detectors;
- 9. Number and types of grade crossings;
- 10. Single versus double track territory;
- 11. Frequency and location of track turnouts;
- 12. Proximity to iconic targets;
- 13. Environmentally sensitive or significant areas;
- 14. Population density along the route;
- 15. Venues along the route (stations, events, places of congregation);
- 16. Emergency response capability along the route;
- 17. Areas of high consequence along the route, including high consequence targets defined as a property, natural resource, location, area, or other target designated by the Secretary of Homeland Security that is a viable terrorist target of national significance, the attack of which by railroad could result in catastrophic loss of life, significant damage to national security or defense capabilities, or national economic harm;
- 18. Presence of passenger traffic along route (shared track);
- 19. Speed of train operations;
- 20. Proximity to en-route storage or repair facilities;
- Known threats, including any non-public threat scenarios provided by the U.S. Department of Homeland Security or the U.S. Department of Transportation for carrier use in the development of the route assessment;
- 22. Measures in place to address apparent safety and security risks;
- 23. Availability of practicable alternative routes;
- 24. Past incidents;
- 25. Overall times in transit;
- 26. Training and skill level of crews; and
- 27. Impact on rail network traffic and congestion.

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SPECIAL CONDITIONS: THE CASE OF HIGH-HAZARD FLAMMABLE TRAINS

The regulatory requirements and industry recommended practices summarized above have emerged over decades of experience transporting hazardous materials by rail and other modes. In some cases the requirements and practices were put in place in response to tragedies; for instance, speed restrictions were imposed on trains transporting tank cars containing poison gases after a derailment of chlorine cars killed nine, injured hundreds, and forced thousands of residents to evacuate their homes in Graniteville, South Carolina, in 2005.⁷ In many other cases, the requirements were established in a more proactive manner in recognition of the special risks posed by hazardous materials shipments and the importance of avoiding harm.

Because LNG had not been transported by rail in the United States, the supplemental requirements or conditions that were placed on the transportation of LNG shipments by portable tank (in Alaska and Florida) and tank car are examples of PHMSA and FRA being proactive and cautious. Undoubtedly, fresh in the memory of regulators and the railroad industry was the troubled safety record during the early 2010s of ethanol and crude oil being transported by tank car. While a detailed account of this experience can be found in the 2018 Transportation Research Board (TRB) report Safely Transporting Hazardous Liquids and Gases in a Changing U.S. Energy Landscape, the crux of the problem is that large volumes of the flammable liquids ethanol and crude oil started being transported by rail in the general-purpose DOT-111 tank cars. Following a series of tank car derailments and fires, by 2012 PHMSA and FRA had launched the Safe Transportation of Energy Products (STEP) initiative. STEP consisted of a series of federal and industry coordination activities that ultimately resulted in the adoption in May 2015 of the final rule HM-251, Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains (HHFTs).

HM-251 defined an HHFT 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" (49 CFR § 171.8). The rule was intended to be comprehensive by including provisions to prevent tank car derailments, limit the severity of incidents when they do occur, and assist state and local agencies in planning and preparing a safer and more effective emergency response to incidents. To reduce the likelihood of HHFT derailments, railroads were required to apply the same 27-factor analysis

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⁷ National Transportation Safety Board, "Collision of Norfolk Southern Freight Train 192 with Standing Norfolk Southern Local Train P22 with Subsequent Hazardous Materials Release at Graniteville, South Carolina January 6, 2005" (NTSB/RAR-05/04).

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used for routing trains containing cars loaded with poison gases toxic by inhalation (TIH), as shown in Box 5-1. Second, the rule requires that train speeds be restricted to 50 mph in all areas, which is the same as the limit for TIH trains. While the main purpose of the speed limit was to reduce the severity of incidents, lower train speeds are also viewed as having the potential to prevent some incidents such as overspeed derailments.

STEP also directed grants to fund track safety improvements in areas affected by the increased transportation of energy products by rail and provided support for additional scientific research on the properties of crude oil.⁸ Although not part of the HHFT rulemaking, in 2015 FRA also launched the Crude Oil Route Track Examination (CORTEx) program to further its goal to prevent incidents. This program concentrates increased track inspections on crude oil routes by a team of inspectors. Afterward, regional inspectors are instructed to reinspect items that had been identified by the CORTEx team.⁹

Another significant provision of HM-251 was an upgraded design specification for tank cars used in crude oil and ethanol service. The rule created the new DOT-117 standard that contains several enhancements to increase resistance to tank punctures such as thicker tank shells and fullheight head shields, reduce overpressurization from exposure to heat from fires (e.g., thermal insulation and jackets, larger pressure relief devices), and minimize crash-related damage to top and bottom fittings.

Railroads operating an HHFT were also required to make additional notifications to support state, tribal, and local emergency response planning (49 CFR § 174.312). For instance, railroads are expected to notify the

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⁸ Pipeline and Hazardous Materials Safety Administration, "Safe Transportation of Energy Products Overview," n.d., accessed May 9, 2022, https://www.phmsa.dot.gov/ safe-transportation-energy-products/safe-transportation-energy-products-overview; Federal Railroad Administration, "Federal Railroad Administration's Action Plan for the Safe Transportation of Energy Products (STEP)," n.d., accessed May 4, 2022, https://railroads. dot.gov/elibrary/safety-action-plan-hazardous-materials-safety; PHMSA; Federal Railroad Administration, "Railroad Safety Grants for the Safe Transportation of Energy Products by Rail Grant Program FY 2015," last updated October 21, 2019, https://dotcms.fra.dot. gov/grants-loans/competitive-discretionary-grant-programs/railroad-safety-grants-safetransportation.

⁹ Federal Railroad Administration, "Federal Railroad Administration's Action Plan for the Safe Transportation of Energy Products (STEP)," n.d., accessed May 4, 2022, https://railroads. dot.gov/elibrary/safety-action-plan-hazardous-materials-safety; Pipeline and Hazardous Materials Safety Administration, "Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains," *Federal Register*, 80 FR 26643, May 8, 2015, https://www.federalregister.gov/documents/2015/05/08/2015-10670/hazardous-materials-enhanced-tank-car-standards-and-operational-controls-for-high-hazard-flammable; National Academies of Sciences, Engineering, and Medicine, *Safely Transporting Hazardous Liquids and Gases in a Changing U.S. Energy Landscape* (Washington, DC: The National Academies Press, 2018), pp. 101–102, https://doi.org/10.17226/24923.

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appropriate state and tribal officials of the estimated number of HHFTs per week, their routes, emergency response information, and a point of contact.

SPECIAL CONDITIONS FOR MOVING LNG BY RAIL

It is interesting that FRA's first approval for transporting LNG by rail in UN-T75 portable tanks was granted to the Alaska Railroad Corporation in October 2015, shortly after PHMSA's issuance of HM-251 in May of that year. The approval set conditions for track inspection, hazardous materials training for railroad personnel, specialized training for local emergency responders, speed limits, incident management, and reporting requirements. Two years later, in granting approval to Florida East Coast Railway to transport LNG in the same type of portable tank, FRA also set conditions for track inspection and route planning analysis. It is reasonable to assume that the experience with HHFTs was a factor in FRA's decision to attach these conditions to approvals of petitions for a new hazardous liquid to be transported in bulk by rail.

When PHMSA authorized the transportation of LNG by tank car for the first time in a final rule in July 2020, the resemblance to the HHFT conditions were even stronger. Most significantly, PHMSA required the use of a cryogenic tank car with an upgraded outer tank, the DOT-113C120W9, as discussed in Chapter 4. In addition, the rule added LNG tank car shipments to the list of hazardous materials requiring compliance with 49 CFR § 172.820, which requires railroad carriers transporting listed hazardous materials to conduct additional planning and route analysis for safety and security annually, as discussed above.¹⁰

While the July 2020 LNG rule does not set any restrictions affecting train speed, it does require enhanced braking by mandating the use of two-way end-of-train devices or distributed power for trains carrying 20 or more loaded tank cars of LNG in a continuous block or 35 or more loaded tank cars. For monitoring tank integrity, the shipper is required to remotely monitor each tank car's location and pressure and notify the carrier if the tank pressure rises by more than 3 psig in any 24-hour period. While existing regulations had already required that shipments of cryogenic liquids in class DOT-113 tank cars be monitored for pressure rise, the LNG rule required that shippers identify the location of the tank car to notify the carrier of increases above this threshold.

It merits noting that, as a flammable cryogenic material, LNG shipments by tank cars are subject to long-standing regulations for timesensitive shipments. If the consignee (designated tank car recipient) has

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¹⁰ "Hazardous Materials: Liquefied Gas by Rail," *Federal Register*, 85 FR 44994, July 24, 2020.

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not received the tank car within 20 days from the date of shipment, the shipper must notify the FRA (49 CFR § 173.319(a)(3)). LNG in tank cars would also be subject to the "48-hour rule" (49 CFR § 174.14), which requires carriers to forward a shipment within 48 hours of arriving at any location, with some exceptions. This rule is designed to expedite shipments of hazardous materials and to prevent shipments of flammable gases in tanks cars from being unofficially stored on a carrier's track.¹¹ A summary comparison of the conditions attached to the Alaska and Florida special permits for transporting LNG by portable tank and the authorization for shipping LNG by railroad tank car are shown in Table 5-1.¹² The table also lists the conditions attached to the (now expired) December 2019 PHMSA special permit authorizing the transportation of LNG in standard DOT-113 cryogenic tank cars between Wyalusing, Pennsylvania, and Gibbstown, New Jersey.

TABLE 5-1 Comparison of Special Operating Requirements for Moving

 LNG by Rail

	FRA Approval: FEC/Florida	FRA Approval: ARRC/Alaska	PHMSA Special Permit: ETS/PA-NJ	2020 Regulations
Type of Tank	UN-T75 Portable Tank, on well car	UN-T75 Portable Tank, on flat car	DOT-113C120W tank car	DOT-113C120W9 tank car
Applicability	Applicant: FEC, the carrier	Applicant: ARRC, the carrier	Applicant: ETS, the shipper	All shippers and rail carriers of LNG
Route	Approved for designated origin– destination pairs, all within operating network of FEC	Approved for designated origin- destination only, using specified route	Approved for designated origin- destination only; no intermediate stops Detailed plan for quantities and timelines to be completed	Must comply with 49 CFR § 172.820, which requires annual consideration of 27 factors that impact route safety
Maximum Tanks per Train	10 tanks; 1 tank per car	24 tanks; 2 tanks per car	No	Not applicable

¹¹ Federal Railroad Administration, "Hazardous Material Guidance-120," December 2017, https://railroads.dot.gov/sites/fra.dot.gov/files/2020-01/signed%20HMG120.pdf.

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¹² Federal Railroad Administration to Florida East Coast Railway, "Letter of Approval," May 1, 2018.

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	FRA Approval: FEC/Florida	FRA Approval: ARRC/Alaska	PHMSA Special Permit: ETS/PA-NJ	2020 Regulations
Limits on Trains	2 per day	2 per week	No	Not applicable
Position in Train	Car placement in train must be consistent with risk assessment	Prohibited from being nearer than the fifth car from any locomotive in a train consist.	Nothing required above existing train placement requirements	Nothing required above existing train placement requirements
Enhanced Braking	Train consisting of 10 tanks requires two- way end-of- train device or distributed power	Nothing required above existing requirements	20 or more loaded tank cars requires two-way end-of- train device or distributed power	20 or more loaded tank cars of LNG in a continuous block or 35 or more loaded tank cars of LNG throughout the train require two-way end-of- train device or distributed power
Speed Limits	50 mph for consist trains with 10 loaded tanks; speed part of risk assessment	50 mph; 40 mph in or near listed populated areas; 20 mph in tunnel	Nothing required above existing requirements	Nothing required above existing requirements
Track Inspections	Track geometry car inspection, minimum 1 annually; internal rail flaw inspections, 4 annually	Track geometry car inspection, minimum 1 annually; internal rail flaw inspections, 4 annually	Not applicable	No additional
Training, Employee (standard is every 3 years)	No additional	LNG hazard training to train crews, <i>annually</i>	No additional	No additional
Training, Emergency Responders	Outreach plan to first responders and local governments, 30 days before first shipment	LNG hazard and emergency response training for responders along route, <i>annually</i>	LNG hazard and emergency response training for affected responders, before first shipment	No additional

 TABLE 5-1 Continued

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	FRA Approval: FEC/Florida	FRA Approval: ARRC/Alaska	PHMSA Special Permit: ETS/PA-NJ	2020 Regulations
Remote Monitoring, Shipper or Offerer	Not applicable	Not applicable	Tank internal pressure, location, and leakage.	Tank location and pressure; notify the carrier if the tank pressure rises by more than 3 psig in any 24- hour period
Incident Reporting (additional)	Any incident involving shipment of LNG, to FRA	Any incident involving train carrying LNG, to FRA	Any incident involving tank car, to PHMSA	No additional
Risk Assessment	A train consist of 10 loaded tanks triggers additional route planning analysis	For route: hazard assessment; mitigation identification and monitoring	No additional risk assessment outside permit process and hazardous materials regulations	Added LNG in tank car to regulation requiring additional route planning analysis
Reporting	Summary of operations, LNG units, trains, and problems, to FRA, quarterly	LNG units to FRA, monthly; Meetings w/ FRA, monthly	Quantities and plan compliance, quarterly to PHMSA	No additional

TABLE 5-1 Continued

SOURCES: Federal Railroad Administration (FRA) to Florida East Coast Railway, Letter of Approval, May 1, 2018; FRA to Alaska Railroad Corporation (ARRC), "Letter of Approval," June 21, 2021, https://downloads.regulations.gov/FRA-2021-0064-0001/ attachment_1.pdf; FRA to ARRC, "Letter of Approval," October 9, 2015, https://downloads.regulations.gov/FRA-2021-0064-0005/attachment_1.pdf; Pipeline and Hazardous Materials Safety Administration, DOT Special Permit 20534, December 5, 2019, https://www. phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/safe-transportation-energy-products/72906/ dot-20534.pdf; "Hazardous Materials: Liquefied Gas by Rail," Federal Register, 85 FR 44994, July 24, 2020; https://www.federalregister.gov/documents/2020/07/24/2020-13604/ hazardous-materials-liquefied-natural-gas-by-rail#h-40.

SAFETY RECORD OF TRANSPORTING LNG AND OTHER **CRYOGENIC AND FLAMMABLE MATERIALS**

Shipments of LNG have been transported in the United States for decades with few incidents. A review of this safety record is provided next for LNG shipments in tanker vessels and cargo tank motor vehicles as well as in portable tanks transported on multiple modes. A review of the incident data for LNG facilities is also provided because the modes serve these facilities. The section concludes with a review of the safety record of tank cars

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transporting flammable and cryogenic materials and the safety record of LNG shipped by rail in Japan.

Marine Tanker Ships

The vast majority of ships transporting LNG to and from U.S. ports are foreign-flag vessels, which are inspected every 2 years by the U.S. Coast Guard under the Certificate of Compliance program. Due to increased LNG exports and ship traffic, these inspections (or exams) have been increasing almost 17 percent per year since 2017, reaching 279 in 2021. Even with this marked increase in ocean-going LNG shipping, tanker vessels carrying LNG have been involved in few incidents and the U.S. Coast Guard has detained only one inspected vessel.

A review of incidents worldwide involving LNG ships shows a similarly strong safety record outside the United States. From 2011 to 2021, LNG ships experienced 22 incidents, none involving cargo-related issues (most were groundings and or involved mechanical issues).¹³ Incident (casualty) data reported by the U.S. Coast Guard shows that cargo-related issues have not been the cause of any marine casualties on LNG ships during the past 10 years (see Table 5-2). The ships experienced 14 reportable incidents with only 1 involving injuries (to crew) from 2012 to 2021.¹⁴ An incident is considered reportable when the vessel incurs structural damage, a mechanical breakdown, or other problem that renders it unseaworthy.

Cargo Tank Motor Vehicles

According to PHMSA data, from 1990 to 2021, trucks carrying LNG in cargo tanks were involved in 16 incidents, including 6 since 2012. Crashes

Loss of Propulsion/Steering	11
Mechanical Failure	3
Collision	3
Grounding	1
Injury	1

TABLE 5-2 Type and Number of Casualties on LNG Ships Operating in U.S. Waters, Reported by the U.S. Coast Guard, 2012–2021¹⁵

¹³ U.S. Coast Guard, "Maritime Transport of LNG: USCG Compliance and Enforcement," committee presentation, September 21, 2021.

¹⁵ Ibid.

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¹⁴ Ibid.

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or collisions were the cause of 7 incidents, with equipment defects or failures the cause of the other 9 incidents. Five of these 9 incidents occurred during cargo transfer. LNG was not released in 4 of the 16 incidents and fewer than 100 gallons were released in 8 of the 16. Four incidents did involve a release of 1,000 or more gallons of LNG, including one caused by a highway crash. None of the 16 incidents since 1990 have involved a fatality, but two injuries were reported during incidents involving cargo transfer.

Intermodal Portable Tanks

As reported in earlier chapters, Florida East Coast Railway has moved LNG in intermodal containers since 2017 without incident.¹⁶

LNG Facilities

From 2012 to 2021, PHMSA received report of 30 incidents at LNG facilities; however, only 2 were related to transportation: One of the two occurred during an equipment failure during truck loading. The other involved an emergency shutdown of the facility after a power failure caused by a fire that did not involve LNG but that did involve a tank truck striking a stationary rail car. None of the two incidents resulted in a release or fatality, but one person was injured during the evacuation of the shutdown facility.¹⁷

Safety Record of Cryogenic and Flammable Materials Transported by Rail Tank Car

As shown in Table 5-3, the majority of cryogenic commodities transported by tank car are shipments of liquid argon and ethylene. Ethylene, like LNG, is a flammable material as well as a cryogen. Other types of cryogens, including liquid nitrogen and oxygen, usually comprise less than 15 percent of traffic during any given year. As discussed in Chapter 4, the approved cryogenic tank car for these hazardous liquids is the DOT-113.

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¹⁶ Pipeline and Hazardous Materials Safety Administration and Federal Railroad Administration, "International Empirical Review Task Resource," August 13, 2020, http://onlinepubs.trb.org/onlinepubs/dvb/LNGrail/Intl_Review.pdf.

¹⁷ Pipeline and Hazardous Materials Safety Administration, "LNG Incident Data, January 2011 to Present," February 16, 2022, https://www.phmsa.dot.gov/data-and-statistics/pipeline/ distribution-transmission-gathering-lng-and-liquid-accident-and-incident-data.

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	Argon	Ethylene	Other	Total
2015	1,588	356	262	2,206
2016	1,611	321	100	2,032
2017	1,731	314	63	2,108
2018	1,669	255	231	2,155
2019	1,978	244	203	2,425
2020	1,879	262	384	2,525

TABLE 5-3 Cryogenic Tank Car Shipments, 2015–2020¹⁸

NOTE: Ethylene is also a flammable material.

Serious incidents involving railroad tank cars carrying cryogenic argon and ethylene have been rare, as shown in Table 5-4. Between 2015 and 2020, tank cars transported more than 10,000 shipments of argon. During this time, 55 incidents were reported, including 7 incidents resulting in a bulk release, 1 incident with an injury related to the cargo, and 2 incidents resulting in an evacuation.¹⁹ Only 1 of the 55 reported incidents stemmed from a derailment. The most common causes of incidents were human error and equipment failures, such as an open valve, ruptured disc, leaking valve, or crack in a piping line.

During the same period from 2015 to 2020, more the railroads moved more than 1,700 tank car shipments of cryogenic ethylene. During this time, there were four reported incidents, none of which were categorized as a having bulk release, evacuation, or injury. All four were caused by human error, including loose and open valves and a tank not being properly emptied.

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¹⁸ Todd Treichel "Research Update Related to Cryogenic Tank Cars," November 9, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/TreichelRSI-AARRail-TankSafety110921.pdf.

¹⁹ U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, "Incident Statistics," n.d., https://www.phmsa.dot.gov/hazmat-program-managementdata-and-statistics/data-operations/incident-statistics.
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 TABLE 5-4 Total Argon and Ethylene Tank Car Incidents,

 2015–2020^{20,21}

			Number of Incidents		Incidents Involving		
Commodity	Tank Car Shipments	Total Incidents	Caused by Derailment	Fatalities	Bulk Release	Evacuation	Injury from Commodity
Argon	10,456	55	1	0	7	2	1
Ethylene	1,752	4	0	0	0	0	0

In addition to PHMSA-reported incidents, the Railway Supply Institute (RSI)-AAR Railroad Tank Car Safety Research and Test Project collects data on damage to, or the failure of, tanks cars and their components that provide or protect containment of the lading.²² Between 1980 and 2020, 17 DOT-113 cars were classified as damaged, which includes damage on tank car–specific features such as the inner tank, valves and fittings, head shields, or outer tank. Of the 17 DOT-113 tank cars damaged, 9 contained ethylene, 7 contained argon, and 1 was unknown. Three of these incidents occurred between 2015 and 2020, all of which involved cryogenic argon. None of these incidents occurred between 2015 and 2020.²³

LNG BY RAIL IN JAPAN

In Japan, one company, JAPEX, uses rail as part of its LNG supply chain. It has shipped LNG in intermodal containers since 2000. JAPEX subcontracts intermodal transport to JOT—Japanese Oil Transport. On average, 23 portable tanks are shipped by JOT by rail per day.²⁴ The rail service is provided by JR Freight. JOT uses a specially designed intermodal portable tank (i.e., not a UN-T75 portable tank) with a capacity of 6,600 gallons (25 m³). JR Freight transports the portable containers on flatcars as part

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²⁰ U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, "Incident Statistics," n.d., https://www.phmsa.dot.gov/hazmat-program-managementdata-and-statistics/data-operations/incident-statistics.

²¹ Todd Treichel "Research Update Related to Cryogenic Tank Cars," November 9, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/TreichelRSI-AARRail-TankSafety110921.pdf.

²² That is, damage to or failure of other equipment, such as trucks or wheels, does not qualify a car for inclusion.

²³ Data from Todd Treichel "Research Update Related to Cryogenic Tank Cars," November 9, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/TreichelRSI-AARRail-TankSafety110921. pdf.

²⁴ Federal Railroad Administration, "Memo on JAPEX response to questions on LNG by Rail," n.d.; see also Richard D. Stewart and Hiroko Tada, "Japan Liquefied Natural Gas (LNG) Intermodal Container Operations: Applicability to U.S. Operations," Paper presented at 51st Annual Conference, CTRF, 2016.

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of mixed-freight trains. JR Freight owns little of its own track and mostly transports freight on track owned by passenger rail companies; as a consequence, trains are limited to a maximum length of fewer than 30 cars.²⁵

Since 2000, the LNG shipments have resulted in only three incidents, all with minor consequences. Two were caused by defects in the tank and one was caused by the improper transfer of the portable tank. Rail was not the cause of either incident.²⁶ JOT is responsible for training all its personnel involved in LNG transport. The company has a dedicated training facility capable of conducting drills on operating procedures and providing in-depth education on emergency response. Education and training are conducted annually, at a minimum, and more frequently depending on employee experience and skill level. JOT also maintains the tanks.²⁷ It merits noting that the JR Freight has the discretion to refuse to carry LNG on a route; however, the only route prohibited to date was one that traversed the 33-mile Seikan Tunnel.

SUMMARY

Precaution, Preparation, and Vigilance to Ensure Safety

Decades of experience and learning about safely transporting LNG by truck and ship suggest that similar levels of safety performance can be achieved in the rail environment, where other cryogenic and flammable materials have been transported by rail in cryogenic tank cars with rare occurrence of incidents. A long-standing framework of regulation and industry practice is in place to ensure the safe transportation of bulk shipments of cryogenic and flammable materials that includes requirements for shipment packaging and handling, train operations, route selection and security planning, track inspection, railroad and shipper employee training, and emergency response preparedness. Shipments of LNG by tank car will be subject to these requirements, as well as several added requirements specified by PHMSA and FRA when authorizing LNG's movement by rail.

Many of the added requirements, including an upgraded tank car, were patterned after those put in place to ensure the safe shipment of crude oil and ethanol by tank car. Until about 15 years ago, these two flammable liquids (which are not cryogenic) had not been moved in large quantities

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²⁵ Pipeline and Hazardous Materials Safety Administration, "Liquefied Natural Gas (LNG) by Rail Task Force: Task 15: Empirical Review of International LNG Rail Transport," n.d.

²⁶ Federal Railroad Administration, "Memo on JAPEX response to questions on LNG by Rail," n.d., "International Empirical Review Task Resource," August 13, 2020, http://online-pubs.trb.org/onlinepubs/dvb/LNGrail/Intl_Review.pdf.

²⁷ Japan Oil Transportation, "LNG Transportation," accessed April 6, 2022, https://www.jot.co.jp/en/service/lng.html.

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by tank car for many years. A rapid uptick in demand led to large quantities being moved regularly in general-purpose, non-pressure tank cars, and often in large blocks and unit trains. In this case, key elements of the safety assurance system failed, overtaken by the speed and scale of this new traffic and lack of anticipation by regulators, shippers, railroads, and emergency responders of the attendant hazards. After dozens of derailments and other accidents involving these shipments, regulators, shippers, railroads, and tank car builders and fleet owners had to make major changes to the safety assurance system, from the introduction of more crashworthy and thermalresistant tank car designs and maximum train operating speeds to new protocols for track inspection and for providing guidance and information to emergency planners and responders. The actions taken were essential and impactful, but largely reactive to hazards already experienced by communities, emergency responders, and rail workers in the field.

Having learned from the experience with crude oil and ethanol, regulators and industry have taken early and deliberate precautionary steps to ensure the safety of rail shipments of LNG. However, it is important to keep in mind that LNG rail shipments will be transported in a tank car with design changes, in volumes and on routes that remain unclear, and through communities whose emergency responders may have little, if any, experience with incidents or training scenarios involving LNG. Under these circumstances, emergency responders will require advance training and guidance, while vigilance will be needed for detecting safety challenges early, and ideally before large-scale shipping begins.

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Emergency Preparedness and Response

Emergency preparedness and response planning for hazardous materials is practiced at the local, state, and federal levels and by the chemical and transportation industry to ensure first responders, employees, and transportation personnel are prepared to handle hazardous materials incidents by all modes, including rail.

This chapter outlines the likely challenges that moving liquefied natural gas (LNG) by tank car would pose for emergency responders, followed by brief descriptions of the current emergency planning, preparedness, and response activities for hazardous materials incidents conducted by government and industry. The chapter closes with an overview of emergency response training for LNG, including the development of materials and guidance addressing LNG by rail. Given the potential for an increase in the transport of flammable, cryogenic materials by tank car, federal agencies are already preparing for the need for such emergency response training. The federal and industry response to increased incidents in the early 2010s involving high-hazard flammable trains (HHFTs) is serving as a model.

LNG CHALLENGES FOR EMERGENCY RESPONSE

Moving LNG by tank car presents several challenges for the agencies responsible for responding to hazardous materials incidents. This section highlights concerns about local emergency response capabilities as well as the availability and adequacy of training materials.

As LNG begins moving by tank car, assessing the emergency response capabilities and resources along the routes will take on added importance.

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While most responders will have extensive familiarity with natural gas in pipeline systems, most first responders will not have encountered such incidents involving LNG due to the relatively small volume of LNG shipments. For ethylene, the only other flammable cryogen currently transported by tank car, there were fewer than 300 rail car loads per year over the past 5 years.¹ LNG incidents may occur in remote, rural areas with reduced exposure and consequences but limited access to hazardous materials response resources. The response may have to come from a regional, statewide, or railroad hazardous materials response team, which will take time. Depending upon incident location, evacuation from the area surrounding a leak or fire could overwhelm local response resources. According to the 2020 Pipeline and Hazardous Materials Safety Administration (PHMSA) Emergency Response Guidebook (ERG), the recommended evacuation distance for a tank car involved in an LNG fire is 1 mile (1,600 meters) in all directions, comparable to the guidance for other flammable liquefied gases such as propane and butane.^{2, $\overline{3}$}

Hazardous materials response in rural areas is likely to be initially coordinated by firefighters who may have little experience with hazardous materials and may therefore be overwhelmed by hazardous materials incidents.⁴ Volunteers represent 67 percent of firefighters in the United States, and 65 percent of fire departments are all-volunteer, most serving rural areas. Many volunteer firefighters serve only part time.⁵

For a large LNG pool fire commensurate with the capacity of a DOT-113 tank car, there may also be a need for additional firefighting equipment and tactical training. According to the International Association of Fire Fighters, most fire departments do not have bulk quantities of high-expansion foam or potassium bicarbonate dry chemical (e.g., Purple K) required to extinguish a large LNG pool fire.⁶

Although a significant body of knowledge and experience exists on the transportation of LNG by marine tanker and cargo tank motor carrier,

¹ Todd Treichel, "Research Update Related to Cryogenic Tank Cars," November 10, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/TreichelRSI-AARRail-TankSafety110921.pdf.

² Ron Hasson, "LNG Transportation by Rail," November 10, 2021, http://onlinepubs.trb. org/onlinepubs/C4rail/HassanIAFFOppositionLNGRail110921.pdf.

³ Pipeline and Hazardous Materials Safety Administration, *Emergency Response Guidebook* 2020, pp. 168–169, https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2021-01/ERG2020-WEB.pdf.

⁴ Timothy Gablehouse, "EPCRA & LEPCs LNG ISSUES," November 10, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/GabelhouseEPCSRA-LEPCSLNGIssues110921.pdf.

⁵ National Fire Protection Association, "U.S. Fire Department Profile," December 2021, https://www.nfpa.org/News-and-Research/Data-research-and-tools/Emergency-Responders/ US-fire-department-profile.

⁶ Ron Hasson, "LNG Transportation by Rail," November 10, 2021, http://onlinepubs.trb. org/onlinepubs/C4rail/HassanIAFFOppositionLNGRail110921.pdf.

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there is little precedent for training materials or incident experience on the transport of LNG by tank car. Current North American experience is limited to small pilot operations in Alaska and Florida that move LNG via portable tanks (i.e., UN-T75). In addition, most hazardous materials awareness and operations-level training curricula are not product specific but provide emergency response information based upon hazard class and general strategic and tactical considerations. Firefighters are not as familiar with LNG and its related containers as they are with other Class 2.1 gases, such as propane, butane, and propylene and with Class 3 flammable liquids, such as crude oil and ethanol. The PHMSA's ERG, which provides emergency responders with initial guidance on a substance's hazards, emergency response methods, and public safety, includes LNG in Guide 115, which covers all flammable gases, including those transported as cryogenic liquids, in a single two-page guide.⁷ As part of the continuous evaluation of the ERG, emergency response to LNG-related incidents is being evaluated to ensure that the current guidance is applicable.

EMERGENCY PLANNING AND PREPAREDNESS

Emergency planning and preparedness for hazardous materials is most effective when there is collaboration between industry, government, and the local community. Industries that manufacture and store hazardous materials are required to develop and maintain facility emergency plans and to prepare risk management plans if they store certain threshold planning quantities of hazardous materials.⁸ Railroads, as well as state and local officials, develop emergency response and operations plans to prepare for rail hazardous materials incidents, releases, and other emergencies. All plans need to be regularly updated to document the correct emergency response resources, contact information, necessary equipment, and emergency planning protocols to handle incidents involving hazardous materials.

The emergency planning requirements ensuring government, industry, and community coordination were codified in the Emergency Planning and Community Right-to-Know Act (EPCRA) adopted in 1986 to help

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⁷ The ERG is developed jointly by PHMSA and other partners every 4 years to assist first responders in making initial decisions at a hazmat/dangerous goods incident; PHMSA, "Emergency Response Guidebook," https://www.phmsa.dot.gov/hazmat/erg/emergency-response-guidebook-erg.

⁸ Risk Management Plans required for facilities using extremely hazardous substances inform emergency response personnel of the emergency response procedures, accident prevention, communications, and awareness. EPA Risk Management Program, https://www.epa.gov/rmp.

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communities plan for hazardous materials emergencies.⁹ Gas companies, manufacturers, LNG storage facilities, and LNG shippers have a responsibility to protect their workers and the community living outside the facility. The Occupational Safety and Health Administration (OSHA) introduced the Process Safety Management program in 1992 to protect employees inside hazardous materials facilities and require emergency action plans.¹⁰ In the context of LNG planning, this would pertain to protocols for the safe handling, loading, and unloading of LNG at facilities by truck, rail car, or ship. The U.S. Environmental Protection Agency (EPA) introduced the Risk Management Program in 1990 to protect the public and environment from the effects of a chemical release outside the facility and to require an Emergency Response Plan (ERP).¹¹ Other requirements include developing worst-case scenarios and off-site consequence plans. For LNG, emergency managers currently plan and train for the off-site consequences of an incident at an LNG facility or during the loading and unloading of a truck or ship at facilities where LNG liquefaction occurs. LNG facilities with pipeline access also come under the facility safety regulations administered by PHMSA's Office of Pipeline Safety (see Chapter 5).

Industry Emergency Preparedness

Industries that manufacture, store, and transport hazardous materials are also required to develop an ERP. The standard for responder competency and performance requirements is set by the National Fire Protection Association, which provides consensus-based guidance for employees and first responders responding to hazardous materials incidents. Regulatory requirements for an emergency response plan, levels of training, elements of the Incident Command System (ICS), and basic hazardous materials response skills are promulgated by OSHA.

In 1986, chemical, manufacturing, and transportation industries recognized the need to provide industry hazardous materials expertise to local

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⁹ EPCRA: The Emergency Planning and Community Right-to-Know Act, https://www.epa. gov/epcra, was a direct response by Congress to the 1984 Bhopal Disaster in India that raised concerns about industrial hazards worldwide (https://www.bhopal.com). EPCRA provided public access to toxics release inventories, required risk management plans, and required the establishment of State Emergency Response Commissions and Tribal Emergency Response Councils at the state level and Local Emergency Planning Committees and Tribal Emergency Planning Committees at the local level. These committees are responsible for obtaining Emergency Response Plans from hazmat facilities and for developing community plans to respond to chemical emergencies.

¹⁰ OSHA (49 CFR § 1910.38) requires facilities to maintain Emergency Action Plans, https://www.osha.gov/etools/evacuation-plans-procedures/eap.

¹¹ U.S. Environmental Protection Agency, Risk Management Program, https://www.epa.gov/rmp.

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communities and partnered to establish the Transportation Community Awareness Emergency Response (TRANSCAER) program. TRANSCAER is a voluntary organization comprised of industry experts that assists communities in preparing for and responding to hazardous materials incidents. Since its inception, TRANSCAER has brought together industry and response community professionals each year to develop training materials and conduct training and exercises for various hazardous materials, including chlorine, anhydrous ammonia, ethanol, crude oil, and, most recently, LNG.¹² Emergency responders train alongside LNG facility managers and other oil and gas industry personnel to learn important procedures and protocols for LNG handling, loading, unloading, transport, and emergency response.

Railroads also have a long history of hazardous materials planning and of working with local emergency officials to prepare for hazardous materials incidents. In addition to participating in TRANSCAER, the railroads provide training for emergency responders and plan with local officials preparing emergency response plans. In partnership with the International Association of Fire Chiefs, the railroad industry developed the AskRail app, which first responders can download to obtain detailed hazardous materials information by rail car in a train consist.¹³ In 2011, the railroad industry published a guidance document on railroad operations for hazardous materials, the "United States Hazardous Materials Instructions for Rail," that includes the federal rules and regulations on hazardous materials response protocols and railroad operations.¹⁴

Shift to "All Hazards" Planning and Training Approach

Although the shift to "all hazards" emergency planning that occurred after 9/11 added to firefighting training requirements, materials such as LNG still require specialized training at the operations and hazardous materials technician levels. In the aftermath of the terrorist attacks, hazardous materials preparedness expanded from planning for hazardous chemicals and fuels, as required by EPA and OSHA and further outlined in EPCRA, to an "all-hazards" emergency planning approach to meet the requirements of the U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA), and the Transportation Security Administration. This shift expanded the requirements for firefighter training to encompass not just

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 $^{^{12}}$ Transportation Community Awareness Emergency Response program, https://www.transcaer.com.

¹³ AskRail, https://www.iafc.org/topics-and-tools/resource/askrail-(tm)-app.

¹⁴ An example of the "U.S. Hazardous Materials Instructions for Rail – HM-1" can be found at https://www.regulations.gov/document/PHMSA-2018-0025-0631.

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chemical and fuel emergencies, but also weapons of mass destruction, active shooter scenarios, explosive devices, and technical rescue training. The expansion of the hazardous materials response curriculum increased the training requirements for all emergency responders, including the volunteer community. To meet this increased demand, training facilities expanded their offerings to additional specializations, including LNG.

EMERGENCY RESPONSE

Emergency response involves responding to incidents, taking action to save lives and protect the community, controlling hazardous materials releases, and preventing further property and environmental damage. The management framework for responding to LNG incidents is the same as for other hazardous materials incidents. First responders are trained in the National Incident Management System (NIMS) and ICS. NIMS provides a uniform framework for the management of large, complex incidents, such as those encountered in hazardous materials incident scenarios. ICS is the national standard for delivering a unified and effective emergency response. When an incident occurs, law enforcement or fire officials typically provide the initial emergency response. The incident commander, usually the senior fire officer responding to the incident, then establishes command, requests additional resources based upon the nature of the incident, and coordinates emergency response activities. For railroad incidents, a joint or unified response organization is established to coordinate response activities between the local jurisdiction, the responsible railroad, and related state and/or federal environmental agencies.

LNG TRAINING

When responding to an emergency, it is important for first responders, hazardous materials technicians, and incident commanders, as well as hazardous materials facility employees and railroad personnel, to have the requisite knowledge and skills to perform their assigned tasks.¹⁵ The delivery of an effective training and exercise program is the most effective way to test emergency operations plans. This section describes LNG-specific training programs in the United States and federal efforts to provide grants, training, and guidance.

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¹⁵ OSHA outlines responsibilities for responders at each level of operations, including awareness, operations, technician, specialist and on-scene commander, https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.120AppC.

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EMERGENCY PREPAREDNESS AND RESPONSE

LNG Training Programs

Two LNG emergency response training programs of note in the United States are in Massachusetts and Texas. When the United States began importing LNG in the 1970s, the Northeast Gas Company and the Massachusetts Firefighters Academy (MFA) joined efforts to develop a comprehensive emergency response to LNG training curriculum to address the requirements set forth in the U.S. Department of Transportation (U.S. DOT) regulations pertaining to LNG emergency training.¹⁶ The curriculum focused on protocols for unloading LNG gas carriers, maritime LNG safety, LNG facility emergency response, and the loading and unloading of LNG motor carriers. The MFA recently acquired a specially designed DOT-113 safety training rail car to help first responders become familiar with the design, construction and characteristics of a cryogenic tank car, and the technical requirements for LNG loading and handling (see Figure 6-1). The Texas A&M Engineering Extension Service (TEEX) is recognized as one of the top fire training schools in the world. TEEX has recently developed multiple LNG training modules for LNG spill control and fire suppression.¹⁷

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Railroads will also need guidance and programs to train their personnel in LNG-specific handling, operations, and emergency response. The Alaska and Florida East Coast Railroads conducted LNG emergency response training in advance of transporting LNG. LNG training is required by some states. For example, the Texas Railroad Commission requires managers



FIGURE 6-1 LNG safety training car. SOURCE: Photo courtesy of the Firefighters Education and Training Foundation.

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 $^{^{16}}$ Northeast Gas Association LNG Curriculum, https://www.northeastgas.org/tql-lng-safety.php.

¹⁷ The Texas A&M Engineering Extension Service, College Station, Texas, https://teex.org.

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and employees in contact with LNG in any capacity to pass a qualifying examination. $^{18}\,$

Federal Role: Grants, Training and Guidance

PHMSA and the Federal Railroad Administration (FRA) support hazardous materials training by providing grants, sponsoring training programs, and issuing guidance. PHMSA and FRA have also worked together to develop new training materials, programs, and guidance in response to a series of incidents in the early 2010s involving tank cars carrying crude oil and ethanol. The federal response to these HHFTs is a model for moving LNG by tank car.

PHMSA has administered the Hazardous Materials Emergency Preparedness grant program for state, local, and industry entities to fund transportation-related hazardous materials training and exercises since 1990.¹⁹ In response to the increased traffic of HHFTs, PHMSA also introduced the Assistance for Local Emergency Response Training grant program in 2015.²⁰

PHMSA and FRA have taken an active role in supporting training for first responders in advance of moving LNG by portable tank and tank car. PHMSA, the HAMMER Federal Training Center, and the National Fire Academy developed training and guidance materials for LNG that is based on a template that was developed for incidents involving HHFTs. The training includes operations-level training to complement baseline hazardous materials training specific to LNG and other flammable refrigerated materials, and technician-level training to provide guidance on LNG and other flammable cryogenic materials, their containers, and tactical guidance in the event of an emergency. In 2016, FRA and PHMSA hosted multiple LNG awareness trainings through the National Response Team, including *Emerging Risks Response Awareness Training for Liquefied Natural Gas.*²¹ In 2019, FRA and PHMSA sponsored an LNG Town Hall in Lancaster, Pennsylvania, with FEMA and the National Fire Academy to determine the

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¹⁸ Texas requires LNG certification for managers and employees handling LNG, https:// www.rrc.texas.gov/alternative-fuels/liquefied-natural-gas/certification-and-company-licensing/ certifications.

¹⁹ The Hazardous Materials Emergency Preparedness (HMEP) grant program was established by PHMSA in 1990 (https://www.phmsa.dot.gov/grants).

²⁰ PHMSA ALERT Grant, https://www.phmsa.dot.gov/grants/hazmat/assistance-local-emergency-response-training-alert.

²¹ National Response Team, https://www.nrt.org/main/Resources.aspx?ResourceType= Training%20and%20Educational%20Materials&ResourceSection=3. The U.S. National Response Team (NRT) is an organization of 15 federal departments and agencies responsible for coordinating emergency preparedness and response to oil and hazardous substance pollution incidents.

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preparedness for LNG incident response in Pennsylvania and New Jersey for a proposed LNG rail operation.²²

In 2020, PHMSA and FRA established a joint task force (Task Force) to prepare for the risk of transporting LNG by rail as well as other LNG safety measures. The Task Force coordinated with the emergency response community—first responders, emergency managers, emergency response teams representing carriers and shippers, and emergency response contractors—to ensure the appropriate level of awareness, training, and resources were available.²³

Federal agencies provide guidance to emergency responders. Examples of federal guidance include PHMSA's ERG;²⁴ safety data sheets required by OSHA,²⁵ which inform responders about cargo properties; and the National Oceanic and Atmospheric Administration's Computer-Aided Management of Emergency Operations, which provides information on fire hazards, health hazards, evacuations, firefighting, protective clothing, and first aid.²⁶ In 2015, PHMSA sponsored the Transportation Rail Incident Preparedness and Response (TRIPR) program to provide guidance for incidents involving crude oil and ethanol. The TRIPR program contains the elements that would also apply to LNG incident response such as incident management, problem identification, hazard assessment and risk identification, personal protective equipment, and other information that is critical to responding to incidents involving flammable and cryogenic commodities. To help first responders with additional LNG guidance and to provide a more standard approach to planning for LNG by rail, FRA developed a two-page LNG emergency responder guidance brochure based on the reference sheet created for HHFTs.27

SUMMARY

Moving LNG by tank car presents challenges for the agencies responsible for responding to hazardous materials incidents. Because only limited quantities of LNG and other flammable cryogens are transported in the

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²² National Academies of Science, Engineering, and Medicine, *Preparing for LNG by Rail Tank Car: A Review of a U.S. DOT Safety Research, Testing, and Analysis Initiative* (Washington, DC: The National Academies Press, 2021), pp. 2, 53.

²³ Ibid.

²⁴ Pipeline and Hazardous Materials Safety Administration, "Emergency Response Guidebook," 2020, https://www.phmsa.dot.gov/hazmat/erg/emergency-response-guidebook-erg.

²⁵ Occupational Safety and Health Administration, "Safety Data Sheets," https://www.osha.gov/sites/default/files/publications/OSHA3514.pdf.

²⁶ CAMEO Chemical Search Tool, https://cameochemicals.noaa.gov/search/simple.

²⁷ Federal Railroad Administration, "Emergency Responder Guidance: Liquefied Natural Gas (LNG)," https://railroads.dot.gov/sites/fra.dot.gov/files/fra_net/18510/Emergency%20 Responder%20Guidance%20LNG%20brochure.pdf.

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United States, few first responders have been trained in LNG emergency response and even fewer have been trained in responding to incidents involving LNG transported by rail. Firefighters are not as familiar with LNG and its related containers as they are with other Class 2.1 gases, such as propane, butane, and propylene, and with Class 3 flammable liquids, such as crude oil and ethanol. LNG incidents may occur in remote, rural areas with reduced exposure and consequences but limited access to hazardous materials response resources. The growth of LNG transportation will require additional emergency planning, responder training, and possibly equipment specifically tailored to LNG and to the LNG tank car. Two LNG emergency response training programs of note in the United States are in Massachusetts and Texas. The Northeast Gas Company and the MFA jointly sponsor LNG emergency training and the TEEX is recognized as one of the top fire training schools in the world. Resources are available to support the needed emergency preparedness efforts. They include industry programs such as TRANSCAER and AskRail and federal grants, training, and guidance. In addition, the federal government and industry can follow the lessons learned from and the models developed for shipments of large blocks of crude oil or ethanol in rail tank cars referred to as high-hazard flammable trains.

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Summary Assessment and Advice

As the domestic production of natural gas and demand from export markets has grown over the past decade, so too has demand for producing and shipping liquefied natural gas (LNG). By super-cooling natural gas to a cryogenic liquid, its volume is reduced significantly for storage and transportation in tanks and vessels. While most natural gas can be transported in compressed form by pipeline, LNG can be transported by other modes, including cargo tank motor vehicles, portable tanks, ship, and rail tank cars. The vast majority of LNG is shipped by marine vessel, usually to overseas markets, but also to some domestic markets such as Puerto Rico. Trucks transport LNG throughout much of the country, meeting demand where pipeline service is not available or where only small quantities of natural gas are needed. By and large, U.S. railroads do not transport LNG, except for limited services in Florida and Alaska, where shipments are made in cryogenic portable tanks. Currently, LNG is not transported by rail in tank cars, nor is there a history of such movements in the United States. However, the decades of experience with safely transporting LNG by cargo tank motor vehicle and marine vessel suggest that the safe transportation of LNG by rail can also be achieved.

LNG is regulated as a hazardous material when transported because it is a cryogenic liquid and flammable as a gas. In July 2020, the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) and Federal Railroad Administration (FRA) issued a rule authorizing the transportation of LNG in an upgraded version of a common cryogenic tank car, the DOT-113. This authorization was preceded by a research, testing, and analysis initiative led by a PHMSA–FRA task force

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(Task Force) charged with assessing the risks of transporting LNG by rail and for gaining a better understanding of how these risks can be prevented or managed. That work continued after the July 2020 authorization, including further testing, modeling, and hazard scenario analyses. This study committee conducted a review of the Task Force's work and reported its finding in July 2021 in *Preparing for LNG by Rail Tank Car: A Review of a U.S. DOT Safety Research, Testing, and Analysis Initiative.*

Some of the Task Force's activities, including the conduct of full-scale impact testing of the upgraded DOT-113 tank car and fire testing of proxy portable tanks, continued after the committee issued its first report. Furthermore, in November 2021, PHMSA proposed amending its earlier rule to temporarily suspend the authorization of tank car movements of LNG. The proposal, which has not advanced to a final rule, pointed to the importance of completing the testing and analyses and responding to a mandate in Executive Order 13990 for PHMSA to review recent actions that could be obstacles to federal policies promoting public health and safety, the environment, and climate change mitigation. As this report was being written, the PHMSA authorization remained in effect; however, LNG has not been moved by rail in large quantities and such movements are not likely in the near term given the time required to manufacture a fleet of upgraded cryogenic tank cars. Hence, more than 18 months after the PHMSA authorization, little has changed with regard to the movement of LNG by rail, even as natural gas and LNG markets domestically and internationally have been roiled by the post-pandemic economy and the war in Ukraine and sanctions on Russian energy supplies. Accordingly, there remains a great deal of uncertainty about the demand for LNG generally and about its prospects for being transported in large quantities by rail, including questions about future regulatory policy.

Conducted during this period of uncertainty about the future role of rail in transporting LNG, this second phase of the committee's study is intended to help inform the many decisions that await and that will help shape this role. Presumably, those decisions will need to be made based on quantitative risk analyses and other decision-support tools commonly used by industry and regulators, such as benefit-cost analysis. The study committee was not tasked with performing such analyses, and indeed the study's focus on LNG does not derive from the commodity having an unusual history of incidents in transportation, storage, or production or in comparison with other commonly shipped hazardous materials. The study's purpose was to identify those areas where additional investigation, analysis, monitoring, training, and other safety assurance practices may be warranted so that industry and regulators can better determine LNG's risks in rail transportation and make choices about how best to manage them on an ongoing basis.

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For these purposes, the preceding chapters have reviewed the hazards associated with LNG's cryogenic and flammable properties and the safety features required of portable tanks and upgraded cryogenic tank cars to account for these properties. The report also reviews the experience with shipping LNG by truck and ship and the safety assurance frameworks established for ensuring that LNG and other hazardous materials shipments are transported without incident. Because a key part of safety assurance is minimizing the harm caused by incidents that do happen, the report describes the state of emergency planning and preparation for hazardous materials incidents in general and for LNG in particular.

Having undertaken this review, the committee believes there are important insights to be gleaned and lessons to be learned from the experience transporting LNG by other modes and from recent experience with transporting other cryogenic and flammable commodities by rail. Furthermore, in having reviewed the results of the Task Force's most recent fire testing of the portable tank and impact testing of the upgraded DOT-113 tank car, the committee finds areas where further investigation and analyses appear warranted given LNG's cryogenic and flammable properties. These findings are summarized next, followed by two sets of recommendations to inform future decision making.

SUMMARY OF FINDINGS

Future Demand for LNG Tank Car Service Is Uncertain

Natural gas has been safely shipped as LNG by ship and truck for decades. These shipments meet demand in locations lacking access to natural gas shipments through pipelines, including markets overseas. Decades of transporting LNG by ship for import and export markets and by truck to fill gaps in the pipeline network have shaped the location and capacity of the country's LNG facilities. The prospects for significant future demand from these and other LNG facilities for shipment by rail tank car remain unclear.

A possible advantage of using rail tank car over portable tanks and cargo tank motor vehicles is the added cargo capacity, which is about three times greater for a tank car. For this advantage to be exploited, however, the origin and destination of the LNG shipments would need rail access. Because rail access has not been a priority for the siting of LNG export and import terminals and peak-shaving plants, this pattern would need to change. Nevertheless, the U.S. freight rail network is extensive. Other possibilities for rail demand include service to regions that lack significant gas pipeline capacity, industries that are in remote locations but need natural gas, and the growing market for LNG as a bunker fuel for marine vessels. In the absence of more information about this future demand profile, it is

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not possible to know whether and to what degree trains will transport LNG in shipments consisting of large or small blocks of rail tank cars and on a well-defined or more dispersed set of routes.

LNG Combines the Hazards of a Cryogenic Liquid and Flammable Gas

Unlike all cryogenic commodities commonly shipped in bulk by rail in the United States, with the exception of ethylene,¹ LNG combines the hazards of a cryogenic liquid with the hazards of a flammable gas. Being flammable, LNG vapor may ignite when released to reach concentrations in air of 5 to 15 percent. In addition, LNG's combustion in a pool fire will create high flame temperatures and high heat flux to surrounding materials. LNG's heat flux is three to five times higher than that of other commonly transported hydrocarbons, including liquid petroleum gas; hence, its combustion will result in a larger region of thermal damage.

LNG's cryogenic temperatures can mean that the material's inadvertent release from containment can be in the form of a very cold liquid, exposure to which can cause the embrittlement of materials. When LNG is released in sufficient volume, the liquid state may be maintained to form a vaporliquid pool that can cause cryogenic burns and asphyxiation in people exposed. Because most cryogenic commodities (i.e., argon, nitrogen, and oxygen) have lower boiling points than LNG, they must be transported at even lower temperatures. As a result, these cryogens pose an elevated risk for cryogenic burns and material embrittlement if inadvertently released to cause exposure. An exception is ethylene, the only other cryogen that is also flammable. Its higher boiling point allows it to be transported at higher temperatures that pose lower risk of embrittlement to materials if released.

Uncertainties About the LNG Tank Car's Likely Performance Under Some Accident Scenarios

The DOT-113 tank car family transports cryogenic commodities. All of the rail tank cars in this family have inner and outer tanks, the former wrapped with insulation to maintain the low temperature of its cryogenic cargo. The inner tank is constructed of stainless steel to withstand cryogenic temperatures, while the outer tank is constructed of carbon steel. The insulation around the inner tank consists of alternating layers of aluminum foil and a non-conducting spacer material, such as fiberglass or ceramic fiber paper. The annular space between the wrapped inner tank and outer tank maintains a vacuum, which is a key part of the insulation system. A pressure relief device (PRD) system and a safety vent are designed and set to activate

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¹ Hydrogen is also authorized but is not currently shipped by rail in the United States.

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when desired temperatures and pressures are not maintained. These systems must function under high-temperature conditions in the event of an incident and must be made from materials suitable for the temperature of the cargo in liquid and vapor phases.

In authorizing the LNG's shipment by tank car, PHMSA established new requirements for a DOT-113C120W9 tank car design that specified an outer tank made with a stronger and thicker carbon steel. The new design did not include changes to the requirements for insulation materials or the PRD system. The upgrades to the DOT-113's outer tank were intended to make it more resistant to impact damage. The results of impact tests conducted by PHMSA and FRA suggest that the DOT-113C120W9's outer tank is more resistant to puncture than the outer tank of a standard DOT-113 tank car. However, questions remain about the resistance of the outer tank's steel to brittle fracture from a potential exposure to cryogenic LNG. A matter that warrants consideration is that the temperature of cryogenic LNG is lower than the temperature at which the outer tank steel can become embrittled. Uncertainties also remain about the PRD's capacity to release sufficient product when the tank car is engulfed in a high-temperature LNG fire and whether the materials used for insulating the inner tank can withstand the intense heat flux of the fire.

Precaution, Preparation, and Vigilance to Ensure Safety

Decades of experience and learning about how to safely transport LNG by truck and ship suggest that high levels of safety performance can be achieved in the rail environment, where other cryogenic and flammable materials have been transported by rail in cryogenic tank cars with rare occurrence of incidents. A long-standing framework of regulation and industry practice is in place to ensure the safe transportation of bulk shipments of cryogenic and flammable materials that includes requirements for shipment packaging and handling, train operations, route selection and security planning, track inspection, railroad and shipper employee training, and emergency response preparedness. Shipments of LNG by tank car will be subject to these requirements, as well as a number of added requirements specified by PHMSA and FRA when authorizing LNG's movement by rail.

Many of the added requirements, including an upgraded tank car, were patterned after those put in place to ensure the safe shipment of crude oil and ethanol by tank car. Until about 15 years ago, these two flammable liquids (which are not cryogenic) had not been moved in large quantities by tank car for many years. A rapid uptick in demand led to large quantities being moved regularly in general-purpose, non-pressure tank cars, and often in large blocks and unit trains. In this case, key elements of the safety assurance system failed, overtaken by the speed and scale of this new traffic

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and lack of anticipation by regulators, shippers, railroads, and emergency responders of the attendant hazards. After dozens of derailments and other accidents involving these shipments, regulators, shippers, railroads, and tank car builders and fleet owners had to make major changes to the safety assurance system, from the introduction of more crashworthy and thermalresistant tank car designs and maximum train operating speeds to new protocols for track inspection and for providing guidance and information to emergency planners and responders. The actions taken were essential and impactful, but largely reactive to risks already experienced by communities, emergency responders, and rail workers in the field.

Having learned from the experience with crude oil and ethanol, regulators and industry have taken early and deliberate precautionary steps to ensure the safety of rail shipments of LNG. However, it is important to keep in mind that LNG rail shipments will be transported in a tank car with design changes, in volumes and on routes that remain unclear, and through communities whose emergency responders may have little, if any, experience with incidents or training scenarios involving LNG. Under these circumstances, emergency responders will require advance training and guidance, while vigilance will be needed for detecting safety challenges early, and ideally before large-scale shipping begins.

RECOMMENDATIONS

LNG by Rail Evaluation and Monitoring Initiative

PHMSA, FRA, and industry have taken initial precautions to ensure the safe transportation of LNG by rail tank car. However, more than 18 months after PHMSA's authorization of these movements little has changed regarding the shipment of LNG by rail, and there remains a great deal of uncertainty about how much LNG will be transported, when, and over which routes. In the committee's view, this lull provides an opportunity to further assess these precautions and to begin to make preparations for an effective response to incidents and emergencies that may arise. Moreover, the uncertainty about how and where LNG will be transported suggests the need for vigilance in monitoring emerging traffic levels and patterns as a way to detect possible safety challenges and to modify and target additional precautions, such as investments in emergency planning and response. It is with these key interests and capabilities in mind that the committee offers the following recommendations.

Recommendation 1: PHMSA and FRA should plan an LNG safety assurance initiative that would be launched before LNG tank cars are put in service. The safety assurance initiative would actively monitor

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initial plans for and early patterns of LNG traffic activity, including the locations and routes of shipments, the number and configuration of tank cars in trains, and reports of incidents involving a tank car or train carrying LNG. The initiative would enable the more timely and targeted development and dissemination of resources, direction, and guidance, with interventions as necessary, to ensure that

- Emergency responders in communities expected to have high levels of LNG rail traffic activity have the needed guidance, training, and specialized resources to respond to potential incidents;
- Personnel engaged in the transfer and transportation of LNG by rail are qualified and properly trained for safe shipment handling, operations, and emergency actions;
- Protocols for train makeup, handling, and operations are suited to LNG shipping patterns, such as in single cars, large blocks, or unit trains, for instance, as informed by the results of longitudinal train dynamics and operation simulation software;
- Track inspection protocols are appropriate for, and targeted to, routes with significant LNG traffic; and
- The risk assessment and management analyses required by regulation (49 CFR § 172.820, Additional planning requirements for transportation by rail) are comprehensive and well informed.

While the surveillance and monitoring of anticipated and actual traffic activity will need to wait until more firm plans are made for LNG's transportation by tank car, the many preoperational aspects of this safety assurance initiative (e.g., the development of emergency response guidance) would need to commence well in advance of when those plans are executed.

Further Investigation of the Safety Performance of the DOT-113C120W9 Tank Car

In its first report, the committee recommended that the PHMSA–FRA Task Force make a number of changes to its planned fire testing of a UN-T75 portable tank to better predict the survivability of the upgraded DOT-113C120W9 tank car design in an LNG pool fire. Fire tests involving realistic conditions are important for predicting a design's capacity to avoid a high-pressure release, and thus to inform choices about the design of pressure relief devices, insulation, and tank steel and to establish safe isolation and protective action distances for emergency responders and the public.

To gain a better understanding of the resistance of the DOT-113C120W9 to the potential for a high-pressure release arising from LNG's distinctive properties, the committee recommends the following.

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Recommendation 2: PHMSA and FRA should review the DOT-113C120W9 tank car specification to ensure that it adequately accounts for the cryogenic and thermal properties of LNG that could contribute to a tank release and cascading impacts. In particular, the agencies should obtain data needed to assess

- The capacity of the pressure relief devices to vent sufficient LNG when the tank car is engulfed in an LNG fire, taking into account derailment conditions, such as a rollover, that could degrade this capacity;
- The effects of adding more and different types of insulation in the annular space to ensure sufficient performance of the multilayer insulation system when the tank car is exposed to heat flux and direct flame impingement from an LNG fire; and
- The potential for the outer tank to experience cryogenic brittle failure and loss of vacuum insulation when exposed to an LNG pool.

The outcomes of this recommended review, should they raise sufficient concerns, could affect the design specifications for PRDs, insulation, and type of outer tank steel, as well as have further implications for other design features such as shell thickness and head protection.

In November 2021, PHMSA proposed amending its earlier rule to temporarily suspend the authorization of tank car movements of LNG, pointing to the importance of completing additional tank car testing and analyses and responding to a mandate in an Executive Order for PHMSA to review recent actions that could be obstacles to federal policies promoting public health and safety, the environment, and climate change mitigation. The committee did not assess this proposal, nor was it tasked with examining and reaching conclusions about the risk and desirability of transporting LNG by rail. The measures recommended in this report are intended to inform follow-on risk assessments and choices about how best to ensure the safe transportation of LNG by rail tank car in the manner demonstrated by pipelines, marine vessels, and trucks for many decades.

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Appendix A

Liquefied Natural Gas Safety Assurance for Trucking and Maritime Transport

The committee reviewed the safety assurance contexts, methods, and practices for liquefied natural gas (LNG) moved by truck and maritime transport, and for transportation access and cargo transfer at LNG facilities in response to its Statement of Task.¹ This appendix reviews the most salient areas to the committee's study of moving LNG by tank car.

SAFETY ASSURANCE FOR LNG FACILITIES

The transfer of LNG to or from a tank car, truck, or vessel takes place in LNG facilities that are regulated at the federal level. This section provides an overview of the federal agencies with jurisdiction over LNG facilities, including cargo transfer. It then provides additional details about safety assurance during design and construction and during operations.

The Federal Energy Regulatory Commission (FERC) has the primary responsibility for facilities used to import and export LNG as well as other LNG facilities that are used for interstate commerce. Because FERC has siting authority, which means an LNG facility under their jurisdiction cannot be built without FERC's approval, FERC is the lead agency for conducting the required environmental review under the National Environmental Policy Act. The Occupational Safety and Health Administration (OSHA),

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¹ "The experience transporting LNG in bulk shipments by other modes, including by water and truck, to identify basic principles applied for safety assurance that can inform measures taken by government and industry to ensure the safe movement of LNG by rail." The full Statement of Task is in Chapter 1.

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the U.S. Environmental Protection Agency (EPA), the Pipeline and Hazardous Materials Safety Administration (PHMSA), and other relevant agencies, such as the U.S. Coast Guard, also participate. FERC also provides continuing oversight during the facility's operation.

Pipeline safety regulations, administered by PHMSA, apply to LNG storage and transfer facilities used in the transfer of natural gas by pipeline, as described in 49 CFR § 193. The regulations cover siting, design, construction, equipment, operations, maintenance, personnel qualifications and training, fire protection, and security. Cargo transfer systems for tank car, tank truck, and marine vessel are included in the regulations. PHMSA does not have siting authority.² The U.S. Coast Guard also has jurisdiction over the marine cargo transfer system (see section on Maritime Safety Assurance below).

Facilities and businesses handling LNG rely on "Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)" (NFPA 59A), produced by the National Fire Protection Association (NFPA). Updates to the NFPA codes and standards reflect industry needs, evolving technologies, and practical experience.³ NFPA 59A applies to the "siting, design, construction, maintenance, and operation of facilities that produce, store, and handle liquefied natural gas (LNG)" and the "training of personnel involved with LNG."⁴

LNG facilities falling outside of the jurisdiction of FERC or PHMSA may still be required to meet EPA and OSHA regulations for hazardous substances.⁵ OSHA's Process Safety Management of Highly Hazardous Chemicals regulations (29 CFR § 1910.119) are likely to apply to LNG facilities that fall outside of FERC's, PHMSA's, or the U.S. Coast Guard's jurisdictions. OSHA consults with the U.S. Department of Transportation on questions of jurisdiction.^{6,7}

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² Pipeline and Hazardous Materials Safety Administration, "LNG Regulatory Documents," accessed February 17, 2022, https://www.phmsa.dot.gov/pipeline/liquified-natural-gas/lng-regulatory-documents.

³ National Fire Protection Association, "Codes and Standards," accessed February 15, 2022, https://www.nfpa.org/Codes-and-Standards.

⁴ National Fire Protection Association, "NFPA 59A: Scope," accessed February 15, 2022, https:// www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/ detail?code=59A.

⁵ Pipeline and Hazardous Materials Safety Administration, "Jurisdiction of LNG Plants," accessed February 22, 2022, https://www.phmsa.dot.gov/pipeline/liquified-natural-gas/jurisdiction-lng-plants.

⁶ Occupational Safety and Health Administration, "Process Safety Management," accessed February 24, 2022, https://www.osha.gov/process-safety-management/hazards.

⁷ Occupational Safety and Health Administration, "Standard Interpretations: PSM Coverage of LNG Facilities," April 27, 2021, https://www.osha.gov/laws-regs/standardinterpretations/ 2021-04-27.

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Under the Clean Air Act, EPA enforces safety regulations designed to prevent the release of hazardous substances from stationary sources through Risk Management Plans. EPA considers that rail cars sitting on private sidings and storing a covered hazardous substance should be counted toward the threshold amounts that trigger the regulations.⁸ A Risk Management Plan is to contain a hazard assessment, including analysis of a worst-case scenario, a prevention program, and an emergency response program. The required prevention and emergency response programs include employee training. The emergency response program also includes procedures for alerting the public and local response agencies. A Risk Management Plan must be reviewed, revised, and submitted to EPA every 5 years.⁹

Federal Safety Assurance for Access and Cargo Transfer

The siting, design, and construction of LNG facilities, including how they are accessed by transport modes carrying LNG and cargo transfer, are likely to come under FERC and/or PHMSA regulations. FERC uses a risk assessment and management approach in its approval process for new or expanded LNG facilities, while the PHMSA regulations are prescriptive. For waterfront facilities, the U.S. Coast Guard also gets involved, which is discussed in detail in the section on maritime transport of LNG.

FERC Authority and Guidance

FERC's environmental review process requires the applicant to prepare a set of "Resource Reports" (18 CFR § 380.12). Particularly relevant to the transport of LNG to and from the facility are Resource Report 10, Alternatives Analysis; Resource Report 11, Reliability and Safety; and Resource Report 13, Engineering and Design Material.

FERC guidance for Resource Report 10 includes analyzing alternatives for the facility site, routes connecting to the facility, and facility layout. Current guidance focuses on alternatives for access by pipeline and roads. Presumably, the alternatives analysis would include rail access, when the delivery or distribution of LNG by rail becomes relevant.¹⁰ Resource

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⁸ U.S. Environmental Protection Agency, "General RMP Guidance—Chapter 1: General Applicability," accessed February 24, 2022, https://www.epa.gov/rmp/general-rmp-guidance-chapter-1-general-applicability.

⁹ U.S. Environmental Protection Agency, "Risk Management Plan (RMP) Rule Overview," accessed February 24, 2022, https://www.epa.gov/rmp/risk-management-plan-rmp-rule-overview.

¹⁰ Federal Energy Regulatory Commission, "4.10 Resource Report 10 – Alternatives," *Guidance Manual for Environmental Report Preparation for Applications Filed Under the Natural Gas Act*, vol. 1, February 2017.

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Report 11 is dedicated to safety and advises the applicant to use a hazard identification and risk management approach for the required analysis. Marine transportation hazards and other transportation hazards within the facility boundaries, alongside the facility, are to be identified. Resource Report 13 contains additional guidance on safety analyses and specifies the information, drawings, plans, procedures, or other engineering documents that should be submitted. Hazards include those related to accidents and natural catastrophes.

To identify transportation hazards, FERC guidance requires safety and reliability impact studies for waterway, road, rail, and air transportation. Hazards include intentional acts. For a waterway, the U.S. Coast Guard's Waterway Suitability Assessment (see below) may suffice. For roads, the study is to document hazards from tanker trucks and other vehicle traffic and includes periods during cargo transfer. The rail study covers similar hazards. The security threats and vulnerabilities analysis also requires that the applicant identify and analyze potential physical and cyber security vulnerabilities related to transportation.¹¹

PHMSA Regulations and Authority

PHMSA's pipeline safety regulations extend to the design and construction of LNG facilities, including their cargo transfer systems, and are prescriptive (49 CFR § 193). Cargo transfer systems are included in the facilities requiring thermal and vapor-dispersion exclusion zones (49 CFR § 193.2057–2059). The regulations also require considering transportation-related accidents or intentional events. The structural design of the impoundment system must take into account the collision or explosion of a train, tank car, or tank truck, if applicable (49 CFR § 193.2155(a)(5)(ii)).

Federal Safety Assurance for Operations and Emergency Response

Operations, including emergency response, come under the purview of FERC and PHMSA's pipeline safety regulations for LNG facilities. FERC requires the documentation of procedures for operations during its review of proposed new and expanded LNG facilities, including cargo transfer. PHMSA's regulations prescriptively govern the operation of facilities, although its emergency response regulations also use a hazard management approach.

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¹¹ Federal Energy Regulatory Commission, Resource Report 13, *Guidance Manual for Environmental Report Preparation for Applications Filed Under the Natural Gas Act*, vol. 2, February 2017.

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FERC Regulations and Activities

During FERC's review of proposed new or expanded LNG facilities, the applicant must submit information on safety assurance during the facility's operation. Operating, maintenance, safety, and security plans and procedures are to be submitted in adequate detail "to demonstrate that the facilities would be operated and maintained to meet the federal regulations and the level of safety is consistent with the design of the facilities." Operating and maintenance plans are to include descriptions of personnel training and facility training procedures. The security plans cover physical and cyber security. Emergency response plans and procedures must show how the applicant proposes to develop and maintain the capabilities of onsite personnel and off-site emergency responders.¹²

Before construction can begin, the owner/operator must submit to FERC a formal Emergency Response Plan, which includes a Cost-Sharing Plan. Costs may be shared among federal, state, and local governmental agencies, in addition to the private sector. The Emergency Response Plan must show how they plan to coordinate with off-site emergency responders and local emergency planning groups. The plan should also include notification and evacuation procedures for residents and others present in areas needing to be evacuated.¹³

PHMSA Regulations and Activities

PHMSA pipeline safety regulations cover their operations, maintenance, personnel qualifications and training, fire protection, and security of LNG facilities. The main safety assurance tool required by the regulations is manuals or other written procedures. PHMSA enforces its safety regulations through requirements for operators to submit annual reports, incident reports, and safety-related conditions reports and through periodic inspections. For violations, PHMSA can issue orders requiring compliance and assess civil penalties.¹⁴

For cargo transfer, the regulations require that transfers must be done in accordance with a manual or written procedure (49 CFR § 193.2513). Most of the regulatory requirements for cargo transfer do not specify mode,

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¹² Federal Energy Regulatory Commission, Resource Report 11, *Guidance Manual for Environmental Report Preparation for Applications Filed Under the Natural Gas Act*, vol. 2, February 2017.

¹³ Ibid. See also Federal Energy Regulatory Commission, "Alaska Gasline Development Corporation: Order Granting Authorization Under Section 3 of the Natural Gas Act," May 21, 2020, https://www.ferc.gov/sites/default/files/2020-06/CP17-178-000.pdf.

¹⁴ Pipeline and Hazardous Materials Safety Administration, "LNG Regulatory Documents," accessed February 25, 2022, https://www.phmsa.dot.gov/pipeline/liquified-natural-gas/lng-regulatory-documents.

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but instead refer generically to a "container," although some required activities apply specifically to tank cars or tank trucks. PHMSA maintenance regulations also require written procedures for the maintenance of each component, including inspections and tests, including for cargo transfer components (49 CFR § 193.2621).

For emergencies, the operator is to identify hazards connected to "operating malfunctions, structural collapse, personnel error, forces of nature, and activities adjacent to the plant" and create written procedures for the identified hazards as well as for fire (49 CFR § 193.2509). The operator is to coordinate and cooperate with local officials, including in the preparation of an evacuation plan to protect the public. PHMSA LNG facility regulations on security also require written procedures (49 CFR § 193.2903) and include notification and communication with local law enforcement.

Training

Training is a part of all the regulatory structures for safety assurance and security at LNG facilities.

FERC requires, as part of its environmental review and oversight processes, that training be part of operations and maintenance plans, physical security and cyber security plans, and emergency response plans developed by facility operators. Emergency response plans require training for on-site personnel and emergency responders. Training costs are also part of the cost-sharing plans prepared as part of the required emergency response plans. Finally, the project schedule for launching new or expanded facilities is to include adequate time for personnel training arranged by operators.¹⁵

PHMSA regulations require appropriate training as part of personnel qualification standards for those employed in construction, installation, inspection and testing, operations and maintenance, and security (49 CFR § 193.2705, 193.2707, and 193.2709). In addition, operators must regularly assess whether personnel are satisfactorily performing these regulated duties (49 CFR § 193.2705). The regulations also outline the required content of training for operations and maintenance, security, and fire protection (49 CFR § 193.2713, 193.2715, and 193.2717). Personnel must participate in the required training at least every 2 years to keep their knowledge and skills current. Operators must maintain records documenting that personnel have participated in and satisfactorily completed the required training (49 CFR § 193.2719).

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¹⁵ Federal Energy Regulatory Commission, Resource Report 13, *Guidance Manual for Environmental Report Preparation for Applications Filed Under the Natural Gas Act*, vol. 2, February 2017.

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TRUCKING SAFETY ASSURANCE

Moving LNG by tank truck comes under federal regulations for hazardous materials and motor carrier safety, with enforcement implemented through federal and state governments. The regulatory approach to safety assurance for operations reflects the large size and the dispersed structure of the commercial motor vehicle industry as well as the industry's utilization of public roads and highways.

Routes

LNG tank trucks must travel on routes designated for hazardous materials, if so designated by state or tribal governments according to federal standards (49 CFR § 397.61–77). The federal standards, which apply to a specific group of non-radioactive hazardous materials including LNG, balance the benefits of efficient travel without delay with the public safety consequences of an incident along a route. The standards include reasonable access to terminals, locations for pickup and delivery, and necessary facilities (food, fuel, etc.). The 13 factors to be considered in designating routes are summarized in Box A-1. The federal standards also set risk versus added distance thresholds that control whether a state or tribal government may substitute a longer, but less risky, route for a current route (49 CFR § 397.71(b)(4)).

BOX A-1

Factors to Be Considered for the Designation of Highway Routes for Non-Radioactive Hazardous Materials (49 CFR § 397.71(b)(9))

1. Population

- Within a potential impact zone along route
- Density of and amount of time with residents, employees, motorists, and other persons
- Special populations such as schools, hospitals, prisons, and senior citizen homes
- 2. Highway type and characteristics
- 3. Types and quantities of hazardous materials
 - Normally transported along route
 - Relationship to impact zone and risks

continued

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BOX A-1 Continued 4. Emergency response capabilities In consultation with fire, law enforcement, and highway safety agencies ٠ Proximity of emergency medical services • Capabilities to contain and suppress releases 5. Results of consultation with affected persons 6. Exposure and other risk factors, including distance to sensitive areas Homes and commercial buildings Special populations in hospitals, schools, handicapped facilities, prisons, and stadiums Water sources and natural areas 7. Terrain and topography and its impact on Severity of crash Dispersion of hazardous material release Control and cleanup 8. Continuity of routes Consultation with adjacent jurisdictions Most direct route preferred 9. Alternative routes resulting from a route designation 10. Effects on commerce 11. Delays in transport No unnecessary delays 12. Climactic or weather conditions 13. Traffic congestion or accident history on route that could impact Potential for an accident Exposure of the public to any release Emergency response Temporary closure for cleanup

Operations

LNG safety assurance for transport operations by truck are administered by the Federal Motor Carrier Safety Administration (FMCSA) in partnership with state governments and law enforcement agencies. The main tools for safety assurance are permits for carriers, licenses for drivers, and a large database that tracks safety violations and incidents, including violations

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specific to hazardous materials, that the FMCSA uses to design appropriate interventions to prevent future incidents.

Carriers

Motor carriers transporting LNG in a cargo tank must maintain a hazardous materials safety permit. The FMCSA's safety permit program (49 CFR § 385.401–423) applies to a set of higher-risk hazardous materials and to intrastate and interstate carriers. The permit indicates that the carrier meets safety performance standards and follows a security program. The safety permit must be renewed every 2 years.

To be issued a hazardous materials safety permit, a carrier must have a "satisfactory" rating in its Safety Fitness Determination, meaning that the carrier must not have a crash rate or an out-of-service (after inspection) rate for drivers, vehicles, hazardous materials, or in total in the top 30 percent of the national average (i.e., above the 70th percentile), as calculated with data collected in the Motor Carrier Management Information System (MCMIS).¹⁶ The motor carrier must also certify that they are in compliance with the hazardous materials regulations for a security program. For motor carriers, the security program consists of a security plan, a communications plan, and documentation that hazardous materials staff are adequately trained, as well as record-keeping requirements. The communications plan covers provisions for contact between carrier and driver (see the section Trip below). Federal regulations also cover cargo tank maintenance and qualification for entering or returning a cargo tank to service (49 CFR § 180.401–417).

Drivers

In addition to a commercial driver's license, federal regulations require a driver of a cargo tank truck carrying LNG to have a tank vehicles endorsement and a hazardous materials endorsement. Both endorsements require passing written tests administered by state governments that cover material outlined in federal regulations (49 CFR § 383.119 and 383.121). The hazardous materials endorsement also requires a "threat assessment" check, which is similar to a background check and conducted by the

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¹⁶ Federal Motor Carrier Safety Administration, "How Is the 'Top 30%' OOS, Hazmat Violations, and Crash Ratings Calculated?," updated April 15, 2014, https://www.fmcsa.dot. gov/faq/how-are-top-30-oos-hazmat-violations-and-crash-ratings-calculated; for more detailed information on calculating rates: Federal Motor Carrier Safety Administration, "Hazardous Materials Safety Permits," accessed March 7, 2022, https://safer.fmcsa.dot.gov/HazMatRates Post.pdf.

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Transportation Security Administration.¹⁷ FMCSA tracks drivers' safety performance in the MCMIS. For pre-employment screening only and with the driver's consent, a carrier can access a driver's crash information for the most recent 5 years and inspection information for the most recent 3 years. Drivers can also access safety information about carriers.¹⁸

Trip

Federal safety regulations for transporting hazardous materials like LNG make it the shipper's responsibility to make sure the cargo is safely packaged. Even when the cargo tank is provided by the carrier, the shipper is still responsible for making sure that the cargo tank meets federal regulations, such as for proper labeling, marking, and placarding, and that the carrier has a valid safety permit (49 CFR § 173.22(a–b)). Similarly, the carrier and driver are forbidden from accepting for transport or transporting a shipment that was not prepared in compliance with federal regulations (49 CFR § 177.801). Regulations specific to the preparation and packaging of cryogenic liquids in cargo tanks, found in 49 CFR § 173.318, cover equipment specifications and liquid transfer procedures.

For cargo transfer of hazardous materials such as LNG, general requirements are found in 49 CFR § 177.834 and requirements specific to gases found in 49 CFR § 177.840. The regulations pay significant attention to the presence and duties of a "qualified person" during loading and unloading operations. Under most circumstances, if the cargo tank belongs to the carrier, the carrier is responsible for ensuring the presence of a qualified person during unloading. In addition to regulations designed to prevent the product from being exposed to fire during loading or unloading, the regulations include procedures for safety checks of discharge equipment and procedures for emergency discharge control and emergency shutdown. LNG transfer procedures differ by location. The shipper or destination customer provides the driver written instructions to be followed for the specific facility.¹⁹

Regulations on travel time for shippers and carriers/drivers are designed to ensure that the trip is completed before the pressure in the tank exceeds the pressure relief valve settings and LNG vapor is vented. The jacket must

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¹⁷ Transportation Security Administration, "HAZMAT endorsement," accessed March 7, 2022, https://www.tsa.gov/for-industry/hazmat-endorsement.

¹⁸ Federal Motor Carrier Safety Administration, "CSA: Measuring and Improving Commercial Motor Vehicle Safety," Spring 2017, https://csa.fmcsa.dot.gov/Documents/CSA-Industry-Briefing.pptx.

¹⁹ Kenan Advantage, "LNG: Merchant Gas Group Safety and Training," October 2013, slides accompanying presentation to the committee by Dan Wright, September 20, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/WrightKenanAdvantageSafetyTraining092021.pdf.

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be marked with the relevant information to ascertain and mark a rated holding time and also marked with a one-way travel time calculated according to specifications in 49 CFR § 173.318(g)(2). Carriers/drivers may not transport LNG unless the pressure is less than or equal to the pressure used to calculate the marked rated holding time and the one-way travel time is greater than or equal to the expected travel time to destination (49 CFR § 177.840(i)). The driver also must avoid unnecessary delays and maintain a record of the cargo tank pressure periodically throughout the trip. To meet the security conditions of the carrier's safety permit, the driver and carrier must be in contact at the start and end of each duty shift and at shipment pickup and delivery. Records of this communication must be kept (49 CFR § 385.415(c)).

Incidents and Crashes

Carriers are required to report incidents related to motor vehicles carrying hazardous materials to PHMSA. For a disabled vehicle, regulations specific to motor vehicles carrying hazardous materials require that "special care be taken to guard the vehicle and its load or to take such steps as may be necessary to provide against hazard" (49 CFR § 177.854(a)).

Inspections and Enforcement

FMCSA has a comprehensive, data-based system for tracking safety in the commercial motor vehicle carrier industry and authority to use an escalating set of interventions targeting unsafe behavior and practices, up to and including shutting down a carrier. FMCSA calls the system as a whole its Compliance, Safety, Accountability (CSA) program. Carriers and drivers of LNG are part of the general CSA program and also responsible for additional compliance, safety, and accountability activities specific to hazardous materials. Data for the general CSA and the hazardous materials CSA come from required record keeping by carriers, periodic and targeted inspections, crash reports, violations, and investigations. CSA has three core components: a Safety Measurement System, a Safety Interventions Process, and a Safety Fitness Determination (described above).²⁰

The Safety Measurement System (SMS) aggregates millions of data points collected each year from roadside inspections and crash reports to flag carriers at higher risk for future safety problems. SMS data are updated once per month. FMCSA uses the SMS to prioritize deploying its resources

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²⁰ Federal Motor Carrier Safety Administration, "CSA: Measuring and Improving Commercial Motor Vehicle Safety," Spring 2017, https://csa.fmcsa.dot.gov/HelpCenter/Resources. aspx?type=topic&vID=44546.

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for interventions and enforcement actions. Carriers can also access the system to track their own safety performance.

Hazardous materials compliance is one of the SMS's seven Behavior Analysis and Safety Improvement Categories (BASICs). The hazardous material BASIC is calculated using data on violations of hazardous materials regulations found during roadside vehicle inspections. Carriers are flagged for enhanced oversight if their percentile rank among similar carriers is above a set threshold. An investigation of a carrier turning up an "acute or critical violation" in the past 12 months can also trigger an enhanced intervention. These violation types include operational and training deficiencies. LNG carriers can also trigger enhanced oversight if they equal or exceed the threshold in two or more of the other BASICs: unsafe driving, crashes, hours of service compliance, vehicle maintenance, controlled substances and alcohol, driver fitness, and insurance and other indicators.²¹

FMCSA has the authority to use an escalating set of investigatory and intervention tools. Interventions start with a letter of warning and, in order of increasing scrutiny, include targeted roadside inspections, off-site inspection of carrier records, on-site inspection of specific safety problems, and comprehensive on-site inspection. Remedies start with a voluntary cooperative safety plan, and then escalate to a notice of violation requiring the carrier to provide evidence of remedy, a notice of claim which can result in civil penalties, and, finally, an operation level out-of-service order requiring that the carrier immediately cease operations.²²

MARITIME SAFETY ASSURANCE

Safety assurance for the maritime transport of LNG is built on a centuriesold safety culture based on international treaties and third-party oversight. The role of the U.S. Coast Guard is pivotal for translating international norms to the U.S. context and for enforcing compliance to laws and regulations on navigable waters, including their ports.

Vessels plying international waters come under the International Maritime Organization (IMO). The IMO administers the International Convention for the Safety of Life at Sea, which requires that ships carrying LNG and other liquefied gases in bulk comply with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code). First issued in 1976, the most recent set of comprehensive

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²¹ Paul Bomgardner, "Transportation of Liquefied Natural Gas (Cryogenic liquid) by Highway Introduction and Federal Motor Carrier Safety Administration Responsibilities," committee presentation, September 20, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/ BomgardnerFCMCR092021.pdf.

²² Federal Motor Carrier Safety Administration, "CSA Interventions," accessed March 14, 2022, https://csa.fmcsa.dot.gov/About/Intervene.

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amendments to the IGC Code came into force in 2016. The IGC Code covers vessel design, construction, and operations.^{23,24,25} LNG carriers for international trade are also required to comply with the IMO's International Convention for the Prevention of Pollution from Ships and the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW).

Safety Assurance for Vessels

Under U.S. law, all foreign-flagged tank vessels must have an IMO Certificate of Fitness and undergo a compliance verification exam (i.e., inspection) at its initial U.S. port of call prior to conducting operations in U.S. navigable waters. The compliance exam verifies that the vessel meets the IGC Code and the American version of the IGC Code, as found in 46 CFR § 154. A Certificate of Compliance (COC), issued by the U.S. Coast Guard, is valid for 2 years and requires an annual exam. The equivalent to a COC for U.S.-flagged vessels, such as the LNG bunker barges, is called a Certificate of Inspection. For quality assurance during the compliance verification exam, U.S. Coast Guard staff work in two-member teams.²⁶

Classification Societies

In addition to IMO and U.S. Coast Guard regulations, classification societies such as the American Bureau of Shipping (ABS) also help ensure that gas carriers meet standards for safety. Classification societies are independent third-party, nongovernmental organizations that certify that a ship meets the society's standards for its designated purpose and, on an ongoing basis, "classes" its condition through periodic surveys or inspections. A society's determinations are typically used for insurance and for quality assurance during purchasing. ABS is a member of the International Association of Classification Societies (IACS), formed to provide some uniformity among

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²³ International Maritime Organization, "IGC Code," https://www.imo.org/en/OurWork/ Safety/Pages/IGC-Code.aspx, accessed December 21, 2021.

²⁴ International Maritime Organization, "International Convention for the Safety of Life at Sea (SOLAS), 1974," https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx, accessed December 21, 2021.

 ²⁵ International Maritime Organization, "Brief History of IMO," https://www.imo.org/en/ About/HistoryOfIMO/Pages/Default.aspx, accessed December 21, 2021.

²⁶ Because the American version, 46 CFR § 154, is under Subchapter O: Certain Bulk Dangerous Cargoes, a fully compliant foreign-flagged LNG carrier is often described as having a COC with a Subchapter O endorsement. U.S. Coast Guard, "Maritime Transport of LNG: U.S. Coast Guard Compliance and Enforcement," committee presentation, September 21, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/USCGCompliance092121.pdf.

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the different societies. IACS estimates that 90 percent of all commercial tonnage traded internationally is classed through a member society.²⁷

Design and Construction of Waterfront LNG Facilities

The U.S. Coast Guard administers a set of regulations specific to waterfront LNG facilities found in 33 CFR § 172, which cover facility design, construction, and operations including firefighting and security. The U.S. Coast Guard's jurisdiction over waterfront facilities for LNG extends through the "marine transfer area of LNG," defined in 33 CFR § 127.005 as "that part of a waterfront facility handling LNG between the vessel, or where the vessel moors, and the last manifold or valve immediately before the receiving tanks."

For new or expanded facilities, the U.S. Coast Guard participates in the required environmental review led by FERC through the preparation of a Waterway Suitability Assessment (see below). The FERC-required Emergency Response Plan and Cost-Sharing Plan is applied to the port environment. The Cost-Sharing Plan typically encompasses personnel and equipment costs for activities such as video surveillance, bridge security, pier security sweeps, training for pilots or tug operators, communication plans and interoperability, law enforcement vessel escorts, and shoreline surveillance and monitoring.²⁸

Waterway Suitability Assessment

A waterway suitability assessment (WSA) informs the U.S. Coast Guard's recommendation to FERC on the appropriateness of the port and coastal area for a proposed LNG waterfront facility. In comparison to LNG by rail, the WSA process includes analysis that would be similar to studying a proposed LNG rail route. A WSA also includes analysis related to port and vessel operations. WSA analysis is in the form of risk assessment and management and includes identifying adequate resources to implement risk management strategies and measures. The regulations guiding the production of a WSA are found in 33 CFR § 127.007 and 127.009, with additional guidance in the U.S. Coast Guard's "Guidance Related to Waterfront Liquefied Natural Gas (LNG) Facilities," Navigation and Vessel Inspection Circular (NVIC) No. 01-2011, 2011.

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²⁷ International Association of Classification Societies, "Classification Societies—What, Why and How?," 2020, https://www.iacs.org.uk/media/7425/classification-what-why-how.pdf.

²⁸ U.S. Coast Guard, Enclosure 1, "Guidance Related to Waterfront Liquefied Natural Gas (LNG) Facilities," Navigation and Vessel Inspection Circular (NVIC) No. 01-2011, 2011.

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Responsibilities of Applicant and the U.S. Coast Guard

The owner or operator of the proposed facility is responsible for submitting the information and studies that make up the three stages of the WSA. The letter of intent, the preliminary WSA, and the follow-on WSA each require more in-depth studies.

The role of the U.S. Coast Guard is to validate the WSA and submit its conclusions to FERC in the form of a Letter of Recommendation. The local Captain of the Port (COTP) takes the lead in the process, with review by appropriate District and Area offices. Validation activities include consulting appropriate stakeholders, such as state governments, local governments, Area Maritime Security Committees, and Harbor Safety Committees.

Geographic Extent and Types of Impacts

The U.S. Coast Guard's WSA procedures require that the applicant examine infrastructure and public impacts within a set of concentric distances or "zones of concern." The applicant's initial letter of intent must include "charts showing waterway channels and identifying commercial, industrial, environmentally sensitive, and residential areas in and adjacent to the waterway used by the LNG or LHG vessels en route to the facility, within at least 25 kilometers (15.5 miles) of the facility" (33 CFR § 127.007(c)(7)). For the subsequent WSA, the U.S. Coast Guard emphasizes three zones of concern of decreasing consequences from a potential breach of an LNG tanker, based on studies by the Sandia National Laboratories.²⁹

Zone 1 extends 500 meters (0.3 miles); Zone 2 extends from 500 m (0.3 miles) to 1,600 m (1 mile); and Zone 3 goes from 1,600 meters (1 mile) to a "conservative maximum" of 3,500 meters (2.2 miles). If the zone analysis indicates that the consequences of a breach could interact with structures or shore terrain or "potential impacts on public safety and property could be high," additional modeling and analysis may be done to deepen understanding of site-specific hazards. For Zones 1 and 2, the WSA considers impacts associated with vapor cloud dispersion and fire hazards, but for Zone 3, vapor dispersion suffices.³⁰

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²⁹ Anay Luketa-Hanlin, M. Michael Hightower, and Stephen Attaway, "Breach and Safety Analysis of Spills over Water from Large Liquefied Natural Gas Carriers," Sandia National Laboratories, SAND2008-3153, May 2008.

³⁰ U.S. Coast Guard, Enclosure 9, "Guidance Related to Waterfront Liquefied Natural Gas (LNG) Facilities," Navigation and Vessel Inspection Circular (NVIC) No. 01-2011, 2011.
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Within the zones of concern, the WSA is to analyze critical infrastructure and key assets, shoreside uses and important community structures, and high- and medium-population-density areas. The list of waterway, facility, infrastructure, security, and community factors to be taken into account are listed in Box A-2.

BOX A-2

Waterway Suitability Assessments: Topics Included in the Characterization of the LNG Facility and LNG Tanker Route

1. Transit route in adequate detail

2. Waterway

- Locks, bridges, or other human-made obstructions
- Natural features and hazards
- Points or areas that pose security concerns or problems
- Density, character, and type of marine traffic
- Regular and non-routine marine events and seasonal considerations
- 3. LNG tankers' characteristics and the frequency of LNG shipments
- 4. Physical location and description of the facility

5. Adjacent to or near the facility

- Depths of the water
- Tidal range
- Protection from high seas
- Natural hazards, including reefs, rocks, and sandbars
- Underwater pipelines and cables
- Distance of berthed vessel from channel and width of channel

6. "Zones of concern" overlaid on the transit route

- Critical infrastructure and key assets
- Populated areas, shoreside uses and important community structures
- High density population areas (>9,000 persons per square mile) and medium density population areas (1,000 to 9,000 persons per square mile)

SOURCE: U.S. Coast Guard, Enclosure 4, "Guidance Related to Waterfront Liquefied Natural Gas (LNG) Facilities," Navigation and Vessel Inspection Circular (NVIC) No. 01-2011, 2011.

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Operations of Vessels and LNG Facilities

The U.S. Coast Guard has oversight authority over LNG carrier operations, and FERC and the U.S. Coast Guard have oversight responsibilities for facility operations. The regulations typically stipulate who is responsible for ensuring that the regulations are met or followed. For example, certain responsibilities fall to a vessel's master, while other activities belong to the "person in charge" of transfer, who in turn is to be designated by the vessel's owner or operator.

U.S. Coast Guard oversight over operations comes in two broad forms: review of operations-related plans and manuals and in-person, on-site interactions and inspections, including spot inspections. These methods are not unique to LNG operations but represent the U.S. Coast Guard's traditional methods of oversight.

The IMO's IGC Code also includes cargo operations, with stipulations for the vessel and the terminal operators. For example, the code requires pretransfer meetings between responsible personnel from the vessel and the terminal before loading or unloading can take place.³¹

Plans and Manuals

For an LNG facility, its owner/operator must submit for examination by the U.S. Coast Guard a Facility Security Plan, an Operations Manual, and an Emergency Manual before operations can begin. The Facility Security Plan is to be based on facility-specific security assessments and is considered Sensitive Security Information (33 CFR § 105). Although the U.S. Coast Guard's regulations for the Facility Security Plan are general in nature, the regulations covering the Operations Manual (33 CFR § 127.305) and the Emergency Manual (33 CFR § 127.307) are specific to waterfront facilities handling LNG. Plans and manuals required for vessels carrying LNG include a loading and stability manual, a cargo manual, and cargo location plan. The cargo manual covers safety and emergency response measures.

The U.S. Coast Guard also recommends, but does not require, that the facility operator take the lead in developing a Transit Management Plan (TMP). The TMP covers the roles and responsibilities of everyone involved from prearrival of the vessel through the transfer of the LNG and includes the U.S. Coast Guard's inspections and monitoring activities. The U.S. Coast Guard likens the plan to a "memorandum of understanding" for activities that require "communication and cooperation between multiple

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³¹ U.S. Coast Guard, "Maritime Transport of LNG: History, Design, and Operations," Presentation to the National Academies LNG-by-Rail Committee, September 21, 2021, http://onlinepubs.trb.org/onlinepubs/C4rail/USCGLNGHistory0921213.pdf.

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agencies and industry" to ensure safe and secure operations. A TMP should be specific to the port and its operations.³²

Inspections and Monitoring

Because LNG is considered a "certain dangerous cargo," LNG carriers must notify the U.S. Coast Guard of their pending arrival 96 hours in advance. The U.S. Coast Guard is empowered to periodically inspect foreign-flagged and U.S.-flagged vessels and LNG facilities. The U.S. Coast Guard may also conduct spot checks and may monitor the transfer of LNG in person. Inspections and monitoring are to be done to ensure that "the vessel and facility are in compliance with all applicable regulations and that they are safe and secure for the intended operations."³³

Training and Expertise

As with the other areas of maritime transport, training is conducted according to international and national standards. This section focuses specifically on the training required for those on the vessel and at the LNG facility involved in LNG transfer operations.

The IMO recognizes the importance of what it calls "the human element" in the safety of international shipping through the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). First adopted in 1978, it sets "minimum standards of competence" for personnel. Subsequent revisions have updated standards and added enforcement mechanisms.³⁴

U.S. Coast Guard regulations specific to gas carriers require that the designated person in charge of transferring cargo has "special training in the particular hazards associated with the cargo and in all special procedures for its handling" (46 CFR § 154.1831(a)(4)). The designated person must also meet an extensive list of qualifications, found in 33 CFR § 155.710, designed to prevent pollution. The operator must be able to produce documentation of the qualifications and training of the person in charge of transfer, upon request.

Likewise for LNG facility personnel, U.S. Coast Guard regulations stipulate the required qualifications and certification process for the person in charge of shoreside transfer operations (33 CFR § 127.301). Knowledge

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³² U.S. Coast Guard, Enclosures 8, "Guidance Related to Waterfront Liquefied Natural Gas (LNG) Facilities," Navigation and Vessel Inspection Circular (NVIC) No. 01-2011, 2011.

³³ U.S. Coast Guard, Enclosures 1, "Guidance Related to Waterfront Liquefied Natural Gas (LNG) Facilities," Navigation and Vessel Inspection Circular (NVIC) No. 01-2011, 2011.

³⁴ International Maritime Organization, "Human Element," https://www.imo.org/en/Our-Work/HumanElement/Pages/Default.aspx, accessed February 8, 2022.

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required includes of the hazards of LNG, U.S. Coast Guard regulations for transfer, and the contents of the port's Operations Manual and Emergency Manual. The facility operator must certify in writing that the person in charge of transfer has the specified qualifications.

All full-time employees at LNG facilities are required to have training in LNG properties and hazards and basic firefighting procedures, according to 33 CFR § 127.503. In addition, employees working in transfer operations must have more advanced training in firefighting, and training in the Operations Manual, the Emergency Manual, security violations, vessel design, transfer operations, LNG release responses, and first aid. Refresher training is to be provided at least once every 5 years. Training programs, to be provided by the owner/operator, are also part of the required Facility Security Plan and Operations Manual.

U.S. Coast Guard personnel are also required to complete extensive training to fulfill their responsibilities to inspect vessels and facilities and to monitor transfer operations. Standard training to receive the advanced qualification as a Foreign Gas Carrier Examiner takes 4 to 6 months. The U.S. Coast Guard also provides accelerated training, which is an intense training schedule that strives to get trainees hands-on experience with as many gas carriers as possible within the 1-month timeframe. Supplementing training is the *Foreign Gas Carrier Examiner Tactics, Techniques, and Procedures*, a U.S. Coast Guard publication that steps an inspector through what is required for the foreign-gas carrier certificate of Compliance process. To maintain their foreign gas carrier examiner qualification, staff must complete at least one Certificate of Compliance exam per year.³⁵

In addition, the U.S. Coast Guard can draw on the subject-matter experts at the Liquefied Gas Carrier National Center of Expertise, created by the Commandant of the U.S. Coast Guard in 2009. The center also promotes and facilitates training. Located in Port Arthur, Texas, the center's scope includes liquefied gas carriers, liquefied gas as fuel, liquefied gas bunkering, and liquefied gas facilities. To maintain their expertise and to stay abreast of developments in the industry, the center's staff also participate in Certificate of Compliance exams and other inspection activities and network with their international and industry counterparts.³⁶

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³⁵ A list of educational opportunities and resources can be found under the "Liquefied Gas Carriers" menu, Liquefied Gas Carrier National Center of Expertise, https://www.dco.uscg. mil/lgcncoe/Inspector-Staff-CG-5P-TI/Liquefied-Gas-Carrier-National-Center-of-Expertise-Purpose, accessed February 9, 2022.

³⁶ U.S. Coast Guard, "Liquefied Gas Carrier National Center of Expertise: Purpose," accessed February 9, 2022, https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Traveling-Inspector-Staff-CG-5P-TI/Liquefied-Gas-Carrier-National-Center-of-Expertise-Purpose.

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Appendix B

Study Committee Biographical Information

Craig E. Philip (NAE) is the Research Professor and the Director of the Vanderbilt Center for Transportation and Operational Resiliency. He spent 30 years with Ingram Barge Company, serving as the President and the Chief Executive Officer for 14 years until his retirement in 2014. He began his career at the Consolidated Rail Corporation and later served with Southern Pacific Railroad, where he was the Vice President of its Intermodal Division. His research focuses on the application of systems engineering to complex infrastructure network problems, operational safety and resilience, and organizational responses to these problems, especially in the maritime sector. He has been actively engaged in transportation and logistics industry leadership, serving as the Chair of The American Waterways Operators, the National Waterways Conference, and the U.S. Chamber of Commerce's Transportation Infrastructure and Logistics Committee. He is currently a member of the Transportation Research Board's (TRB's) Executive Committee and is the Vice Chair of its Marine Board. He served on the TRB Committee for a Study of Domestic Transportation of Petroleum, Natural Gas, and Ethanol, as well as a reviewer for several TRB special reports, including Modernizing Freight Rail Regulation. He serves on numerous boards, including the ArcBest Corporation, the Cumberland River Compact, the Cumberland Heights Foundation, and Seamen's Church Institute, which presented him with its Lifetime Achievement Award in 2015. In 2010, he was designated as a Distinguished Diplomate in the Academy of Coastal, Ocean, Port & Navigation Engineers. He was elected to the National Academy of Engineering in 2014. He earned a B.S. in civil

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engineering from Princeton University and a Ph.D. in civil engineering from the Massachusetts Institute of Technology.

H. Norman Abramson (NAE) is the former Executive Vice President of Southwest Research Institute. He is known internationally in the field of theoretical and applied mechanics. His specific area of expertise is in the dynamics of contained liquids in astronautical, nuclear, and marine systems. He began his career as an associate professor of aeronautical engineering at Texas A&M University and has served as the Vice President and the Governor of the American Society of Mechanical Engineers and as the Director of the American Institute of Aeronautics and Astronautics. As a member of the National Academy of Engineering (NAE), he served on its council from 1984 to 1990. He has been appointed to many other NAE and National Research Council committees, including the Transportation Research Board's (TRB's) Research and Technology Coordinating Committee and the Committee on the Federal Transportation R&D Strategic Planning Process, for all of which he served as the Chair. He served as a member of the U.S. Air Force Scientific Advisory Board from 1986 to 1990. He earned a B.S. in mechanical engineering and an M.S. in engineering mechanics from Stanford University, and a Ph.D. in engineering mechanics from The University of Texas at Austin.

Nii Attoh-Okine is a professor in the Department of Civil and Environmental Engineering at the University of Maryland, College Park, and Chair of the department. He is an expert in data analytics as applied to railroad safety and engineering. His research areas include railway engineering and safety, machine intelligence in railway condition data, image and signal processing, and cyber resilience. He has published extensively in crossdisciplinary areas, including two books: Big Data and Differential Privacy in Railway Track Engineering (Wiley, 2017), which introduces researchers and railway track engineers to the emerging areas of the book's title, and Resilience Engineering: Model and Analysis (Cambridge Press, 2016). He holds professional society memberships in the American Society of Civil Engineers (ASCE) and the Institute of Electrical and Electronics Engineers (IEEE). He serves on the ASCE Committees on Risk and Resilience Measurements and Vulnerability and Risk. He was a Founding Associate Editor for the ASCE/American Society of Mechanical Engineers' Journal of Risk and Uncertainty in Engineering Systems, on which he still serves. He has served as an Associate Editor of various ASCE and IEEE journals. He is a past member of the Transportation Research Board committees on Artificial Intelligence (A5008) and Application of Emerging Technology (A2F09). He earned an M.Sc. in civil engineering from the Rostov State Institute of Civil Engineering, Russia, and a Ph.D. in civil and environmental engineering

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from The University of Kansas. He is a registered professional engineer in Delaware and Kansas.

Amos A. Avidan (NAE) is a retired energy and construction industry executive with 40 years of experience. He served as the Senior Vice President and the Manager of Engineering and Technology at Bechtel Corporation. He has led people, technology research and development and engineering, large-scale operations, marketing, and large capital projects teams in Mobil Oil and Bechtel. He has more than 20 years of experience in natural gas and liquefied natural gas systems. He is interested in a broad range of fields ranging from leading people and businesses to all established and emerging energy systems and technologies, broad sustainability considerations, impacts of economic growth on society, and addressing global climate change issues related to energy, sustainability, and economic growth. He has authored many technical publications and patents. He holds a B.S. from the Technion–Israel Institute of Technology, and an M.S. and a Ph.D. from The City University of New York, both in chemical engineering. He was elected to the National Academy of Engineering in 2009.

Christina M. Baxter is the Chief Executive Officer of Emergency Response TIPS, LLC, that provides practical, evidence-based solutions for emergency response through the development of next-generation tools for enhanced situational awareness and responder safety and instructional design materials for instructor-led and web-based programs in the areas of chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE); hazardous materials; and clandestine laboratory response. Prior to forming Emergency Response TIPS, LLC, Dr. Baxter was the Program Manager of the CBRNE program at the U.S. Department of Defense's Combating Terrorism Technical Support Office, where she was responsible for managing domestic and international CBRNE research and development programs to combat terrorism on behalf of the U.S. government as well as overseeing the international CBRNE agreements with Australia, Canada, Israel, Singapore, and the United Kingdom. She is the Chair for the National Fire Protection Association standards for CBRNE personal protective equipment and a committee member for hazardous materials operations arenas with more than 20 years of experience. She holds a B.S. in chemistry and environmental science from the University of Massachusetts Amherst and a Ph.D. in analytical chemistry from the Georgia Institute of Technology.

Lisa M. Bendixen is an expert in hazardous materials risk and safety and has addressed risk management, risk assessment, security, and resilience challenges across numerous industries for fixed facilities and transportation

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systems. She is a Vice President at ICF, consulting on critical infrastructure security and resilience, mission assurance, and other risk management issues with the U.S. Departments of Defense (DOD), Energy (DOE), and Homeland Security (DHS). She served on the Transportation Security Panel for the National Research Council's (NRC's) report Making the Nation Safer: The Role of Science and Technology in Countering Terrorism and was on the NRC committee that produced the report Terrorism and the Chemical Infrastructure: Protecting People and Reducing Vulnerabilities. She also served on several other national committees focusing on transportation risks, including spent fuel. She was the project manager and the primary author of the Guidelines for Chemical Transportation Risk Analysis, published by the American Institute of Chemical Engineers' Center for Chemical Process Safety, and served on the center's technical steering committee. Her work with DHS has included long-term support on critical infrastructure security and resilience, including several versions of the National Infrastructure Protection Plan, development and implementation of the Chemical Facility Anti-Terrorism Standards, and strategic and policy support to the Office of Infrastructure Protection. She has supported DOE on work related to grid security from natural hazards and adversarial threats. She is also actively supporting DOD on critical energy and communications infrastructure. She has played leading roles in several safety and risk associations. Ms. Bendixen holds a B.S. in applied mathematics and an M.S. in operations research from the Massachusetts Institute of Technology.

Jorge A. Carrasco is the Technical Director of Ambipar USA and has more than 40 years of experience in emergency management. He has been providing hazardous materials response services and specialized training worldwide in the areas of industrial emergencies, weapons of mass destruction (WMDs), and emergency management to clients at the chemical producers, railways, mining companies, ports, governments, and emergency responders in Argentina, Brazil, Chile, Colombia, Mexico, Northern Africa, Peru, Spain, the United States, and Venezuela. He began his career as a Vessel Engineer in the Chilean Merchant Marine before moving into the railroad industry as Safety Operations Manager at the Antofagasta (Chile) and Bolivia Railway Company, where he specialized in hazardous materials and tank car safety. Afterward, he became the Manager of International Hazmat Operations at the Security and Emergency Response Training Center, based at the Transportation Technology Center in Pueblo, Colorado. Since 2012, he has been a Principal on the Technical Committee for the Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents (National Fire Protection Association [NFPA] 472) and

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serves on three other NFPA technical committees concerned with standards for hazardous materials and WMD response. He earned a diploma in solidstate chemistry at the Massachusetts Institute of Technology.

Anay Luketa is a Principal Member of the Technical Staff of the Fire Science and Technology Department at Sandia National Laboratories. She is currently evaluating computational fluid dynamics models to predict dispersion and fire hazards for liquefied natural gas (LNG) facilities and is developing model evaluation protocols for LNG and non-LNG fires. This evaluation also includes assistance with reviews by the Pipeline and Hazardous Materials Safety Administration of hazard modeling software to comply with 49 CFR § 193. She has provided independent review and analysis of explosion hazards from a natural gas pipeline for the U.S. Nuclear Regulatory Commission (U.S. NRC) in response to safety concerns identified in a report by the U.S. NRC Inspector General and evaluated LNG models for fire and dispersion. Her LNG studies include a safety analysis of large LNG carriers and fire and dispersion analyses of LNG over water. She has also published models for LNG dispersion about large-scale LNG spills. She earned a B.S. in mathematics and a B.A. in psychology from Seattle University and an M.S. and a Ph.D. in mechanical engineering from the University of Washington.

Gregory G. Noll is the Senior Planning Specialist for the South Central Task Force, a nine-county, all-hazards emergency preparedness organization in south-central Pennsylvania. He is also the Principal at GGN Technical Resources, LLC, a consulting firm specializing in emergency planning, response, and incident management issues. He is the past Chair and a current member of the National Fire Protection Association Technical Committee on Hazardous Materials Response and the InterAgency Board Training and Exercises SubGroup. He is the recipient of a number of national-level awards, including the 2011 John M. Eversole Lifetime Achievement Award by the International Association of Fire Chiefs and the 2010 California Continuing Challenge HazMat Lifetime Achievement Award. In 2019, he was inducted into the National Fire Heritage Center's Hall of Legends, Legacies and Leaders for his lifetime contributions to the fire service. As a Certified Safety Professional and a Certified Emergency Manager, he has been involved in many national emergency response initiatives involving hazardous materials and energy products. A retired member of the U.S. Air Force Reserve with 29 years of service, he is the author of nine textbooks on hazardous materials emergency response topics. He earned a B.A. in business administration and management from Kutztown State College and an M.A. in public administration from Iowa State University.

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Dimitris Rizos is an associate professor in the Department of Civil and Environmental Engineering at the University of South Carolina (UofSC) and the Associate Chair of the department. He is also the coordinator of the Advanced Railroad Technology Group at UofSC. In this capacity, he has developed the railway engineering curriculum, established sponsored research, and is the Director of the Graduate Certificate in Railway Engineering. He has more than 30 years of experience in computational and experimental structural mechanics, structural dynamics, and soil-structure interaction and directs sponsored research relevant to the railway and highway infrastructure with emphasis on remote sensing and smart monitoring of track and structures; railway dynamics; train-track interaction; and analysis and design of freight, passenger, and high-speed railway structures (bridges, tunnels, and track). He is the current Chair of the American Society of Civil Engineers (ASCE) Transportation & Development Institute Rail Transportation Committee. His involvement with the professional community includes membership in organizing committees of conferences, seminars, and workshops; membership in ASCE, the Transportation Research Board, and American Railway Engineering and Maintenance-of-Way Association committees; and he has served as the general Chair of the Joint Rail Conference 2016. He received a B.Sc. in civil engineering from the University of Patras, Greece, and an M.Sc. and a Ph.D. in civil engineering from UofSC.

William (Bill) C. Shust is a mechanical engineer and the consulting owner of Objective Engineers Inc., since 2000. He performs mechanical analyses and testing for clients, including railroads, other industries, and four national laboratories. He has more than 35 years of mechanical and structural engineering experience and dynamics and has taught courses on vehicle crash testing and mechanical testing and analysis. He has published and presented more than 40 technical papers in refereed journals or conferences and authored reports for the Association of American Railroads and others. He is active in professional societies such as the American Society of Mechanical Engineers, SAE International, the Society for Experimental Mechanics, and the American Railway Engineering and Maintenance-of-Way Association. He is a registered professional engineer in Colorado and Illinois and earned bachelor's and master's degrees in mechanical engineering from Michigan Technological University.

Patrick J. Student has more than 40 years of experience with industry regulations governing hazardous materials transportation by rail. He currently consults for the Association of American Railroads (AAR) as an editor for the AAR *Manual of Standards and Recommended Practices for Interoperable Fuel Tenders for Locomotives, M-1004 Specifications for Fuel Tenders.* In 2016, he retired as the Director of Hazardous Material, Union Pacific

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Railroad, where he was responsible for interpreting hazardous materials regulations, railroad operating rules for train makeup and powering, and developing systems for compliance with the rules and regulations. While at Union Pacific, he served on the AAR Hazardous Materials Committee, Tank Car Committee, and Electronic Data Interchange Hazardous Materials Technical Advisory Group. He also served on the Next Generation Rail Tank Car Project and Advanced Tank Car Collaborative Research Project. He holds a bachelor's degree in chemistry from the University of Missouri-Rolla.

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Appendix C

Disclosure of Unavoidable Conflicts of Interest

The conflict-of-interest policy of the National Academies of Sciences, Engineering, and Medicine (www.nationalacademies.org/coi) prohibits the appointment of an individual to a committee like the one that authored this Consensus Study Report if the individual has a conflict of interest that is relevant to the task to be performed. An exception to this prohibition is permitted only if the National Academies determines that the conflict is unavoidable and the conflict is promptly and publicly disclosed.

When the committee that authored this report was established, a determination of whether there was a conflict of interest was made for each committee member given the individual's circumstances and the task being undertaken by the committee. A determination that an individual has a conflict of interest is not an assessment of that individual's actual behavior or character or ability to act objectively despite the conflicting interest.

Mr. William (Bill) C. Shust was determined to have a conflict of interest because he owns Objective Engineers Inc., which performs mechanical testing and analysis for clients in the railroad industry.

Mr. Patrick J. Student was determined to have a conflict of interest because he consults for a railroad industry trade association that represents freight rail carriers.

In each case, the National Academies determined that the experience and expertise of the individual was needed for the committee to accomplish the task for which it was established. The National Academies could

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not find another available individual with the equivalent experience and expertise who did not have a conflict of interest. Therefore, the National Academies concluded that the conflict was unavoidable and publicly disclosed it through the National Academies Current Projects System (https:// nationalacademies.org/pa).

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No. 20-1317 (consolidated with Nos. 20-1318, 20-1431, & 21-1009)

IN THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

SIERRA CLUB, et al.,

Petitioners,

v.

U.S. DEPARTMENT OF TRANSPORTATION, et al.,

Respondents.

STATE PETITIONERS' ADDENDUM

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Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1009(b).	June 11, 1946, ch. 324, §10(b), 60 Stat. 243.

Standard changes are made to conform with the definitions applicable and the style of this title as outlined in the preface to the report.

Editorial Notes

Amendments

1976—Pub. L. 94-574 provided that if no special statutory review proceeding is applicable, the action for judicial review may be brought against the United States, the agency by its official title, or the appropriate officer as defendant.

§704. Actions reviewable

Agency action made reviewable by statute and final agency action for which there is no other adequate remedy in a court are subject to judicial review. A preliminary, procedural, or intermediate agency action or ruling not directly reviewable is subject to review on the review of the final agency action. Except as otherwise expressly required by statute, agency action otherwise final is final for the purposes of this section whether or not there has been presented or determined an application for a declaratory order, for any form of reconsideration, or, unless the agency otherwise requires by rule and provides that the action meanwhile is inoperative, for an appeal to superior agency authority.

(Pub. L. 89-554, Sept. 6, 1966, 80 Stat. 392.)

HISTORICAL AND REVISION NOTES

Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1009(c).	June 11, 1946, ch. 324, §10(c), 60 Stat. 243.

Standard changes are made to conform with the definitions applicable and the style of this title as outlined in the preface of this report.

§705. Relief pending review

When an agency finds that justice so requires, it may postpone the effective date of action taken by it, pending judicial review. On such conditions as may be required and to the extent necessary to prevent irreparable injury, the reviewing court, including the court to which a case may be taken on appeal from or on application for certiorari or other writ to a reviewing court, may issue all necessary and appropriate process to postpone the effective date of an agency action or to preserve status or rights pending conclusion of the review proceedings.

(Pub. L. 89-554, Sept. 6, 1966, 80 Stat. 393.)

HISTORICAL AND REVISION NOTES

Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1009(d).	June 11, 1946, ch. 324, §10(d), 60 Stat. 243.

Standard changes are made to conform with the definitions applicable and the style of this title as outlined in the preface of this report.

§706. Scope of review

To the extent necessary to decision and when presented, the reviewing court shall decide all relevant questions of law, interpret constitutional and statutory provisions, and determine the meaning or applicability of the terms of an agency action. The reviewing court shall—

(1) compel agency action unlawfully withheld or unreasonably delayed; and

(2) hold unlawful and set aside agency action, findings, and conclusions found to be—

(A) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law;

(B) contrary to constitutional right, power, privilege, or immunity;

(C) in excess of statutory jurisdiction, authority, or limitations, or short of statutory right;

(D) without observance of procedure required by law;

(E) unsupported by substantial evidence in a case subject to sections 556 and 557 of this title or otherwise reviewed on the record of an agency hearing provided by statute; or

(F) unwarranted by the facts to the extent that the facts are subject to trial de novo by the reviewing court.

In making the foregoing determinations, the court shall review the whole record or those parts of it cited by a party, and due account shall be taken of the rule of prejudicial error.

(Pub. L. 89-554, Sept. 6, 1966, 80 Stat. 393.)

HISTORICAL AND REVISION NOTES

Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1009(e).	June 11, 1946, ch. 324, §10(e), 60 Stat. 243.

Standard changes are made to conform with the definitions applicable and the style of this title as outlined in the preface of this report.

Statutory Notes and Related Subsidiaries

ABBREVIATION OF RECORD

Pub. L. 85–791, Aug. 28, 1958, 72 Stat. 941, which authorized abbreviation of record on review or enforcement of orders of administrative agencies and review on the original papers, provided, in section 35 thereof, that: "This Act [see Tables for classification] shall not be construed to repeal or modify any provision of the Administrative Procedure Act [see Short Title note set out preceding section 551 of this title]."

CHAPTER 8—CONGRESSIONAL REVIEW OF AGENCY RULEMAKING

Sec.	
801.	Congressional review.
802.	Congressional disapproval procedure.
803.	Special rule on statutory, regulatory, and ju-
	dicial deadlines.
804.	Definitions.
805.	Judicial review.
806.	Applicability; severability.
807.	Exemption for monetary policy.
808.	Effective date of certain rules.

§801. Congressional review

(a)(1)(A) Before a rule can take effect, the Federal agency promulgating such rule shall submit

objection of such party or intervenor, who may prosecute, defend, or continue said action or proceeding unaffected by the action or nonaction of the Attorney General therein.

(June 25, 1948, ch. 646, 62 Stat. 970; May 24, 1949, ch. 139, §116, 63 Stat. 105; Pub. L. 93-584, §6, Jan. 2, 1975, 88 Stat. 1917; Pub. L. 95-473, §2(a)(3)(C), Oct. 17, 1978, 92 Stat. 1465; Pub. L. 104-88, title III, §305(c)(1)(C), (D), Dec. 29, 1995, 109 Stat. 945.)

HISTORICAL AND REVISION NOTES

1948 ACT

Based on title 28, U.S.C., 1940 ed., §45a (Mar. 3, 1911, ch. 231, §§ 212, 213, 36 Stat. 1150, 1151; Oct. 22, 1913, ch. 32, 38 Stat. 220).

The provision in the second sentence of section 45a of title 28, U.S.C., 1940 ed., authorizing the Attorney General to employ and compensate special attorneys was omitted as covered by sections 503 and 508 [now 543 and 548] of this title. The provision in the same sentence authorizing the court to make rules for the conduct and procedure of actions under this section were omitted as covered by the Federal Rules of Civil Procedure and section 2071 of this title relating to authority of district courts to promulgate local rules of procedure.

The last paragraph of section 45a of title 28, U.S.C., 1940 ed., was omitted as merely repetitive of the language immediately following the first proviso. Word "action" was substituted for "suit" in con-

formity with Rule 2 of the Federal Rules of Civil Procedure.

Changes were made in phraseology.

1949 Act

This section corrects, in section 2323 of title 28, U.S.C., the reference to certain sections in title 49, U.S.C. The provisions which were formerly set out as section 49 of such title 49 are now set out as section 23 of such title.

Editorial Notes

Amendments

1995-Pub. L. 104-88 substituted "Surface Transportation Board" for "Interstate Commerce Commission" and substituted "the Board" for "the Commission" in two places.

1978-Pub. L. 95-473 substituted "enforcement actions and actions to collect civil penalties under subtitle IV of title 49" for "actions under section 20 of the Act of February 4, 1887, as amended (24 Stat. 386; 49 U.S.C. 20), section 23 of the Act of May 16, 1942, as amended (56 Stat. 301; 49 U.S.C. 23), and section 3 of the Act of February 19, 1903, as amended (32 Stat. 848; 49 U.S.C. 43)" in first par.

1975-Pub. L. 93-584 struck out reference to the district courts and the Supreme Court of the United States upon appeal from the district courts as the courts in which the Attorney General can represent the United States in first par.

1949-Act May 24, 1949, substituted "20, 23, and 43" for "20, 43, and 49" in first par.

Statutory Notes and Related Subsidiaries

EFFECTIVE DATE OF 1995 AMENDMENT

Amendment by Pub. L. 104-88 effective Jan. 1, 1996, see section 2 of Pub. L. 104-88, set out as an Effective Date note under section 1301 of Title 49, Transportation.

Effective Date of 1975 Amendment

Amendment by Pub. L. 93-584 not applicable to actions commenced on or before last day of first month beginning after Jan. 2, 1975, and actions to enjoin or suspend orders of Interstate Commerce Commission which are pending when this amendment becomes effective shall not be affected thereby, but shall proceed to final disposition under the law existing on the date they were commenced, see section 10 of Pub. L. 93-584, set out as a note under section 2321 of this title.

[§§ 2324, 2325. Repealed. Pub. L. 93-584, §7, Jan. 2, 1975, 88 Stat. 1918]

Section 2324, act June 25, 1948, ch. 646, 62 Stat. 970, related to power of court to restrain or suspend operation of orders of Interstate Commerce Commission pending final hearing and determination of action.

Section 2325, act June 25, 1948, ch. 646, 62 Stat. 970, related to requirement of a three judge district court to hear and determine interlocutory or permanent injunctions restraining enforcement, operation or execution of orders of Interstate Commerce Commission.

Statutory Notes and Related Subsidiaries

EFFECTIVE DATE OF REPEAL

Repeal applicable to actions commenced on or before last day of first month beginning after Jan. 2, 1975, and actions to enjoin or suspend orders of Interstate Commerce Commission which are pending when this repeal becomes effective shall not be affected thereby, but shall proceed to final disposition under the law existing on the date they were commenced, see section 10 of Pub. L. 93-584, set out as an Effective Date of 1975 Amendment note under section 2321 of this title.

CHAPTER 158—ORDERS OF FEDERAL AGENCIES; REVIEW

- Sec. 2341.
- Definitions. 2342 Jurisdiction of court of appeals.
 - Venue.
- 2343. 2344.
- Review of orders; time; notice; contents of petition; service.
- 2345. Prehearing conference. 2346. Certification of record on review.
- 2347. Petitions to review: proceedings.
- 2348. Representation in proceeding: intervention.
- Jurisdiction of the proceeding. 2349.
- 2350.
- Review in Supreme Court on certiorari or certification.

Enforcement of orders by district courts. 2351

[2352, 2353. Repealed.]

Editorial Notes

AMENDMENTS

1982—Pub. L. 97-164, title I, §138, Apr. 2, 1982, 96 Stat. 42, struck out item 2353 "Decision of the Plant Variety Protection Office"

1966—Pub. L. 89–773, §4, Nov. 6, 1966, 80 Stat. 1323, struck out item 2352 "Rules".

§2341. Definitions

As used in this chapter—

(1) "clerk" means the clerk of the court in which the petition for the review of an order, reviewable under this chapter, is filed;

(2) "petitioner" means the party or parties by whom a petition to review an order, reviewable under this chapter, is filed; and

(3) "agency" means-

(A) the Commission, when the order sought to be reviewed was entered by the Federal Communications Commission, the Federal Maritime Commission, or the Atomic Energy Commission, as the case may be;

(B) the Secretary, when the order was entered by the Secretary of Agriculture or the Secretary of Transportation;

(C) the Administration, when the order was entered by the Maritime Administration;

(D) the Secretary, when the order is under section 812 of the Fair Housing Act; and

(E) the Board, when the order was entered by the Surface Transportation Board.

(Added Pub. L. 89-554, §4(e), Sept. 6, 1966, 80 Stat. 622; amended Pub. L. 93-584, §3, Jan. 2, 1975, 88 Stat. 1917; Pub. L. 100-430, §11(b), Sept. 13, 1988, 102 Stat. 1635; Pub. L. 102-365, §5(c)(1), Sept. 3, 1992, 106 Stat. 975; Pub. L. 104-88, title III, §305(d)(1)-(4), Dec. 29, 1995, 109 Stat. 945.)

HISTORICAL AND REVISION NOTES

Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1031.	Dec. 29, 1950, ch. 1189, §1, 64 Stat. 1129. Aug. 30, 1954, ch. 1073, §2(a), 68 Stat. 961.

Subsection (a) of former section 1031 of title 5 is omitted as unnecessary because the term "court of appeals" as used in title 28 means a United States Court of Appeals and no additional definition is necessary.

In paragraph (3), reference to the United States Maritime Commission is omitted because that Commission was abolished by 1950 Reorg. Plan No. 21, §306, eff. May 24, 1950, 64 Stat. 1277. Reference to "Federal Maritime Commission" is substituted for "Federal Maritime Board" on authority of 1961 Reorg. Plan No. 7, eff. Aug. 12, 1961, 75 Stat. 840.

Editorial Notes

References in Text

Section 812 of the Fair Housing Act, referred to in par. (3)(D), is classified to section 3612 of Title 42, The Public Health and Welfare.

Amendments

1995—Par. (3)(A). Pub. L. 104-88, §305(d)(1), struck out "the Interstate Commerce Commission," after "Maritime Commission,".

Par. (3)(E). Pub. L. 104-88, §305(d)(2)-(4), added subpar. (E).

1992—Par. (3)(B). Pub. L. 102–365 inserted "or the Secretary of Transportation" after "Secretary of Agriculture".

1988—Par. (3)(D). Pub. L. 100–430 added subpar. (D).

1975—Par. (3)(A). Pub. L. 93–584 inserted reference to the Interstate Commerce Commission.

Statutory Notes and Related Subsidiaries

Effective Date of 1995 Amendment

Amendment by Pub. L. 104-88 effective Jan. 1, 1996, see section 2 of Pub. L. 104-88, set out as an Effective Date note under section 1301 of Title 49, Transportation.

Effective Date of 1988 Amendment

Amendment by Pub. L. 100-430 effective on the 180th day beginning after Sept. 13, 1988, see section 13(a) of Pub. L. 100-430, set out as a note under section 3601 of Title 42, The Public Health and Welfare.

Effective Date of 1975 Amendment

Amendment by Pub. L. 93-584 not applicable to actions commenced on or before last day of first month beginning after Jan. 2, 1975, and actions to enjoin or suspend orders of Interstate Commerce Commission which are pending when this amendment becomes effective shall not be affected thereby, but shall proceed to final disposition under the law existing on the date they were commenced, see section 10 of Pub. L. $93{-}584,$ set out as a note under section 2321 of this title.

TRANSFER OF FUNCTIONS

Atomic Energy Commission abolished and functions transferred by sections 5814 and 5841 of Title 42, The Public Health and Welfare. See, also, Transfer of Functions notes set out under those sections.

§2342. Jurisdiction of court of appeals

The court of appeals (other than the United States Court of Appeals for the Federal Circuit) has exclusive jurisdiction to enjoin, set aside, suspend (in whole or in part), or to determine the validity of—

(1) all final orders of the Federal Communication Commission made reviewable by section 402(a) of title 47;

(2) all final orders of the Secretary of Agriculture made under chapters 9 and 20A of title 7, except orders issued under sections 210(e), 217a, and 499g(a) of title 7;

(3) all rules, regulations, or final orders of—
(A) the Secretary of Transportation issued pursuant to section 50501, 50502, 56101-56104, or 57109 of title 46 or pursuant to part B or C of subtitle IV, subchapter III of chapter 311, chapter 313, or chapter 315 of title 49; and

(B) the Federal Maritime Commission issued pursuant to section 305,¹ 41304, 41308, or 41309 or chapter 421 or 441 of title 46;

(4) all final orders of the Atomic Energy Commission made reviewable by section 2239 of title 42;

(5) all rules, regulations, or final orders of the Surface Transportation Board made reviewable by section 2321 of this title;

(6) all final orders under section 812 of the Fair Housing Act; and

(7) all final agency actions described in section 20114(c) of title 49.

Jurisdiction is invoked by filing a petition as provided by section 2344 of this title.

(Added Pub. L. 89-554, §4(e), Sept. 6, 1966, 80 Stat. 622; amended Pub. L. 93-584, §4, Jan. 2, 1975, 88 Stat. 1917; Pub. L. 95-454, title II, §206, Oct. 13, 1978, 92 Stat. 1144; Pub. L. 96-454, §8(b)(2), Oct. 15, 1980, 94 Stat. 2021; Pub. L. 97-164, title I, §137, Apr. 2, 1982, 96 Stat. 41; Pub. L. 98-554, title II, §227(a)(4), Oct. 30, 1984, 98 Stat. 2852; Pub. L. 99-336, §5(a), June 19, 1986, 100 Stat. 638; Pub. L. 100-430, §11(a), Sept. 13, 1988, 102 Stat. 1635; Pub. L. 102-365, §5(c)(2), Sept. 3, 1992, 106 Stat. 975; Pub. L. 103-272, §5(h), July 5, 1994, 108 Stat. 1375; Pub. L. 104-88, title III, §305(d)(5)-(8), Dec. 29, 1995, 109 Stat. 945; Pub. L. 104-287, §6(f)(2), Oct. 11, 1996, 110 Stat. 3399; Pub. L. 109-59, title IV, §4125(a), Aug. 10, 2005, 119 Stat. 1738; Pub. L. 109-304, §17(f)(3), Oct. 6, 2006, 120 Stat. 1708.)

HISTORICAL AND REVISION NOTES

Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1032.	Dec. 29, 1950, ch. 1189, §2, 64 Stat. 1129. Aug. 30, 1954, ch. 1073, §2(b), 68 Stat. 961.

¹See References in Text note below.



The words "have exclusive jurisdiction" are substituted for "shall have exclusive jurisdiction"

In paragraph (1), the word "by" is substituted for "in accordance with'

In paragraph (3), the word "now" is omitted as unnecessary. The word "under" is substituted for "pursuant to the provisions of". Reference to "Federal Maritime Commission" is substituted for "Federal Maritime Board" on authority of 1961 Reorg. Plan No. 7, eff. Aug. 12, 1961, 75 Stat. 840. Reference to the United States Maritime Commission is omitted because that Commission was abolished by 1950 Reorg. Plan No. 21, §306, eff. May 24, 1951, 64 Stat. 1277, and any existing rights are preserved by technical sections 7 and 8.

Editorial Notes

References in Text

Section 305 of title 46, referred to in par. $(3)(\mathrm{B}),$ was redesignated section 46105 of Title 46, Shipping, by Pub. L. 116-283, div. G, title LVXXXVI, §8605(a)(3), Jan. 1, 2021, 134 Stat. 4765.

Section 812 of the Fair Housing Act, referred to in par. (6), is classified to section 3612 of Title 42, The Public Health and Welfare.

Amendments

2006—Par. (3)(A). Pub. L. 109–304, §17(f)(3)(A), substituted "section 50501, 50502, 56101-56104, or 57109 of title 46" for "section 2, 9, 37, or 41 of the Shipping Act, 1916 (46 U.S.C. App. 802, 803, 808, 835, 839, and 841a)'

Par. (3)(B). Pub. L. 109-304, §17(f)(3)(B), added subpar. (B) and struck out former subpar. (B) which read as follows:

"(B) the Federal Maritime Commission issued pursuant to-

"(i) section 19 of the Merchant Marine Act, 1920 (46 U.S.C. App. 876);

"(ii) section 14 or 17 of the Shipping Act of 1984 (46 U.S.C. App. 1713 or 1716); or

"(iii) section 2(d) or 3(d) of the Act of November 6,

1966 (46 U.S.C. App. 817d(d) or 817e(d);". 2005—Par. (3)(A). Pub. L. 109-59 inserted ", subchapter III of chapter 311, chapter 313, or chapter 315" before "of title 49"

1996-Par. (3)(A). Pub. L. 104-287 amended Pub. L. 104-88, §305(d)(6). See 1995 Amendment note below.

1995—Par. (3)(A). Pub. L. 104–88, §305(d)(6), as amended by Pub. L. 104–287, inserted "or pursuant to part B or C of subtitle IV of title 49" before the semicolon.

Pub. L. 104-88, §305(d)(5), substituted "or 41" for "41, or 43''

Par. (3)(B). Pub. L. 104-88, §305(d)(7), redesignated cls. (ii), (iv), and (v) as (i), (ii), and (iii), respectively, and struck out former cls. (i) and (iii) which read as follows:

(i) section 23, 25, or 43 of the Shipping Act, 1916 (46 U.S.C. App. 822, 824, or 841a); "(iii) section 2, 3, 4, or 5 of the Intercoastal Shipping

Act, 1933 (46 U.S.C. App. 844, 845, 845a, or 845b);". Par. (5). Pub. L. 104-88, §305(d)(8), added par. (5) and

struck out former par. (5) which read as follows: "all rules, regulations, or final orders of the Interstate Commerce Commission made reviewable by section 2321 of this title and all final orders of such Commission made reviewable under section 11901(i)(2) of title 49. United States Code:'

1994-Par. (7). Pub. L. 103-272 substituted "section 20114(c) of title 49" for "section 202(f) of the Federal Railroad Safety Act of 1970".

1992—Par. (7). Pub. L. 102-365, which directed the addition of par. (7) at end, was executed by adding par. (7) after par. (6) and before concluding provisions, to reflect the probable intent of Congress.

1988—Par. (6). Pub. L. 100–430 added par. (6).

1986—Par. (3). Pub. L. 99–336 amended par. (3) generally. Prior to amendment, par. (3) read as follows: "such final orders of the Federal Maritime Commission or the Maritime Administration entered under chapters 23 and 23A of title 46 as are subject to judicial review under section 830 of title 46:".

1984—Par. (5). Pub. L. 98-554 substituted "11901(j)(2)" for "11901(i)(2)"

1982-Pub. L. 97-164 inserted "(other than the United States Court of Appeals for the Federal Circuit)" after "court of appeals" in provisions preceding par. (1), and struck out par. (6) which had given the court of appeals jurisdiction in cases involving all final orders of the Merit Systems Protection Board except as provided for in section 7703(b) of title 5. See section 1295(a)(9) of this title.

1980-Par. (5). Pub. L. 96-454 inserted "and all final orders of such Commission made reviewable under section 11901(i)(2) of title 49, United States Code" after 'section 2321 of this title'

1978—Par. (6). Pub. L. 95–454 added par. (6).

1975-Par. (5). Pub. L. 93-584 added par. (5).

Statutory Notes and Related Subsidiaries

EFFECTIVE DATE OF 1996 AMENDMENT

Pub. L. 104-287, §6(f), Oct. 11, 1996, 110 Stat. 3399, provided that the amendment made by that section is effective Dec. 29, 1995.

Effective Date of 1995 Amendment

Amendment by Pub. L. 104-88 effective Jan. 1, 1996, see section 2 of Pub. L. 104-88, set out as an Effective Date note under section 1301 of Title 49, Transportation.

EFFECTIVE DATE OF 1988 AMENDMENT

Amendment by Pub. L. 100-430 effective on 180th day beginning after Sept. 13, 1988, see section 13(a) of Pub. L. 100-430, set out as a note under section 3601 of Title 42. The Public Health and Welfare.

EFFECTIVE DATE OF 1986 AMENDMENT

Pub. L. 99-336, §5(b), June 19, 1986, 100 Stat. 638, provided that: "The amendment made by this section [amending this section] shall apply with respect to any rule, regulation, or final order described in such amendment which is issued on or after the date of the enactment of this Act [June 19, 1986].'

EFFECTIVE DATE OF 1982 AMENDMENT

Amendment by Pub. L. 97-164 effective Oct. 1, 1982, see section 402 of Pub. L. 97-164, set out as a note under section 171 of this title.

EFFECTIVE DATE OF 1978 AMENDMENT

Amendment by Pub. L. 95-454 effective 90 days after Oct. 13, 1978, see section 907 of Pub. L. 95-454, set out as a note under section 1101 of Title 5, Government Organization and Employees.

EFFECTIVE DATE OF 1975 AMENDMENT

Amendment by Pub. L. 93-584 not applicable to actions commenced on or before last day of first month beginning after Jan. 2, 1975, and actions to enjoin or suspend orders of Interstate Commerce Commission which are pending when this amendment becomes effective shall not be affected thereby, but shall proceed to final disposition under the law existing on the date they were commenced, see section 10 of Pub. L. 93-584, set out as a note under section 2321 of this title.

TRANSFER OF FUNCTIONS

Atomic Energy Commission abolished and functions transferred by sections 5814 and 5841 of Title 42, The Public Health and Welfare. See, also, Transfer of Functions notes set out under those sections.

§2343. Venue

The venue of a proceeding under this chapter is in the judicial circuit in which the petitioner resides or has its principal office, or in the United States Court of Appeals for the District of Columbia Circuit.

(Added Pub. L. 89-554, §4(e), Sept. 6, 1966, 80 Stat. 622.)

HISTORICAL AND REVISION NOTES

Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1033.	Dec. 29, 1950, ch. 1189, §3, 64 Stat. 1130.

The section is reorganized for clarity and conciseness. The word "is" is substituted for "shall be". The word "petitioner" is substituted for "party or any of the parties filing the petition for review" in view of the definition of "petitioner" in section 2341 of this title.

§2344. Review of orders; time; notice; contents of petition; service

On the entry of a final order reviewable under this chapter, the agency shall promptly give notice thereof by service or publication in accordance with its rules. Any party aggrieved by the final order may, within 60 days after its entry, file a petition to review the order in the court of appeals wherein venue lies. The action shall be against the United States. The petition shall contain a concise statement of—

(1) the nature of the proceedings as to which review is sought;

- (2) the facts on which venue is based;
- (3) the grounds on which relief is sought; and(4) the relief prayed.

The petitioner shall attach to the petition, as exhibits, copies of the order, report, or decision of the agency. The clerk shall serve a true copy of the petition on the agency and on the Attorney General by registered mail, with request for a return receipt.

(Added Pub. L. 89-554, §4(e), Sept. 6, 1966, 80 Stat. 622.)

HISTORICAL AND REVISION NOTES

Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1034.	Dec. 29, 1950, ch. 1189, §4, 64 Stat. 1130.

The section is reorganized, with minor changes in phraseology. The words "as prescribed by section 1033 of this title" are omitted as surplusage. The words "of the United States" following "Attorney General" are omitted as unnecessary.

§2345. Prehearing conference

The court of appeals may hold a prehearing conference or direct a judge of the court to hold a prehearing conference.

(Added Pub. L. 89-554, §4(e), Sept. 6, 1966, 80 Stat. 622.)

HISTORICAL AND REVISION NOTES

Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1035.	Dec. 29, 1950, ch. 1189, §5, 64 Stat. 1130.

§2346. Certification of record on review

Unless the proceeding has been terminated on a motion to dismiss the petition, the agency shall file in the office of the clerk the record on review as provided by section 2112 of this title. (Added Pub. L. 89-554, §4(e), Sept. 6, 1966, 80 Stat. 623.)

HISTORICAL AND REVISION NOTES

Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1036.	Dec. 29, 1950, ch. 1189, §6, 64 Stat. 1130. Aug. 28, 1958, Pub. L. 85-791, §31(a), 72 Stat. 951.

The words "of the court of appeals in which the proceeding is pending" are omitted as unnecessary in view of the definition of "clerk" in section 2341 of this title, and by reason of the exclusive jurisdiction of the court of appeals set forth in section 2342 of this title.

§2347. Petitions to review; proceedings

(a) Unless determined on a motion to dismiss, petitions to review orders reviewable under this chapter are heard in the court of appeals on the record of the pleadings, evidence adduced, and proceedings before the agency, when the agency has held a hearing whether or not required to do so by law.

(b) When the agency has not held a hearing before taking the action of which review is sought by the petition, the court of appeals shall determine whether a hearing is required by law. After that determination, the court shall—

(1) remand the proceedings to the agency to hold a hearing, when a hearing is required by law;

(2) pass on the issues presented, when a hearing is not required by law and it appears from the pleadings and affidavits filed by the parties that no genuine issue of material fact is presented; or

(3) transfer the proceedings to a district court for the district in which the petitioner resides or has its principal office for a hearing and determination as if the proceedings were originally initiated in the district court, when a hearing is not required by law and a genuine issue of material fact is presented. The procedure in these cases in the district court is governed by the Federal Rules of Civil Procedure.

(c) If a party to a proceeding to review applies to the court of appeals in which the proceeding is pending for leave to adduce additional evidence and shows to the satisfaction of the court that—

(1) the additional evidence is material; and

- (2) there were reasonable grounds for failure
- to adduce the evidence before the agency;

the court may order the additional evidence and any counterevidence the opposite party desires to offer to be taken by the agency. The agency may modify its findings of fact, or make new findings, by reason of the additional evidence so taken, and may modify or set aside its order, and shall file in the court the additional evidence, the modified findings or new findings, and the modified order or the order setting aside the original order.

(Added Pub. L. 89-554, §4(e), Sept. 6, 1966, 80 Stat. 623.)

Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1037.	 Dec. 29, 1950, ch. 1189, §7, 64 Stat. 1130. Aug. 28, 1958, Pub. L. 85-791, §31(b), 72 Stat. 951.

The headnotes of the subsections are omitted as unnecessary and to conform to the style of title 28.

In subsection (a), the words "the petition" following "on a motion to dismiss" are omitted as unnecessary. The word "are" is substituted for "shall be". The words "in fact" following "when the agency has" are omitted as unnecessary.

In subsection (b)(3), the words "United States" preceding "district court" are omitted as unnecessary because the term "district court" as used in title 28 means a United States district court. See section 451 of title 28, United States Code. The words "or any petitioner" are omitted as unnecessary in view of the definition of "petitioner" in section 2341 of this title. In the last sentence, the word "is" is substituted for "shall be".

In subsection (c), the words "applies" and "shows" are substituted for "shall apply" and "shall show", respectively.

Editorial Notes

References in Text

The Federal Rules of Civil Procedure, referred to in subsec. (b)(3), are set out in the Appendix to this title.

§2348. Representation in proceeding; intervention

The Attorney General is responsible for and has control of the interests of the Government in all court proceedings under this chapter. The agency, and any party in interest in the proceeding before the agency whose interests will be affected if an order of the agency is or is not enjoined, set aside, or suspended, may appear as parties thereto of their own motion and as of right, and be represented by counsel in any proceeding to review the order. Communities, associations, corporations, firms, and individuals, whose interests are affected by the order of the agency, may intervene in any proceeding to review the order. The Attorney General may not dispose of or discontinue the proceeding to review over the objection of any party or intervenor, but any intervenor may prosecute, defend, or continue the proceeding unaffected by the action or inaction of the Attorney General.

(Added Pub. L. 89-554, §4(e), Sept. 6, 1966, 80 Stat. 623.)

HISTORICAL AND REVISION NOTES

Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1038.	Dec. 29, 1950, ch. 1189, §8, 64 Stat. 1131.

In the first sentence, the words "is responsible for and has control" are substituted for "shall be responsible for and have charge and control".

In the last sentence, the word "may" is substituted for "shall". The word "aforesaid" following "any party or intervenor" is omitted as unnecessary. The words "any intervenor" and "inaction" are substituted for "said intervenor or intervenors" and "nonaction", respectively.

§2349. Jurisdiction of the proceeding

(a) The court of appeals has jurisdiction of the proceeding on the filing and service of a petition to review. The court of appeals in which the record on review is filed, on the filing, has jurisdiction to vacate stay orders or interlocutory injunctions previously granted by any court, and has exclusive jurisdiction to make and enter, on the petition, evidence, and proceedings set forth in the record on review, a judgment determining the validity of, and enjoining, setting aside, or suspending, in whole or in part, the order of the agency.

(b) The filing of the petition to review does not of itself stay or suspend the operation of the order of the agency, but the court of appeals in its discretion may restrain or suspend, in whole or in part, the operation of the order pending the final hearing and determination of the petition. When the petitioner makes application for an interlocutory injunction restraining or suspending the enforcement, operation, or execution of, or setting aside, in whole or in part, any order reviewable under this chapter, at least 5 days' notice of the hearing thereon shall be given to the agency and to the Attorney General. In a case in which irreparable damage would otherwise result to the petitioner, the court of appeals may, on hearing, after reasonable notice to the agency and to the Attorney General, order a temporary stay or suspension, in whole or in part, of the operation of the order of the agency for not more than 60 days from the date of the order pending the hearing on the application for the interlocutory injunction, in which case the order of the court of appeals shall contain a specific finding, based on evidence submitted to the court of appeals, and identified by reference thereto, that irreparable damage would result to the petitioner and specifying the nature of the damage. The court of appeals, at the time of hearing the application for an interlocutory injunction, on a like finding, may continue the temporary stay or suspension, in whole or in part, until decision on the application.

(Added Pub. L. 89-554, §4(e), Sept. 6, 1966, 80 Stat. 624; amended Pub. L. 98-620, title IV, §402(29)(F), Nov. 8, 1984, 98 Stat. 3359.)

HISTORICAL AND REVISION NOTES

Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1039.	Dec. 29, 1950, ch. 1189, §9, 64 Stat. 1131. Sept. 13, 1961, Pub. L. 87-225, §1, 75 Stat. 497.

The headnotes of the subsections are omitted as unnecessary and to conform to the style of title 28.

necessary and to conform to the style of title 28. In subsection (a), the words "has jurisdiction" and "has exclusive jurisdiction" are substituted for "shall have jurisdiction" and "shall have exclusive jurisdiction", respectively. The words "previously granted" are substituted for "theretofore granted" as the preferred expression.

In subsection (b), the words "does not" are substituted for "shall not". The words "of the United States" following "Attorney General" are omitted as unnecessary. The words "In a case in which" are substituted for "In cases where". The word "result" is substituted for "ensue". In the fourth sentence, the words "provided for above" following the last word "application" are omitted as unnecessary. In the last sentence, the word "applies" is substituted for "shall apply".

Editorial Notes

Amendments

1984—Subsec. (b). Pub. L. 98-620 struck out provisions that the hearing on an application for an interlocutory injunction be given preference and expedited and heard at the earliest practicable date after the expiration of the notice of hearing on the application, and that on the final hearing of any proceeding to review any order under this chapter, the same requirements as to precedence and expedition was to apply.

Statutory Notes and Related Subsidiaries

EFFECTIVE DATE OF 1984 AMENDMENT

Amendment by Pub. L. 98-620 not applicable to cases pending on Nov. 8, 1984, see section 403 of Pub. L. 98-620 set out as an Effective Date note under section 1657 of this title.

§2350. Review in Supreme Court on certification

(a) An order granting or denying an interlocutory injunction under section 2349(b) of this title and a final judgment of the court of appeals in a proceeding to review under this chapter are subject to review by the Supreme Court on a writ of certiorari as provided by section 1254(1) of this title. Application for the writ shall be made within 45 days after entry of the order and within 90 days after entry of the judgment, as the case may be. The United States, the agency, or an aggrieved party may file a petition for a writ of certiorari.

(b) The provisions of section 1254(2) of this title, regarding certification, and of section 2101(f) of this title, regarding stays, also apply to proceedings under this chapter.

(Added Pub. L. 89-554, §4(e), Sept. 6, 1966, 80 Stat. 624; amended Pub. L. 100-352, §5(e), June 27, 1988, 102 Stat. 663.)

HISTORICAL AND REVISION NOTES

Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1040.	Dec. 29, 1950, ch. 1189, §10, 64 Stat. 1132.

The words "of the United States" following "Supreme Court" are omitted as unnecessary because the term "Supreme Court" as used in title 28 means the Supreme Court of the United States.

The words "section 2101(f) of this title" are substituted for "section 2101(e) of Title 28" on authority of the Act of May 24, 1949, ch. 139, §106(b), 63 Stat. 104, which redesignated subsection (e) of section 2101 as subsection (f).

Editorial Notes

Amendments

1988—Subsec. (b). Pub. L. 100-352 substituted "1254(2)" for "1254(3)".

Statutory Notes and Related Subsidiaries

Effective Date of 1988 Amendment

Amendment by Pub. L. 100-352 effective ninety days after June 27, 1988, except that such amendment not to apply to cases pending in Supreme Court on such effective date or affect right to review or manner of reviewing judgment or decree of court which was entered before such effective date, see section 7 of Pub. L. 100-352, set out as a note under section 1254 of this title.

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§2351. Enforcement of orders by district courts

The several district courts have jurisdiction specifically to enforce, and to enjoin and restrain any person from violating any order issued under section 193 of title 7.

(Added Pub. L. 89-554, §4(e), Sept. 6, 1966, 80 Stat. 624.)

HISTORICAL AND REVISION NOTES

Derivation	U.S. Code	Revised Statutes and Statutes at Large
	5 U.S.C. 1042.	Dec. 29, 1950, ch. 1189, §12, 64 Stat. 1132.

The words "United States" preceding "district court" are omitted as unnecessary because the term "district court" as used in title 28 means a United States district court. See section 451 of title 28, United States Code. The words "have jurisdiction" are substituted for "are vested with jurisdiction". The words "heretofore or hereafter" following "order" are omitted as unnecessary and any existing rights and liabilities are preserved by technical sections 7 and 8.

[§2352. Repealed. Pub. L. 89–773, §4, Nov. 6, 1966, 80 Stat. 1323]

Section, Pub. L. 89-554, §4(e), Sept. 6, 1966, 80 Stat. 624, directed the several courts of appeals to adopt and promulgate rules, subject to the approval of the Judicial Conference of the United States, governing the practice and procedure, including prehearing conference procedure, in proceedings to review orders under this chapter. See section 2072 of this title.

Statutory Notes and Related Subsidiaries

SAVINGS PROVISION

Pub. L. 89-773, §4, Nov. 6, 1966, 80 Stat. 1323, provided in part that the repeal of this section shall not operate to invalidate or repeal rules adopted under the authority of this section prior to the enactment of Pub. L. 89-773, which rules shall remain in effect until superseded by rules prescribed under authority of section 2072 of this title as amended by Pub. L. 89-773.

[§2353. Repealed. Pub. L. 97-164, title I, §138, Apr. 2, 1982, 96 Stat. 42]

Section, added Pub. L. 91-577, title III, §143(c), Dec. 24, 1970, 84 Stat. 1559, gave the court of appeals nonexclusive jurisdiction to hear appeals under section 71 of the Plant Variety Protection Act (7 U.S.C. 2461). See section 1295(a)(8) of this title.

Statutory Notes and Related Subsidiaries

EFFECTIVE DATE OF REPEAL

Repeal effective Oct. 1, 1982, see section 402 of Pub. L. 97-164, set out as an Effective Date of 1982 Amendment note under section 171 of this title.

CHAPTER 159—INTERPLEADER

Sec. 2361. Process and procedure.

§2361. Process and procedure

In any civil action of interpleader or in the nature of interpleader under section 1335 of this title, a district court may issue its process for all claimants and enter its order restraining

§ 4332. Cooperation of agencies; reports; availability of information; recommendations; international and national coordination of efforts

The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this chapter, and (2) all agencies of the Federal Government shall—

(A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment;

(B) identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by subchapter II of this chapter, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on—

(i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) alternatives to the proposed action,

(iv) the relationship between local shortterm uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of title 5, and shall accompany the proposal through the existing agency review processes;

(D) Any detailed statement required under subparagraph (C) after January 1, 1970, for any major Federal action funded under a program of grants to States shall not be deemed to be legally insufficient solely by reason of having been prepared by a State agency or official, if:

(i) the State agency or official has statewide jurisdiction and has the responsibility for such action,

(ii) the responsible Federal official furnishes guidance and participates in such preparation, (iii) the responsible Federal official independently evaluates such statement prior to its approval and adoption, and

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(iv) after January 1, 1976, the responsible Federal official provides early notification to, and solicits the views of, any other State or any Federal land management entity of any action or any alternative thereto which may have significant impacts upon such State or affected Federal land management entity and, if there is any disagreement on such impacts, prepares a written assessment of such impacts and views for incorporation into such detailed statement.

The procedures in this subparagraph shall not relieve the Federal official of his responsibilities for the scope, objectivity, and content of the entire statement or of any other responsibility under this chapter; and further, this subparagraph does not affect the legal sufficiency of statements prepared by State agencies with less than statewide jurisdiction.¹

(E) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

(F) recognize the worldwide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment;

(G) make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

(H) initiate and utilize ecological information in the planning and development of resource-oriented projects; and

(I) assist the Council on Environmental Quality established by subchapter II of this chapter.

(Pub. L. 91-190, title I, §102, Jan. 1, 1970, 83 Stat. 853; Pub. L. 94-83, Aug. 9, 1975, 89 Stat. 424.)

Amendments

1975—Subpars. (D) to (I). Pub. L. 94-83 added subpar. (D) and redesignated former subpars. (D) to (H) as (E) to (I), respectively.

CERTAIN COMMERCIAL SPACE LAUNCH ACTIVITIES

Pub. L. 104-88, title IV, \$401, Dec. 29, 1995, 109 Stat. 955, provided that: "The licensing of a launch vehicle or launch site operator (including any amendment, extension, or renewal of the license) under [former] chapter 701 of title 49, United States Code [now chapter 509 (\$50901 et seq.) of Title 51, National and Commercial Space Programs], shall not be considered a major Federal action for purposes of section 102(C) of the National Environmental Policy Act of 1969 (42 U.S.C. 4332(C)) if—

"(1) the Department of the Army has issued a permit for the activity; and

"(2) the Army Corps of Engineers has found that the activity has no significant impact."

¹So in original. The period probably should be a semicolon.

Ex. Ord. No. 13352, Aug. 26, 2004, 69 F.R. 52989, provided:

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

SECTION 1. Purpose. The purpose of this order is to ensure that the Departments of the Interior, Agriculture, Commerce, and Defense and the Environmental Protection Agency implement laws relating to the environment and natural resources in a manner that promotes cooperative conservation, with an emphasis on appropriate inclusion of local participation in Federal decisionmaking, in accordance with their respective agency missions, policies, and regulations.

SEC. 2. Definition. As used in this order, the term "cooperative conservation" means actions that relate to use, enhancement, and enjoyment of natural resources, protection of the environment, or both, and that involve collaborative activity among Federal, State, local, and tribal governments, private for-profit and nonprofit institutions, other nongovernmental entities and individuals.

SEC. 3. Federal Activities. To carry out the purpose of this order, the Secretaries of the Interior, Agriculture, Commerce, and Defense and the Administrator of the Environmental Protection Agency shall, to the extent permitted by law and subject to the availability of appropriations and in coordination with each other as appropriate:

(a) carry out the programs, projects, and activities of the agency that they respectively head that implement laws relating to the environment and natural resources in a manner that:

(i) facilitates cooperative conservation;

(ii) takes appropriate account of and respects the interests of persons with ownership or other legally recognized interests in land and other natural resources:

(iii) properly accommodates local participation in Federal decisionmaking; and

(iv) provides that the programs, projects, and activities are consistent with protecting public health and safety;

(b) report annually to the Chairman of the Council on Environmental Quality on actions taken to implement this order; and

(c) provide funding to the Office of Environmental Quality Management Fund (42 U.S.C. 4375) for the Conference for which section 4 of this order provides.

SEC. 4. White House Conference on Cooperative Conservation. The Chairman of the Council on Environmental Quality shall, to the extent permitted by law and subject to the availability of appropriations:

(a) convene not later than 1 year after the date of this order, and thereafter at such times as the Chairman deems appropriate, a White House Conference on Cooperative Conservation (Conference) to facilitate the exchange of information and advice relating to (i) cooperative conservation and (ii) means for achievement of the purpose of this order; and

(b) ensure that the Conference obtains information in a manner that seeks from Conference participants their individual advice and does not involve collective judgment or consensus advice or deliberation.

SEC. 5. General Provision. This order is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, instrumentalities or entities, its officers, employees or agents, or any other person.

George W. Bush.

§4332a. Repealed. Pub. L. 114-94, div. A, title I, §1304(j)(2), Dec. 4, 2015, 129 Stat. 1386

Section, Pub. L. 112-141, div. A, title I, §1319, July 6, 2012, 126 Stat. 551, related to accelerated decisionmaking in environmental reviews.

EFFECTIVE DATE OF REPEAL

§ 4342

Repeal effective Oct. 1, 2015, see section 1003 of Pub. L. 114-94, set out as an Effective Date of 2015 Amendment note under section 5313 of Title 5, Government Organization and Employees.

§4333. Conformity of administrative procedures to national environmental policy

All agencies of the Federal Government shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein which prohibit full compliance with the purposes and provisions of this chapter and shall propose to the President not later than July 1, 1971, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this chapter.

(Pub. L. 91-190, title I, §103, Jan. 1, 1970, 83 Stat. 854.)

§4334. Other statutory obligations of agencies

Nothing in section 4332 or 4333 of this title shall in any way affect the specific statutory obligations of any Federal agency (1) to comply with criteria or standards of environmental quality, (2) to coordinate or consult with any other Federal or State agency, or (3) to act, or refrain from acting contingent upon the recommendations or certification of any other Federal or State agency.

(Pub. L. 91-190, title I, §104, Jan. 1, 1970, 83 Stat. 854.)

§4335. Efforts supplemental to existing authorizations

The policies and goals set forth in this chapter are supplementary to those set forth in existing authorizations of Federal agencies.

(Pub. L. 91-190, title I, §105, Jan. 1, 1970, 83 Stat. 854.)

SUBCHAPTER II-COUNCIL ON ENVIRONMENTAL QUALITY

§4341. Omitted

CODIFICATION

Section, Pub. L. 91-190, title II, §201, Jan. 1, 1970, 83 Stat. 854, which required the President to transmit to Congress annually an Environmental Quality Report, terminated, effective May 15, 2000, pursuant to section 3003 of Pub. L. 104-66, as amended, set out as a note under section 1113 of Title 31, Money and Finance. See, also, item 1 on page 41 of House Document No. 103-7.

§4342. Establishment; membership; Chairman; appointments

There is created in the Executive Office of the President a Council on Environmental Quality (hereinafter referred to as the "Council"). The Council shall be composed of three members who shall be appointed by the President to serve at his pleasure, by and with the advice and consent of the Senate. The President shall designate one of the members of the Council to serve as Chairman. Each member shall be a person who, as a result of his training, experience, and attainPage 45

tion, to determine the best practices for meeting the diverse needs throughout the National Airspace System;

(g) establish strong incentives to managers for achieving results; and

(h) formulate and recommend to the Administrator any management, fiscal, or legislative changes necessary for the organization to achieve its performance goals.

SEC. 3. Aviation Management Advisory Committee. The Air Traffic Control Subcommittee of the Aviation Management Advisory Committee shall provide, consistent with its responsibilities under Air-21, general oversight to ATO regarding the administration, management, conduct, direction, and supervision of the air traffic control system.

SEC. 4. Evaluation and Report. Not later than 5 years after the date of this order, the Aviation Management Advisory Committee shall provide to the Secretary and the Administrator a report on the operation and effectiveness of the ATO, together with any recommendations for management, fiscal, or legislative changes to enable the organization to achieve its goals.

SEC. 5. Definitions. The term "air traffic control system" has the same meaning as the term defined by section 40102(a)(42) [now 40102(a)(47)] of title 49, United States Code.

SEC. 6. Judicial Review. This order is intended only to improve the internal management of the executive branch and is not intended to, nor does it, create any right to administrative or judicial review, or any right, whether substantive or procedural, enforceable by any party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.

DEFINITIONS FOR TITLE II OF PUB. L. 104–264

Pub. L. 104-264, title II, §202, Oct. 9, 1996, 110 Stat. 3227, provided that: "In this title [see Effective Date of 1996 Amendment note set out above], the following definitions apply:

"(1) ADMINISTRATION.—The term 'Administration' means the Federal Aviation Administration.

"(2) ADMINISTRATOR.—The term 'Administrator' means the Administrator of the Federal Aviation Administration.

"(3) SECRETARY.—The term 'Secretary' means the Secretary of Transportation."

§107. Federal Transit Administration

(a) The Federal Transit Administration is an administration in the Department of Transportation.

(b) The head of the Administration is the Administrator who is appointed by the President, by and with the advice and consent of the Senate. The Administrator reports directly to the Secretary of Transportation.

(c) The Administrator shall carry out duties and powers prescribed by the Secretary.

(Pub. L. 97-449, §1(b), Jan. 12, 1983, 96 Stat. 2417; Pub. L. 102-240, title III, §3004(c)(1), (2), Dec. 18, 1991, 105 Stat. 2088.)

HISTORICAL AND REVISION NOTES

Revised Section	Source (U.S. Code)	Source (Statutes at Large)
107	49:1608 (note).	Reorg. Plan No. 2 of 1968, eff. July 1, 1968, §3, 82 Stat. 1369.

In subsection (b), the words "and shall be compensated at the rate now or hereafter provided for Level III of the Executive Schedule Pay Rates (5 U.S.C. 5314)" are omitted as surplus because of 5:5314.

Amendments

1991—Pub. L. 102–240 substituted "Federal Transit Administration" for "Urban Mass Transportation Administration" in section catchline and subsec. (a).

CHANGE OF NAME

Pub. L. 102–240, title III, $3004(a),\,(b),\,Dec.\,18,\,1991,\,105$ Stat. 2088, provided that:

"(a) REDESIGNATION OF UMTA.—The Urban Mass Transportation Administration of the Department of Transportation shall be known and designated as the 'Federal Transit Administration'.

"(b) REFERENCES.—Any reference in a law, map, regulation, document, paper, or other record of the United States to the Urban Mass Transportation Administration shall be deemed to be a reference to the 'Federal Transit Administration'."

§108. Pipeline and Hazardous Materials Safety Administration

(a) IN GENERAL.—The Pipeline and Hazardous Materials Safety Administration shall be an administration in the Department of Transportation.

(b) SAFETY AS HIGHEST PRIORITY.—In carrying out its duties, the Administration shall consider the assignment and maintenance of safety as the highest priority, recognizing the clear intent, encouragement, and dedication of Congress to the furtherance of the highest degree of safety in pipeline transportation and hazardous materials transportation.

(c) ADMINISTRATOR.—The head of the Administration shall be the Administrator who shall be appointed by the President, by and with the advice and consent of the Senate, and shall be an individual with professional experience in pipeline safety, hazardous materials safety, or other transportation safety. The Administrator shall report directly to the Secretary of Transportation.

(d) DEPUTY ADMINISTRATOR.—The Administration shall have a Deputy Administrator who shall be appointed by the Secretary. The Deputy Administrator shall carry out duties and powers prescribed by the Administrator.

(e) CHIEF SAFETY OFFICER.—The Administration shall have an Assistant Administrator for Pipeline and Hazardous Materials Safety appointed in the competitive service by the Secretary. The Assistant Administrator shall be the Chief Safety Officer of the Administration. The Assistant Administrator shall carry out the duties and powers prescribed by the Administrator.

(f) DUTIES AND POWERS OF THE ADMINIS-TRATOR.—The Administrator shall carry out—

(1) duties and powers related to pipeline and hazardous materials transportation and safety vested in the Secretary by chapters 51, 57, 61, 601, and 603; and

(2) other duties and powers prescribed by the Secretary.

(g) LIMITATION.—A duty or power specified in subsection (f)(1) may be transferred to another part of the Department of Transportation or another government entity only if specifically provided by law.

(Pub. L. 97–449, §1(b), Jan. 12, 1983, 96 Stat. 2417; Pub. L. 103–272, §4(j)(4), July 5, 1994, 108 Stat. 1365; Pub. L. 108–426, §2(a), Nov. 30, 2004, 118 Stat. 2423.)

HISTORICAL AND REVISION NOTES PUB L 97-449

Revised Section	Source (U.S. Code)	Source (Statutes at Large)
108(a)	49:1655(b)(1), (2).	Oct. 15, 1966, Pub. L. 89-670, §§3(e)(3) (related to USCG), 6(b)(1), (2), 80 Stat. 932, 938.
108(b)	49:1652(e)(3) (related to USCG).	

Subsection (a) reflects the transfer of the Coast Guard to the Department of Transportation as provided by the source provisions and 14:1. The words "Except when operating as a service of the Navy" are substituted for 49:1655(b)(2) because of 14:3. The words "The Secretary of Transportation exercises . . . vested in the Secretary of the Treasury . . . immediately before April 1, 1967" are substituted for "and there are hereby transferred to and vested in the Secretary . . . of the Secretary of the Treasury" to reflect the transfer of duties and powers to the Secretary of Transportation on April 1, 1967, the effective date of the Department of Transportation Act (Pub. L. 89–670, 80 Stat. 931).

In subsection (b), the first sentence is included to provide the name of the officer in charge of the Coast Guard, as reflected in 14:44. In the 2d sentence, the words "carrying out the duties and powers specified by law" are substituted for "such functions, powers, and duties as are specified in this chapter to be carried out", and the words "carry out duties and powers prescribed" are substituted for "carry out such additional functions, powers, and duties as", for consistency.

PUB. L. 103-272

Section 4(j)(4) amends 49:108(a) to reflect the intent of 49 App.:1655(b)(2), on which 49:108(a) was based.

Amendments

2004—Pub. L. 108-426 amended section catchline and text generally, substituting provisions relating to Pipeline and Hazardous Materials Safety Administration for provisions relating to Coast Guard.

1994—Subsec. (a). Pub. L. 103–272 designated existing provisions as par. (1), substituted "The Coast Guard" for "Except when operating as a service in the Navy, the Coast Guard", and added par. (2).

SAVINGS PROVISIONS

Pub. L. 108-426, §5, Nov. 30, 2004, 118 Stat. 2426, as amended by Pub. L. 110-244, title III, §302(h), June 6, 2008, 122 Stat. 1618, provided that:

"(a) TRANSFER OF ASSETS AND PERSONNEL.—Personnel, property, and records employed, used, held, available, or to be made available in connection with functions transferred within the Department of Transportation by this Act [see Short Title of 2004 Amendment note set out under section 101 of this title] shall be transferred for use in connection with the functions transferred, and unexpended balances of appropriations, allocations, and other funds (including funds of any predecessor entity) shall also be transferred accordinelv.

(b) LEGAL DOCUMENTS.—All orders (including delegations by the Secretary of Transportation), determinations, rules, regulations, permits, grants, loans, contracts, settlements, agreements, certificates, licenses, and privileges—

"(1) that have been issued, made, granted, or allowed to become effective by any officer or employee, or any other Government official, or by a court of competent jurisdiction, in the performance of any function that is transferred by this Act; and

"(2) that are in effect on the effective date of such transfer (or become effective after such date pursuant to their terms as in effect on such effective date).

shall continue in effect according to their terms until modified, terminated, superseded, set aside, or revoked in accordance with law by the Department, any other authorized official, a court of competent jurisdiction, or operation of law.

"(c) PROCEEDINGS.—The provisions of this Act shall not affect any proceedings, including administrative enforcement actions, pending before this Act takes effect, insofar as those functions are transferred by this Act; but such proceedings, to the extent that they relate to functions so transferred, shall proceed in accordance with applicable law and regulations. Nothing in this subsection shall be deemed to prohibit the conclusion or modification of any proceeding described in this subsection under the same terms and conditions and to the same extent that such proceeding could have been concluded or modified if this Act had not been enacted. The Secretary of Transportation is authorized to provide for the orderly transfer of pending proceedings. "(d) SUITS.—

"(1) IN GENERAL.—This Act shall not affect suits commenced before the date of enactment of this Act [Nov. 30, 2004], except as provided in paragraphs (2) and (3). In all such suits, proceedings shall be had, appeals taken, and judgments rendered in the same manner and with the same effect as if this Act had not been enacted.

"(2) SUITS BY OR AGAINST DEPARTMENT.—Any suit by or against the Department begun before the date of enactment of this Act, shall proceed in accordance with applicable law and regulations, insofar as it involves a function retained and transferred under this Act.

"(3) PROCEDURES FOR REMANDED CASES.—If the court in a suit described in paragraph (1) remands a case, subsequent proceedings related to such case shall proceed under procedures that are in accordance with applicable law and regulations as in effect at the time of such subsequent proceedings.

"(e) CONTINUANCE OF ACTIONS AGAINST OFFICERS.—No suit, action, or other proceeding commenced by or against any officer in his or her official capacity shall abate by reason of the enactment of this Act.

"(f) EXERCISE OF AUTHORITIES.—An officer or employee of the Department, for purposes of performing a function transferred by this Act, may exercise all authorities under any other provision of law that were available with respect to the performance of that function to the official responsible for the performance of the function immediately before the effective date of the transfer of the function by this Act.

"(g) REFERENCES.—A reference relating to an agency, officer, or employee affected by this Act in any Federal law, Executive order, rule, regulation, or delegation of authority, or in any document pertaining to an officer or employee, is deemed to refer, as appropriate, to the agency, officer, or employee who succeeds to the functions transferred by this Act.

tions transferred by this Act. "(h) DEFINITION.—In this section, the term 'this Act' includes the amendments made by this Act."

WORKFORCE MANAGEMENT

Pub. L. 114-183, §9, June 22, 2016, 130 Stat. 520, provided that:

"(a) REVIEW.—Not later than 1 year after the date of the enactment of this Act [June 22, 2016], the Inspector General of the Department of Transportation shall submit to the Committee on Transportation and Infrastructure and the Committee on Energy and Commerce of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, a review of Pipeline and Hazardous Materials Safety Administration staff resource management, including—

"(1) geographic allocation plans, hiring and timeto-hire challenges, and expected retirement rates and recruitment and retention strategies;

"(2) an identification and description of any previous periods of macroeconomic and pipeline industry conditions under which the Pipeline and Hazardous Materials Safety Administration has encountered difficulty in filling vacancies, and the degree to which special hiring authorities, including direct hiring authority authorized by the Office of Personnel Management, could have ameliorated such difficulty; and Page 47

"(3) recommendations to address hiring challenges, training needs, and any other identified staff resource challenges.

"(b) DIRECT HIRING.—Upon identification of a period described in subsection (a)(2), the Administrator of the Pipeline and Hazardous Materials Safety Administration may apply to the Office of Personnel Management for the authority to appoint qualified candidates to any position relating to pipeline safety, as determined by the Administrator, without regard to sections 3309 through 3319 of title 5, United States Code.

"(c) SAVINGS CLAUSE.—Nothing in this section shall preclude the Administrator of the Pipeline and Hazardous Materials Safety Administration from applying to the Office of Personnel Management for the authority described in subsection (b) prior to the completion of the report required under subsection (a)."

TRANSFER OF DUTIES AND POWERS OF RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION

Pub. L. 108-426, §2(b), Nov. 30, 2004, 118 Stat. 2424, provided that: "The authority of the Research and Special Programs Administration exercised under chapters 51, 57, 61, 601, and 603 of title 49, United States Code, is transferred to the Administrator of the Pipeline and Hazardous Materials Safety Administration."

For transfer of authority of the Research and Special Programs Administration, other than authority exercised under chapters 51, 57, 61, 601, and 603 of this title, to the Administrator of the Research and Innovative Technology Administration, see section 4(b) of Pub. L. 108-426, set out as a note under former section 112 of this title.

Pub. L. 108-426, §7, Nov. 30, 2004, 118 Stat. 2428, provided that: "The Secretary shall provide for the orderly transfer of duties and powers under this Act [see Short Title of 2004 Amendment note set out under section 101 of this title], including the amendments made by this Act, as soon as practicable but not later than 90 days after the date of enactment of this Act [Nov. 30, 2004]."

Reports

Pub. L. 108-426, §6, Nov. 30, 2004, 118 Stat. 2428, provided that:

"(a) REPORTS BY THE INSPECTOR GENERAL.—Not later than 30 days after the date of enactment of this Act [Nov. 30, 2004], the Inspector General of the Department of Transportation shall submit to the Secretary of Transportation and the Administrator of the Pipeline and Hazardous Materials Safety Administration a report containing the following:

"(1) A list of each statutory mandate regarding pipeline safety or hazardous materials safety that has not been implemented.

"(2) A list of each open safety recommendation made by the National Transportation Safety Board or the Inspector General regarding pipeline safety or hazardous materials safety.

"(b) REPORTS BY THE SECRETARY.-

"(1) STATUTORY MANDATES.—Not later than 90 days after the date of enactment of this Act, and every 180 days thereafter until each of the mandates referred to in subsection (a)(1) has been implemented, the Secretary shall transmit to the Committee on Transportation and Infrastructure and the Committee on Energy and Commerce of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the specific actions taken to implement such mandates.

"(2) NTSB AND INSPECTOR GENERAL RECOMMENDA-TIONS.—Not later than January 1st of each year, the Secretary shall transmit to the Committee on Transportation and Infrastructure and the Committee on Energy and Commerce of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report containing each recommendation referred to in subsection (a)(2) and a copy of the Department of Transportation response to each such recommendation."

§109. Maritime Administration

(a) ORGANIZATION AND MISSION.—The Maritime Administration is an administration in the Department of Transportation. The mission of the Maritime Administration is to foster, promote, and develop the merchant maritime industry of the United States.

(b) MARITIME ADMINISTRATOR.—The head of the Maritime Administration is the Maritime Administrator, who is appointed by the President by and with the advice and consent of the Senate. The Administrator shall report directly to the Secretary of Transportation and carry out the duties prescribed by the Secretary.

(c) DEPUTY MARITIME ADMINISTRATOR.—The Maritime Administration shall have a Deputy Maritime Administrator, who is appointed in the competitive service by the Secretary, after consultation with the Administrator. The Deputy Administrator shall carry out the duties prescribed by the Administrator. The Deputy Administrator shall be Acting Administrator during the absence or disability of the Administrator and, unless the Secretary designates another individual, during a vacancy in the office of Administrator.

(d) DUTIES AND POWERS VESTED IN SEC-RETARY.—All duties and powers of the Maritime Administration are vested in the Secretary.

(e) REGIONAL OFFICES.—The Maritime Administration shall have regional offices for the Atlantic, Gulf, Great Lakes, and Pacific port ranges, and may have other regional offices as necessary. The Secretary shall appoint a qualified individual as Director of each regional office. The Secretary shall carry out appropriate activities and programs of the Maritime Administration through the regional offices.

(f) INTERAGENCY AND INDUSTRY RELATIONS.— The Secretary shall establish and maintain liaison with other agencies, and with representative trade organizations throughout the United States, concerned with the transportation of commodities by water in the export and import foreign commerce of the United States, for the purpose of securing preference to vessels of the United States for the transportation of those commodities.

(g) DETAILING Officers From Armed FORCES.—To assist the Secretary in carrying out duties and powers relating to the Maritime Administration, not more than five officers of the armed forces may be detailed to the Secretary at any one time, in addition to details authorized by any other law. During the period of a detail, the Secretary shall pay the officer an amount that, when added to the officer's pay and allowances as an officer in the armed forces, makes the officer's total pay and allowances equal to the amount that would be paid to an individual performing work the Secretary considers to be of similar importance, difficulty, and responsibility as that performed by the officer during the detail.

(h) CONTRACTS, COOPERATIVE AGREEMENTS, AND AUDITS.—

(1) CONTRACTS AND COOPERATIVE AGREE-MENTS.—In the same manner that a private corporation may make a contract within the scope of its authority under its charter, the Secretary prescribes after November 16, 1990. However, the".

Subsec. (d)(1). Pub. L. 109-59, 7122(b), inserted "or section 5119(e)" before period at end of first sentence.

Subsec. (e). Pub. L. 109-59, §7122(c), inserted "or section 5119(b)" before period at end of first sentence.

Subsec. (f). Pub. L. 109-59, §7123(a), redesignated subsec. (g) as (f), realigned margins, and struck out heading and text of former subsec. (f). Text read as follows: "A party to a proceeding under subsection (d) or (e) of this section may bring a civil action in an appropriate district court of the United States for judicial review of the decision of the Secretary not later than 60 days after the decision becomes final."

Subsec. (g). Pub. L. 109–59, \$7123(a)(2), redesignated subsec. (h) as (g). Former subsec. (g) redesignated (f).

Subsecs. (h), (i). Pub. L. 109–59, 7123(a)(2), redesignated subsecs. (h) and (i) as (g) and (h), respectively.

Pub. L. 109-59, §7122(d), added subsecs. (h) and (i).

2002—Subsecs. (a), (b)(1). Pub. L. 107–296 substituted "chapter, a regulation prescribed under this chapter, or a hazardous materials transportation security regulation or directive issued by the Secretary of Homeland Security" for "chapter or a regulation prescribed under this chapter" wherever appearing.

1994—Subsecs. (a), (b)(1). Pub. L. 103-429 inserted "and unless authorized by another law of the United States" after "section" in introductory provisions.

Subsec. (b)(1)(E). Pub. L. 103-311, 17(a)(2), substituted "a packaging or a" for "a package or".

Subsec. (d). Pub. L. 103-311, §120(b), inserted after second sentence "The Secretary shall issue a decision on an application for a determination within 180 days after the date of the publication of the notice of having received such application, or the Secretary shall publish a statement in the Federal Register of the reason why the Secretary's decision on the application is delayed, along with an estimate of the additional time necessary before the decision is made."

Subsec. (g). Pub. L. 103-311, §107, designated existing provisions as par. (1) and added par. (2).

EFFECTIVE DATE OF 2012 AMENDMENT

Amendment by Pub. L. 112-141 effective Oct. 1, 2012, see section 3(a) of Pub. L. 112-141, set out as an Effective and Termination Dates of 2012 Amendment note under section 101 of Title 23, Highways.

EFFECTIVE DATE OF 2002 AMENDMENT

Amendment by Pub. L. 107-296 effective 60 days after Nov. 25, 2002, see section 4 of Pub. L. 107-296, set out as an Effective Date note under section 101 of Title 6, Domestic Security.

EFFECTIVE DATE OF 1994 AMENDMENT

Amendment by Pub. L. 103-429 effective July 5, 1994, see section 9 of Pub. L. 103-429, set out as a note under section 321 of this title.

§ 5126. Relationship to other laws

(a) CONTRACTS.—A person under contract with a department, agency, or instrumentality of the United States Government that transports hazardous material, or causes hazardous material to be transported, or designs, manufactures, fabricates, inspects, marks, maintains, reconditions, repairs, or tests a package, container, or packaging component that is represented as qualified for use in transporting hazardous material shall comply with this chapter, regulations prescribed and orders issued under this chapter, and all other requirements of the Government, State and local governments, and Indian tribes (except a requirement preempted by a law of the United States) in the same way and to the same extent that any person engaging in

that transportation, designing, manufacturing, fabricating, inspecting, marking, maintaining, reconditioning, repairing, or testing that is in or affects commerce must comply with the provision, regulation, order, or requirement.

(b) NONAPPLICATION.—This chapter does not apply to—

(1) a pipeline subject to regulation under chapter 601 of this title; or

(2) any matter that is subject to the postal laws and regulations of the United States under this chapter or title 18 or 39.

(Pub. L. 103-272, §1(d), July 5, 1994, 108 Stat. 783; Pub. L. 103-311, title I, §117(a)(2), Aug. 26, 1994, 108 Stat. 1678; Pub. L. 109-59, title VII, §7124, Aug. 10, 2005, 119 Stat. 1908; Pub. L. 110-244, title III, §302(d), June 6, 2008, 122 Stat. 1618.)

HISTORICAL AND REVISION NOTES

Revised Section	Source (U.S. Code)	Source (Statutes at Large)
5126(a)	49 App.:1818.	Jan. 3, 1975, Pub. L. 93-633, 88 Stat. 2156, §120; added Nov. 16, 1990, Pub. L. 101-615 §20 104 Stat. 3270
5126(b)	49 App.:1811(f).	 Jan. 3, 1975, Pub. L. 93-633, §112(f), 88 Stat. 2161; Nov. 30, 1979, Pub. L. 96-129, §216(a), 93 Stat. 1015; restated Nov. 16, 1990, Pub. L. 101-615, §13, 104 Stat. 3260.

In subsection (a), the word "manufactures" is substituted for "manufacturers" to correct an error in the source provisions. The words "of the executive, legislative, or judicial branch", "be subject to and", "substantive and procedural", and "this chapter or any other" are omitted as surplus.

Amendments

2008—Subsec. (a). Pub. L. 110–244 amended Pub. L. 109–59. See 2005 Amendment note below.

2005—Subsec. (a). Pub. L. 109-59, §7124(4), substituted "designing, manufacturing, fabricating, inspecting, marking, maintaining, reconditioning, repairing, or testing" for "manufacturing, fabricating, marking, maintenance, reconditioning, repairing, or testing".

Pub. L. 109-59, §7124(3), as amended by Pub. L. 110-244, substituted "shall comply with this chapter" for "must comply with this chapter".

Pub. L. 109-59, §7124(1), (2), substituted "transports hazardous material, or causes hazardous material to be transported," for "transports or causes to be transported hazardous material," and "designs, manufactures, fabricates, inspects, marks, maintains, reconditions, repairs, or tests a package, container, or packaging component that is represented" for "manufactures, fabricates, marks, maintains, reconditions, repairs, or tests a packaging or a container that the person represents, marks, certifies, or sells".

1994—Subsec. (a). Pub. L. 103-311 substituted "a packaging or a" for "a package or".

EFFECTIVE DATE OF 2008 AMENDMENT

Amendment by Pub. L. 110-244 effective as of the date of enactment of Pub. L. 109-59 (Aug. 10, 2005) and to be treated as included in Pub. L. 109-59 as of that date, and provisions of Pub. L. 109-59, as in effect on the day before June 6, 2008, that are amended by Pub. L. 110-244 to be treated as not enacted, see section 121(b) of Pub. L. 110-244, set out as a note under section 101 of Title 23, Highways.

§5127. Judicial review

(a) FILING AND VENUE.—Except as provided in section 20114(c), a person adversely affected or aggrieved by a final action of the Secretary

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under this chapter may petition for review of the final action in the United States Court of Appeals for the District of Columbia or in the court of appeals for the United States for the circuit in which the person resides or has its principal place of business. The petition must be filed not more than 60 days after the Secretary's action becomes final.

(b) JUDICIAL PROCEDURES.—When a petition is filed under subsection (a), the clerk of the court immediately shall send a copy of the petition to the Secretary. The Secretary shall file with the court a record of any proceeding in which the final action was issued, as provided in section 2112 of title 28.

(c) AUTHORITY OF COURT.—The court has exclusive jurisdiction, as provided in subchapter II of chapter 5 of title 5, to affirm or set aside any part of the Secretary's final action and may order the Secretary to conduct further proceedings.

(d) REQUIREMENT FOR PRIOR OBJECTION .- In reviewing a final action under this section, the court may consider an objection to a final action of the Secretary only if the objection was made in the course of a proceeding or review conducted by the Secretary or if there was a reasonable ground for not making the objection in the proceeding.

(Added Pub. L. 109-59, title VII, §7123(b), Aug. 10, 2005, 119 Stat. 1907.)

PRIOR PROVISIONS

A prior section 5127 was renumbered section 5128 of this title.

§5128. Authorization of appropriations

(a) IN GENERAL.—There are authorized to be appropriated to the Secretary to carry out this chapter (except sections 5107(e), 5108(g)(2), 5113, 5115, 5116, and 5119)-

- (1) \$53,000,000 for fiscal year 2016;
- (2) \$55,000,000 for fiscal year 2017;
- (3) \$57,000,000 for fiscal year 2018;
 (4) \$58,000,000 for fiscal year 2019; and
- (5) \$60,000,000 for fiscal year 2020.

(b) HAZARDOUS MATERIALS EMERGENCY PRE-PAREDNESS FUND.-From the Hazardous Materials Emergency Preparedness Fund established under section 5116(h), the Secretary may expend, for each of fiscal years 2016 through 2020-

(1) \$21,988,000 to carry out section 5116(a);

(2) \$150,000 to carry out section 5116(e);

(3) \$625,000 to publish and distribute the Emergency Response Guidebook under section 5116(h)(3): and

(4) \$1,000,000 to carry out section 5116(i).

(c) HAZARDOUS MATERIALS TRAINING GRANTS.-From the Hazardous Materials Emergency Preparedness Fund established pursuant to section 5116(h), the Secretary may expend \$4,000,000 for each of fiscal years 2016 through 2020 to carry out section 5107(e).

(d) COMMUNITY SAFETY GRANTS.—Of the amounts made available under subsection (a) to carry out this chapter, the Secretary shall withhold \$1,000,000 for each of fiscal years 2016 through 2020 to carry out section 5107(i).

(e) CREDITS TO APPROPRIATIONS.-

(1) EXPENSES.—In addition to amounts otherwise made available to carry out this chapter, the Secretary may credit amounts received from a State, Indian tribe, or other public authority or private entity for expenses the Secretary incurs in providing training to the State, Indian tribe, authority, or entity.

(2) AVAILABILITY OF AMOUNTS.—Amounts made available under this section shall remain available until expended.

(Pub. L. 103-272, §1(d), July 5, 1994, 108 Stat. 783, §5127; Pub. L. 103-311, title I, §§103, 119(b), (c)(4), Aug. 26, 1994, 108 Stat. 1673, 1680; renumbered §5128 and amended Pub. L. 109-59, title VII, §§7123(b), 7125, Aug. 10, 2005, 119 Stat. 1907, 1908; Pub. L. 110-244, title III, §302(f), June 6, 2008, 122 Stat. 1618; Pub. L. 112-141, div. C, title III, §33017, July 6, 2012, 126 Stat. 841; Pub. L. 113-159, title I, §1301, Aug. 8, 2014, 128 Stat. 1847; Pub. L. 114-21, title I, §1301, May 29, 2015, 129 Stat. 225; Pub. L. 114-41, title I, §1301, July 31, 2015, 129 Stat. 453; Pub. L. 114-73, title I, §1301, Oct. 29, 2015, 129 Stat. 575; Pub. L. 114-87, title I, §1301, Nov. 20, 2015, 129 Stat. 684; Pub. L. 114-94, div. A, title VII, §7101, Dec. 4, 2015, 129 Stat. 1588.)

HISTORICAL AND REVISION NOTES

Revised Section	Source (U.S. Code)	Source (Statutes at Large)
5127(a)	49 App.:1812(a).	Jan. 3, 1975, Pub. L. 93-633, §115, 88 Stat. 2164; July 19, 1975, Pub. L. 94+56, §4, 89 Stat. 264; Oct. 11, 1976, Pub. L. 94+74, §3, 90 Stat. 2068; Sept. 30, 1978, Pub. L. 95-403, 92 Stat. 863; Oct. 30, 1984, Pub. L. 98-559, §2, 98 Stat. 2907; restated Nov. 16, 1990, Pub. L. 101-615, §14, 104 Stat. 3260; Oct. 24, 1992, Pub. L. 102-508, §504, 10252, Pub. L. 102-508, §504,
5127(b)	49 App.:1816(d).	106 Stat. 3311. Jan. 3, 1975, Pub. L. 93-633, 88 Stat. 2156, §118(d); added Nov. 16, 1990, Pub. L. 101-615, §18, 104 Stat. 3269; Oct. 24, 1992, Pub. L. 102-508, §506, 106 Stat. 3312
5127(c)	49 App.:1815(i)(3).	Jan. 3, 1975, Pub. L. 93-633, 88 Stat. 2156, §117A(i); added Nov. 16, 1990, Pub. L. 101-615, §17, 104 Stat. 3268.
5127(d)	49 App.:1815(i)(1), (2), (4).	
5127(e)	49 App.:1819(h) (1st sentence).	Jan. 3, 1975, Pub. L. 93-633, 88 Stat. 2156, §121(h); added Nov. 16, 1990, Pub. L. 101-615, §22, 104 Stat. 3272.
5127(f) 5127(g)	 49 App.:1812(b). 49 App.:1815(i)(5). 49 App.:1819(h) (last sentence). 	

In the section, references to fiscal years 1991 and 1992 are omitted as obsolete.

In subsections (b), (c)(1), and (d), the words "amounts in" are omitted as surplus.

In subsection (c), the text of 49 App.:1815(i)(3)(A) is omitted as obsolete.

In subsection (c)(2), the words "relating to dissemination of the curriculum" are omitted as surplus.

AMENDMENTS

2015-Pub. L. 114-94 amended section generally. Prior to amendment, section related to authorization of appropriations for fiscal years 2013 to 2015.

Subsec. (a)(3). Pub. L. 114-41, §1301(a)(2), added par. (3) and struck out former par. (3) which read as follows: "\$35,615,474 for the period beginning on October 1, 2014,

and ending on July 31, 2015." Pub. L. 114-21, §130(a), amended par. (3) generally. Prior to amendment, par. (3) read as follows: "\$28,468,948 for the period beginning on October 1, 2014, and ending on May 31, 2015.'

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principal executive office. However, a State authority may not bring an action under this section outside the State.

(Pub. L. 103-272, §1(e), July 5, 1994, 108 Stat. 869.)

Revised Section	Source (U.S. Code)	Source (Statutes at Large)
20113(a)	45:436(b)(1) (related to authority to bring actions), (2).	Oct. 16, 1970, Pub. L. 91-458, \$207(b), (c), 84 Stat. 974; Nov. 2, 1978, Pub. L. 95-574, \$8, 92 Stat. 2461; restated Oct. 10, 1980, Pub. L.
	45:439(a) (related to actions by States).	96-423, §5, 94 Stat. 1812. Oct. 16, 1970, Pub. L. 91-458, §210(a) (related to actions by States), 84 Stat. 975; Oct. 10, 1980, Pub. L. 96-423, §9(a), 94 Stat. 1814; Nov. 16, 1990, Pub. L. 101-615, §28(f), 104 Stat.
20113(b)	45:436(a)(1) (related to authority to bring actions), (2).	 3277. Oct. 16, 1970, Pub. L. 91–458, §207(a), 84 Stat. 974; Nov. 2, 1978, Pub. L. 95–574, §8, 92 Stat. 2461; restated Oct. 10, 1980, Pub. L. 96–422, §5, 94 Stat. 1812; Nov. 16, 1990, Pub. L. 101–615, §28(e), 104 Stat. 3277
20113(c)	45:436(a)(1) (related to venue), (b)(1) (related to venue),	5020. 0211.
	45:439(c) (related to actions by States).	Oct. 16, 1970, Pub. L. 91-458, 84 Stat. 971, §210(c) (re- lated to actions by States); added Oct. 10, 1980, Pub. L. 96-423, §9(b), 94 Stat. 1815.

In subsection (a), the language about jurisdiction in 45:439(a) (related to actions by States) is omitted for the reasons explained in the revision note for section 20112(a) of the revised title.

In subsection (b), the word "impose" is substituted for "assess" for consistency. The words "the authority may bring a civil action in an appropriate district court of the United States" are substituted for "agency may apply to the United States district court" for consistency in the revised title and with other titles of the United States Code. The words "included in or made applicable to such rule, regulation, order, or standard" are omitted as surplus.

In subsection (c), the reference to ''section $207(\mbox{d})\mbox{''}$ in section 210(c) of the Federal Railroad Safety Act of 1970 (Public Law 91-458, 84 Stat. 971), as added by section 9(b) of the Federal Railroad Safety Authorization Act of 1980 (Public Law 96-423, 94 Stat. 1815), is assumed to have been intended as a reference to section 207(c). The Federal Railroad Safety Authorization Act of 1980 was derived from S. 2730, which in turn was derived from H.R. 7104. See 126 Cong. Rec. 26535 (1980). Section 207(d) in an earlier version of H.R. 7104 was redesignated as section 207(c) during the legislative process and no section 207(d) was enacted. See H.R. Rept. No. 96-1025, 96th Cong., 2d Sess., pp. 14, 15 (1980).

§20114. Judicial procedures

(a) CRIMINAL CONTEMPT.-In a trial for criminal contempt for violating an injunction or restraining order issued under this chapter, the violation of which is also a violation of this chapter, the defendant may demand a jury trial. The defendant shall be tried as provided in rule 42(b) of the Federal Rules of Criminal Procedure (18 App. U.S.C.).

(b) SUBPENAS FOR WITNESSES.—A subpena for a witness required to attend a district court of the United States in an action brought under this chapter may be served in any judicial district.

(c) REVIEW OF AGENCY ACTION.-Except as provided in section 20104(c) of this title, a proceeding to review a final action of the Secretary of Transportation under this part or, as applicable to railroad safety, chapter 51 or 57 of this title shall be brought in the appropriate court of appeals as provided in chapter 158 of title 28.

(Pub. L. 103-272, §1(e), July 5, 1994, 108 Stat. 870.)

HISTORICAL AND REVISION NOTES

Revised Section	Source (U.S. Code)	Source (Statutes at Large)
20114(a)	45:439(b).	Oct. 16, 1970, Pub. L. 91-458, §§ 209(d), 210(b), 84 Stat. 975, 976.
20114(b) 20114(c)	45:438(d). 45:431(f).	Oct. 16, 1970, Pub. L. 91-458, §202(f), 84 Stat. 972; re- stated Sept. 3, 1992, Pub. L. 102-365, §5(a)(1), 106 Stat. 975.

In subsection (a), the words "the defendant may de-mand a jury trial" are substituted for "trial shall be by the court, or, upon demand of the accused, by a jury to eliminate unnecessary words and for consistency in the revised title.

In subsection (b), the words "may be served in any judicial district" are substituted for "may run into any other district" for clarity.

In subsection (c), the words "a final action of the Secretary" are substituted for "Any final agency action taken by the Secretary" to eliminate unnecessary words. The words "this part or, as applicable to rail-road safety, chapter 51 or 57 of this title" are sub-stituted for "this subchapter or under any of the other Federal railroad safety laws, as defined in section 441(e) of this title" because of the restatement. The words "is subject to judicial review as provided in chapter 7 of title 5" are omitted as unnecessary because 5:ch. 7 applies unless otherwise stated. The words "by and in the manner prescribed" are omitted as surplus.

§20115. User fees

(a) SCHEDULE OF FEES.—The Secretary of Transportation shall prescribe by regulation a schedule of fees for railroad carriers subject to this chapter. The fees-

(1) shall cover the costs of carrying out this chapter (except section 20108(a));

(2) shall be imposed fairly on the railroad carriers, in reasonable relationship to an appropriate combination of criteria such as revenue ton-miles, track miles, passenger miles, or other relevant factors; and

(3) may not be based on that part of industry revenues attributable to a railroad carrier or class of railroad carriers.

(b) COLLECTION PROCEDURES.—The Secretary shall prescribe procedures to collect the fees. The Secretary may use the services of a department, agency, or instrumentality of the United States Government or of a State or local authority to collect the fees, and may reimburse the department, agency, or instrumentality a reasonable amount for its services.

(c) Collection, Deposit, and Use.—(1) The Secretary shall impose and collect fees under this section for each fiscal year before the end of the fiscal year.

(2) Fees collected under this section shall be deposited in the general fund of the Treasury as offsetting receipts. The fees may be used, to the extent provided in advance in an appropriation law, only to carry out this chapter.

(3) Fees prescribed under this section shall be imposed in an amount sufficient to pay for the



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CODE OF FEDERAL REGULATIONS

Title 40 Protection of Environment

Part 1060 to End

Revised as of July 1, 2019

Containing a codification of documents of general applicability and future effect

As of July 1, 2019

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PART 1500-PURPOSE, POLICY. AND MANDATE

Sec.

1500.1 Purpose.

1500.2Policy.

1500.3 Mandate.

1500.4 Reducing paperwork.

1500.5 Reducing delay.

1500.6 Agency authority

AUTHORITY: NEPA, the Environmental Quality Improvement Act of 1970, as amend-A definition of the control of the clean Air Act, as amended (42 U.S.C. 4371 et seq.), sec. 309 of the Clean Air Act, as amended (42 U.S.C. 7609) and E.O. 11514, Mar. 5, 1970, as amended by E.O. 11991, May 24, 1977).

SOURCE: 43 FR 55990, Nov. 28, 1978, unless otherwise noted.

§1500.1 Purpose.

(a) The National Environmental Policy Act (NEPA) is our basic national charter for protection of the environment. It establishes policy, sets goals (section 101), and provides means (section 102) for carrying out the policy. Section 102(2) contains "action-forcing" provisions to make sure that federal agencies act according to the letter and spirit of the Act. The regulations that follow implement section 102(2). Their purpose is to tell federal agencies what they must do to comply with the procedures and achieve the goals of the Act. The President, the federal agencies, and the courts share responsibility for enforcing the Act so as to achieve the substantive requirements of section 101.

(b) NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA. Most important. NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail.

(c) Ultimately, of course, it is not better documents but better decisions that count. NEPA's purpose is not to generate paperwork-even excellent paperwork-but to foster excellent action. The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment. These regulations provide the direction to achieve this purpose.

§1500.2 Policy.

Federal agencies shall to the fullest extent possible:

(a) Interpret and administer the policies, regulations, and public laws of the United States in accordance with the policies set forth in the Act and in these regulations.

(b) Implement procedures to make the NEPA process more useful to decisionmakers and the public; to reduce paperwork and the accumulation of extraneous background data; and to emphasize real environmental issues and alternatives. Environmental impact statements shall be concise, clear, and to the point, and shall be supported by evidence that agencies have made the necessary environmental analyses.

(c) Integrate the requirements of NEPA with other planning and environmental review procedures required by law or by agency practice so that all such procedures run concurrently rather than consecutively.

(d) Encourage and facilitate public involvement in decisions which affect the quality of the human environment.

(e) Use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment.

(f) Use all practicable means, consistent with the requirements of the Act and other essential considerations of national policy, to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions upon the quality of the human environment.

§1500.3 Mandate.

Parts 1500 through 1508 of this title provide regulations applicable to and binding on all Federal agencies for implementing the procedural provisions of the National Environmental Policy Act of 1969, as amended (Pub. L. 91-190, 42 U.S.C. 4321 et seq.) (NEPA or the Act)
§1500.4

except where compliance would be inconsistent with other statutory requirements. These regulations are issued pursuant to NEPA, the Environmental Quality Improvement Act of 1970, as amended (42 U.S.C. 4371 et seq.) section 309 of the Clean Air Act, as amended (42 U.S.C. 7609) and Executive Order 11514, Protection and Enhancement of Environmental Quality (March 5, 1970, as amended by Executive Order 11991, May 24, 1977). These regulations, unlike the predecessor guidelines, are not confined to sec. 102(2)(C) (environmental impact statements). The regulations apply to the whole of section 102(2). The provisions of the Act and of these regulations must be read together as a whole in order to comply with the spirit and letter of the law. It is the Council's intention that judicial review of agency compliance with these regulations not occur before an agency has filed the final environmental impact statement, or has made a final finding of no significant impact (when such a finding will result in action affecting the environment), or takes action that will result in irreparable injury. Furthermore, it is the Council's intention that any trivial violation of these regulations not give rise to any independent cause of action.

§1500.4 Reducing paperwork.

Agencies shall reduce excessive paperwork by:

(a) Reducing the length of environmental impact statements (§1502.2(c)), by means such as setting appropriate page limits (§§1501.7(b)(1) and 1502.7).

(b) Preparing analytic rather than encyclopedic environmental impact statements (§1502.2(a)).

(c) Discussing only briefly issues other than significant ones (§1502.2(b)).

(d) Writing environmental impact statements in plain language (§1502.8).

(e) Following a clear format for environmental impact statements (\$1502.10).

(f) Emphasizing the portions of the environmental impact statement that are useful to decisionmakers and the public (§§1502.14 and 1502.15) and reducing emphasis on background material (\$1502.16).

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(g) Using the scoping process, not only to identify significant environmental issues deserving of study, but also to deemphasize insignificant issues, narrowing the scope of the environmental impact statement process accordingly (§1501.7).

(h) Summarizing the environmental impact statement (§1502.12) and circulating the summary instead of the entire environmental impact statement if the latter is unusually long (§1502.19).

(i) Using program, policy, or plan environmental impact statements and tiering from statements of broad scope to those of narrower scope, to eliminate repetitive discussions of the same issues (§§ 1502.4 and 1502.20).

Incorporating reference (j) bv (§1502.21).

(k) Integrating NEPA requirements with other environmental review and consultation requirements (§1502.25).

(1) Requiring comments to be as specific as possible (§1503.3).

(m) Attaching and circulating only changes to the draft environmental impact statement, rather than rewriting and circulating the entire statement when changes are minor (\$1503.4(c)).

(n) Eliminating duplication with State and local procedures, by providing for joint preparation (§1506.2), and with other Federal procedures, by providing that an agency may adopt appropriate environmental documents prepared by another agency (§1506.3).

(o) Combining environmental documents with other documents (§1506.4).

(p) Using categorical exclusions to define categories of actions which do not individually or cumulatively have a significant effect on the human environment and which are therefore exempt from requirements to prepare an environmental impact statement (§1508.4).

(q) Using a finding of no significant impact when an action not otherwise excluded will not have a significant effect on the human environment and is therefore exempt from requirements to prepare an environmental impact statement (§1508.13).

[43 FR 55990, Nov. 29, 1978; 44 FR 873, Jan. 3, 1979]

§1500.5 Reducing delay.

Agencies shall reduce delay by:

(a) Integrating the NEPA process into early planning (§1501.2).

(b) Emphasizing interagency cooperation before the environmental impact statement is prepared, rather than submission of adversary comments on a completed document (§1501.6).

(c) Insuring the swift and fair resolution of lead agency disputes (§1501.5).

(d) Using the scoping process for an early identification of what are and what are not the real issues (§1501.7).

(e) Establishing appropriate time limits for the environmental impact statement process (§§1501.7(b)(2) and 1501.8).

(f) Preparing environmental impact statements early in the process (§1502.5).

(g) Integrating NEPA requirements with other environmental review and consultation requirements (§1502.25).

(h) Eliminating duplication with State and local procedures by providing for joint preparation (§1506.2) and with other Federal procedures by providing that an agency may adopt appropriate environmental documents prepared by another agency (§1506.3).

(i) Combining environmental documents with other documents (§1506.4).

(j) Using accelerated procedures for proposals for legislation (§1506.8).

(k) Using categorical exclusions to define categories of actions which do not individually or cumulatively have a significant effect on the human environment (§1508.4) and which are therefore exempt from requirements to prepare an environmental impact statement.

(1) Using a finding of no significant impact when an action not otherwise excluded will not have a significant effect on the human environment (§1508.13) and is therefore exempt from requirements to prepare an environmental impact statement.

§1500.6 Agency authority.

Each agency shall interpret the provisions of the Act as a supplement to its existing authority and as a mandate to view traditional policies and missions in the light of the Act's national environmental objectives. Agencies shall review their policies, procedures, and regulations accordingly and revise them as necessary to insure full compliance with the purposes and provisions of the Act. The phrase "to the fullest extent possible" in section 102 means that each agency of the Federal Government shall comply with that section unless existing law applicable to the agency's operations expressly prohibits or makes compliance impossible.

PART 1501-NEPA AND AGENCY PLANNING

Sec.

1501.1 Purpose.

- 1501.2 Apply NEPA early in the process.
- 1501.3 When to prepare an environmental assessment.
- 1501.4 Whether to prepare an environmental impact statement.
- 1501.5 Lead agencies.
- 1501.6 Cooperating agencies.
- 1501.7 Scoping
- 1501.8 Time limits.

AUTHORITY: NEPA, the Environmental Quality Improvement Act of 1970, as amended (42 U.S.C. 4371 et seq.), sec. 309 of the Clean Air Act, as amended (42 U.S.C. 7609, and E.O. 11514 (Mar. 5, 1970, as amended by E.O. 11991, May 24, 1977).

SOURCE: 43 FR 55992, Nov. 29, 1978, unless otherwise noted.

§1501.1 Purpose.

The purposes of this part include:

(a) Integrating the NEPA process into early planning to insure appropriate consideration of NEPA's policies and to eliminate delay.

(b) Emphasizing cooperative consultation among agencies before the environmental impact statement is prepared rather than submission of adversary comments on a completed document.

(c) Providing for the swift and fair resolution of lead agency disputes.

(d) Identifying at an early stage the significant environmental issues deserving of study and deemphasizing insignificant issues, narrowing the scope of the environmental impact statement accordingly.

(e) Providing a mechanism for putting appropriate time limits on the environmental impact statement process.

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action, or if significant new circumstances or information arise which bear on the proposal or its impacts.

§1501.8 Time limits.

Although the Council has decided that prescribed universal time limits for the entire NEPA process are too inflexible, Federal agencies are encouraged to set time limits appropriate to individual actions (consistent with the time intervals required by §1506.10). When multiple agencies are involved the reference to agency below means lead agency.

(a) The agency shall set time limits if an applicant for the proposed action requests them: Provided, That the limits are consistent with the purposes of NEPA and other essential considerations of national policy.

(b) The agency may:

(1) Consider the following factors in determining time limits:

- (i) Potential for environmental harm.
- (ii) Size of the proposed action.

(iii) State of the art of analytic techniques.

(iv) Degree of public need for the proposed action, including the consequences of delay.

(v) Number of persons and agencies affected.

(vi) Degree to which relevant information is known and if not known the time required for obtaining it.

(vii) Degree to which the action is controversial.

(viii) Other time limits imposed on the agency by law, regulations, or executive order.

(2) Set overall time limits or limits for each constituent part of the NEPA process, which may include:

(i) Decision on whether to prepare an environmental impact statement (if not already decided).

(ii) Determination of the scope of the environmental impact statement.

(iii) Preparation of the draft environmental impact statement.

(iv) Review of any comments on the draft environmental impact statement from the public and agencies.

(v) Preparation of the final environmental impact statement.

(vi) Review of any comments on the final environmental impact statement.

(vii) Decision on the action based in part on the environmental impact statement.

(3) Designate a person (such as the project manager or a person in the agency's office with NEPA responsibilities) to expedite the NEPA process.

(c) State or local agencies or members of the public may request a Federal Agency to set time limits.

PART 1502—ENVIRONMENTAL **IMPACT STATEMENT**

Sec.

- 1502.1 Purpose.
- 1502.2Implementation.
- 1502.3 Statutory requirements for statements.
- 1502.4 Major Federal actions requiring the preparation of environmental impact statements.
- 1502.5 Timing.
- 1502.6 Interdisciplinary preparation. 1502.7
- Page limits. 1502.8 Writing.
- 1502.9 Draft, final, and supplemental statements.
- 1502.10 Recommended format.
- 1502.11Cover sheet.
- Summary. 1502.12
- 1502.13 Purpose and need.
- 1502.14 Alternatives including the proposed action.
- 1502.15 Affected environment.

1502.16Environmental consequences. List of preparers.

- 1502.17
- 1502.18Appendix.
- 1502.19Circulation of the environmental impact statement.
- 1502.20 Tiering.
- 1502.21Incorporation by reference.
- 1502.22 Incomplete or unavailable informa-
- tion. 1502.23 Cost-benefit analysis.

1502.24Methodology and scientific accuracy.

1502.25 Environmental review and consultation requirements.

AUTHORITY: NEPA, the Environmental Quality Improvement Act of 1970, as amended (42 U.S.C. 4371 et seq.), sec. 309 of the Clean Air Act, as amended (42 U.S.C. 7609), and E.O. 11514 (Mar. 5, 1970, as amended by E.O. 11991, May 24, 1977).

SOURCE: 43 FR 55994, Nov. 29, 1978, unless otherwise noted.

§1502.1 Purpose.

The primary purpose of an environmental impact statement is to serve as an action-forcing device to insure that the policies and goals defined in the

§ 1502.1

§1502.2

Act are infused into the ongoing programs and actions of the Federal Government. It shall provide full and fair discussion of significant environmental impacts and shall inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment. Agencies shall focus on significant environmental issues and alternatives and shall reduce paperwork and the accumulation of extraneous background data. Statements shall be concise, clear, and to the point, and shall be supported by evidence that the agency has made the necessary environmental analyses. An environmental impact statement is more than a disclosure document. It shall be used by Federal officials in conjunction with other relevant material to plan actions and make decisions.

§1502.2 Implementation.

To achieve the purposes set forth in §1502.1 agencies shall prepare environmental impact statements in the following manner:

(a) Environmental impact statements shall be analytic rather than encyclopedic.

(b) Impacts shall be discussed in proportion to their significance. There shall be only brief discussion of other than significant issues. As in a finding of no significant impact, there should be only enough discussion to show why more study is not warranted.

(c) Environmental impact statements shall be kept concise and shall be no longer than absolutely necessary to comply with NEPA and with these regulations. Length should vary first with potential environmental problems and then with project size.

(d) Environmental impact statements shall state how alternatives considered in it and decisions based on it will or will not achieve the requirements of sections 101 and 102(1) of the Act and other environmental laws and policies.

(e) The range of alternatives discussed in environmental impact statements shall encompass those to be considered by the ultimate agency decisionmaker.

(f) Agencies shall not commit resources prejudicing selection of alter-

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natives before making a final decision (§1506.1).

(g) Environmental impact statements shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made.

§1502.3 Statutory requirements for statements.

As required by sec. 102(2)(C) of NEPA environmental impact statements (§1508.11) are to be included in every recommendation or report.

On proposals (§1508.23).

For legislation and (§1508.17).

Other major Federal actions (§1508.18).

Significantly (§1508.27).

Affecting (§§1508.3, 1508.8).

The quality of the human environ-

ment (§1508.14).

§1502.4 Major Federal actions requiring the preparation of environ-mental impact statements.

(a) Agencies shall make sure the proposal which is the subject of an environmental impact statement is properly defined. Agencies shall use the criteria for scope (§1508.25) to determine which proposal(s) shall be the subject of a particular statement. Proposals or parts of proposals which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement.

(b) Environmental impact statements may be prepared, and are sometimes required, for broad Federal actions such as the adoption of new agency programs or regulations (§1508.18). Agencies shall prepare statements on broad actions so that they are relevant to policy and are timed to coincide with meaningful points in agency planning and decisionmaking.

(c) When preparing statements on broad actions (including proposals by more than one agency), agencies may find it useful to evaluate the proposal(s) in one of the following ways:

(1) Geographically, including actions occurring in the same general location, such as body of water, region, or metropolitan area.

(2) Generically, including actions which have relevant similarities, such

as common timing, impacts, alternatives, methods of implementation, media, or subject matter.

(3) By stage of technological development including federal or federally assisted research, development or demonstration programs for new technologies which, if applied, could significantly affect the quality of the human environment. Statements shall be prepared on such programs and shall be available before the program has reached a stage of investment or commitment to implementation likely to determine subsequent development or restrict later alternatives.

(d) Agencies shall as appropriate employ scoping (§1501.7), tiering (§1502.20), and other methods listed in §§1500.4 and 1500.5 to relate broad and narrow actions and to avoid duplication and delay.

§1502.5 Timing.

An agency shall commence preparation of an environmental impact statement as close as possible to the time the agency is developing or is presented with a proposal (§1508.23) so that preparation can be completed in time for the final statement to be included in any recommendation or report on the proposal. The statement shall be prepared early enough so that it can serve practically as an important contribution to the decisionmaking process and will not be used to rationalize or justify decisions already made (§§1500.2(c), 1501.2, and 1502.2). For instance:

(a) For projects directly undertaken by Federal agencies the environmental impact statement shall be prepared at the feasibility analysis (go-no go) stage and may be supplemented at a later stage if necessary.

(b) For applications to the agency appropriate environmental assessments or statements shall be commenced no later than immediately after the application is received. Federal agencies are encouraged to begin preparation of such assessments or statements earlier, preferably jointly with applicable State or local agencies.

(c) For adjudication, the final environmental impact statement shall normally precede the final staff recommendation and that portion of the

public hearing related to the impact study. In appropriate circumstances the statement may follow preliminary hearings designed to gather information for use in the statements.

(d) For informal rulemaking the draft environmental impact statement shall normally accompany the proposed rule.

§1502.6 Interdisciplinary preparation.

Environmental impact statements shall be prepared using an inter-disciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts (section 102(2)(A) of the Act). The disciplines of the preparers shall be appropriate to the scope and issues identified in the scoping process (§1501.7).

§1502.7 Page limits.

The text of final environmental impact statements (e.g., paragraphs (d) through (g) of §1502.10) shall normally be less than 150 pages and for proposals of unusual scope or complexity shall normally be less than 300 pages.

§1502.8 Writing.

Environmental impact statements shall be written in plain language and may use appropriate graphics so that decisionmakers and the public can readily understand them. Agencies should employ writers of clear prose or editors to write, review, or edit statements, which will be based upon the analysis and supporting data from the natural and social sciences and the environmental design arts.

§1502.9 Draft, final, and supplemental statements.

Except for proposals for legislation as provided in §1506.8 environmental impact statements shall be prepared in two stages and may be supplemented.

(a) Draft environmental impact statements shall be prepared in accordance with the scope decided upon in the scoping process. The lead agency shall work with the cooperating agencies and shall obtain comments as required in part 1503 of this chapter. The draft statement must fulfill and satisfy to the fullest extent possible the requirements established for final statements

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in section 102(2)(C) of the Act. If a draft statement is so inadequate as to preclude meaningful analysis, the agency shall prepare and circulate a revised draft of the appropriate portion. The agency shall make every effort to disclose and discuss at appropriate points in the draft statement all major points of view on the environmental impacts of the alternatives including the proposed action.

(b) Final environmental impact statements shall respond to comments as required in part 1503 of this chapter. The agency shall discuss at appropriate points in the final statement any responsible opposing view which was not adequately discussed in the draft statement and shall indicate the agency's response to the issues raised.

(c) Agencies:

(1) Shall prepare supplements to either draft or final environmental impact statements if:

(i) The agency makes substantial changes in the proposed action that are relevant to environmental concerns: or

(ii) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

(2) May also prepare supplements when the agency determines that the purposes of the Act will be furthered by doing so.

(3) Shall adopt procedures for introducing a supplement into its formal administrative record, if such a record exists.

(4) Shall prepare, circulate, and file a supplement to a statement in the same fashion (exclusive of scoping) as a draft and final statement unless alternative procedures are approved by the Council

§1502.10 Recommended format.

Agencies shall use a format for environmental impact statements which will encourage good analysis and clear presentation of the alternatives including the proposed action. The following standard format for environmental impact statements should be followed unless the agency determines that there is a compelling reason to do otherwise:

(a) Cover sheet.

(b) Summary.

(c) Table of contents.

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(d) Purpose of and need for action.

(e) Alternatives including proposed action (sections 102(2)(C)(iii) and 102(2)(E) of the Act).

(f) Affected environment.

(g) Environmental consequences (especially sections 102(2)(C)(i), (ii), (iv), and (v) of the Act).

(h) List of preparers.

(i) List of Agencies, Organizations, and persons to whom copies of the statement are sent.

(i) Index.

(k) Appendices (if any).

If a different format is used, it shall include paragraphs (a), (b), (c), (h), (i), and (j), of this section and shall include the substance of paragraphs (d), (e), (f), (g), and (k) of this section, as further described in §§1502.11 through 1502.18, in any appropriate format.

§1502.11 Cover sheet.

The cover sheet shall not exceed one page. It shall include:

(a) A list of the responsible agencies including the lead agency and any cooperating agencies.

(b) The title of the proposed action that is the subject of the statement (and if appropriate the titles of related cooperating agency actions), together with the State(s) and county(ies) (or other jurisdiction if applicable) where the action is located.

(c) The name, address, and telephone number of the person at the agency who can supply further information.

(d) A designation of the statement as a draft, final, or draft or final supplement.

(e) A one paragraph abstract of the statement.

(f) The date by which comments must be received (computed in cooperation with EPA under §1506.10).

The information required by this section may be entered on Standard Form 424 (in items 4, 6, 7, 10, and 18).

§1502.12 Summary.

Each environmental impact statement shall contain a summary which adequately and accurately summarizes the statement. The summary shall stress the major conclusions, areas of controversy (including issues raised by agencies and the public), and the issues to be resolved (including the choice

among alternatives). The summary will normally not exceed 15 pages.

§1502.13 Purpose and need.

The statement shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action.

§1502.14 Alternatives including the proposed action.

This section is the heart of the environmental impact statement. Based on the information and analysis presented in the sections on the Affected Environment (§1502.15) and the Environmental Consequences (§1502.16), it should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public. In this section agencies shall:

(a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.

(b) Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits.

(c) Include reasonable alternatives not within the jurisdiction of the lead agency.

(d) Include the alternative of no action.

(e) Identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference.

(f) Include appropriate mitigation measures not already included in the proposed action or alternatives.

§1502.15 Affected environment.

The environmental impact statement shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration. The descriptions shall be no longer than is necessary to understand the effects of the alternatives. Data

and analyses in a statement shall be commensurate with the importance of the impact, with less important material summarized, consolidated, or simply referenced. Agencies shall avoid useless bulk in statements and shall concentrate effort and attention on important issues. Verbose descriptions of the affected environment are themselves no measure of the adequacy of an environmental impact statement.

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§1502.16 Environmental consequences.

This section forms the scientific and analytic basis for the comparisons under §1502.14. It shall consolidate the discussions of those elements required by sections 102(2)(C)(i), (ii), (iv), and (v) of NEPA which are within the scope of the statement and as much of section 102(2)(C)(iii) as is necessary to support the comparisons. The discussion will include the environmental impacts of the alternatives including the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented. This section should not duplicate discussions in §1502.14. It shall include discussions of:

(a) Direct effects and their significance (§1508.8).

(b) Indirect effects and their significance (§1508.8).

(c) Possible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned. (See §1506.2(d).)

(d) The environmental effects of alternatives including the proposed action. The comparisons under §1502.14 will be based on this discussion.

(e) Energy requirements and conservation potential of various alternatives and mitigation measures.

(f) Natural or depletable resource requirements and conservation potential of various alternatives and mitigation measures.

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(g) Urban quality, historic and cultural resources, and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures.

(h) Means to mitigate adverse environmental impacts (if not fully covered under §1502.14(f)).

[43 FR 55994, Nov. 29, 1978; 44 FR 873, Jan. 3, 19791

§1502.17 List of preparers.

The environmental impact statement shall list the names, together with their qualifications (expertise, experience, professional disciplines), of the persons who were primarily responsible for preparing the environmental impact statement or significant background papers, including basic components of the statement (§§1502.6 and 1502.8). Where possible the persons who are responsible for a particular analysis, including analyses in background papers, shall be identified. Normally the list will not exceed two pages.

§1502.18 Appendix.

If an agency prepares an appendix to an environmental impact statement the appendix shall:

(a) Consist of material prepared in connection with an environmental impact statement (as distinct from material which is not so prepared and which is incorporated by reference (§1502.21)).

(b) Normally consist of material which substantiates any analysis fundamental to the impact statement.

(c) Normally be analytic and relevant to the decision to be made.

(d) Be circulated with the environmental impact statement or be readily available on request.

§1502.19 Circulation of the environmental impact statement.

Agencies shall circulate the entire draft and final environmental impact statements except for certain appendices as provided in §1502.18(d) and unchanged statements as provided in §1503.4(c). However, if the statement is unusually long, the agency may circulate the summary instead, except that the entire statement shall be furnished to:

(a) Any Federal agency which has jurisdiction by law or special expertise with respect to any environmental im-

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pact involved and any appropriate Federal, State or local agency authorized to develop and enforce environmental standards.

(b) The applicant, if any.

(c) Any person, organization, or agency requesting the entire environmental impact statement.

(d) In the case of a final environmental impact statement any person, organization, or agency which submitted substantive comments on the draft.

If the agency circulates the summary and thereafter receives a timely request for the entire statement and for additional time to comment. the time for that requestor only shall be extended by at least 15 days beyond the minimum period.

§1502.20 Tiering.

Agencies are encouraged to tier their environmental impact statements to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision at each level of environmental review (§1508.28). Whenever a broad environmental impact statement has been prepared (such as a program or policy statement) and a subsequent statement or environmental assessment is then prepared on an action included within the entire program or policy (such as a site specific action) the subsequent statement or environmental assessment need only summarize the issues discussed in the broader statement and incorporate discussions from the broader statement by reference and shall concentrate on the issues specific to the subsequent action. The subsequent document shall state where the earlier document is available. Tiering may also be appropriate for different stages of actions. (Section 1508.28).

§1502.21 Incorporation by reference.

Agencies shall incorporate material into an environmental impact statement by reference when the effect will be to cut down on bulk without impeding agency and public review of the action. The incorporated material shall be cited in the statement and its content briefly described. No material

may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment. Material based on proprietary data which is itself not available for review and comment shall not be incorporated by reference.

§1502.22 Incomplete or unavailable information.

When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.

(a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.

(b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:

(1) A statement that such information is incomplete or unavailable; (2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment; (3) a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment, and (4) the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

(c) The amended regulation will be applicable to all environmental impact statements for which a Notice of Intent (40 CFR 1508.22) is published in the FED-ERAL REGISTER on or after May 27, 1986. For environmental impact statements in progress, agencies may choose to comply with the requirements of either the original or amended regulation.

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[51 FR 15625, Apr. 25, 1986]

§1502.23 Cost-benefit analysis.

If a cost-benefit analysis relevant to the choice among environmentally different alternatives is being considered for the proposed action, it shall be incorporated by reference or appended to the statement as an aid in evaluating the environmental consequences. To assess the adequacy of compliance with section 102(2)(B) of the Act the statement shall, when a cost-benefit analvsis is prepared, discuss the relationship between that analysis and any analyses of unquantified environmental impacts, values, and amenities. For purposes of complying with the Act, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are important qualitative considerations. In any event, an environmental impact statement should at least indicate those considerations, including factors not related to environmental quality, which are likely to be relevant and important to a decision.

§1502.24 Methodology and scientific accuracy.

Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements. They shall identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement. An agency may place discussion of methodology in an appendix.

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§1502.25 Environmental review and consultation requirements.

(a) To the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with environmental impact analyses and related surveys and studies required by the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), the National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.), the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), and other environmental review laws and executive orders.

(b) The draft environmental impact statement shall list all Federal permits, licenses, and other entitlements which must be obtained in implementing the proposal. If it is uncertain whether a Federal permit, license, or other entitlement is necessary, the draft environmental impact statement shall so indicate.

PART 1503—COMMENTING

Sec.

1503.1 Inviting comments.

1503.2 Duty to comment.

1503.3 Specificity of comments.

1503.4 Response to comments.

AUTHORITY: NEPA, the Environmental Quality Improvement Act of 1970, as amended (42 U.S.C. 4371 et seq.), sec. 309 of the Clean Air Act, as amended (42 U.S.C. 7609), and E.O. 11514 (Mar. 5, 1970, as amended by E.O. 11991, May 24, 1977).

SOURCE: 43 FR 55997, Nov. 29, 1978, unless otherwise noted.

§1503.1 Inviting comments.

(a) After preparing a draft environmental impact statement and before preparing a final environmental impact statement the agency shall:

(1) Obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved or which is authorized to develop and enforce environmental standards.

(2) Request the comments of:

(i) Appropriate State and local agencies which are authorized to develop and enforce environmental standards:

(ii) Indian tribes, when the effects may be on a reservation; and

40 CFR Ch. V (7-1-19 Edition) (iii) Any agency which has requested

that it receive statements on actions of the kind proposed.

Office of Management and Budget Circular A-95 (Revised), through its system of clearinghouses, provides a means of securing the views of State and local environmental agencies. The clearinghouses may be used, by mutual agreement of the lead agency and the clearinghouse, for securing State and local reviews of the draft environmental impact statements.

(3) Request comments from the applicant, if any.

(4) Request comments from the public, affirmatively soliciting comments from those persons or organizations who may be interested or affected.

(b) An agency may request comments on a final environmental impact statement before the decision is finally made. In any case other agencies or persons may make comments before the final decision unless a different time is provided under §1506.10.

§1503.2 Duty to comment.

Federal agencies with jurisdiction by law or special expertise with respect to any environmental impact involved and agencies which are authorized to develop and enforce environmental standards shall comment on statements within their jurisdiction, expertise, or authority. Agencies shall comment within the time period specified for comment in §1506.10. A Federal agency may reply that it has no comment. If a cooperating agency is satisfied that its views are adequately reflected in the environmental impact statement, it should reply that it has no comment.

§1503.3 Specificity of comments.

(a) Comments on an environmental impact statement or on a proposed action shall be as specific as possible and may address either the adequacy of the statement or the merits of the alternatives discussed or both.

(b) When a commenting agency criticizes a lead agency's predictive methodology, the commenting agency should describe the alternative methodology which it prefers and why.

which address classified proposals may be safeguarded and restricted from public dissemination in accordance with agencies' own regulations applicable to classified information. These documents may be organized so that classified portions can be included as annexes, in order that the unclassified portions can be made available to the public.

(d) Agency procedures may provide for periods of time other than those presented in §1506.10 when necessary to comply with other specific statutory requirements.

(e) Agency procedures may provide that where there is a lengthy period between the agency's decision to prepare an environmental impact statement and the time of actual preparation, the notice of intent required by §1501.7 may be published at a reasonable time in advance of preparation of the draft statement.

PART 1508—TERMINOLOGY AND INDEX

Sec.

- 1508.1 Terminology.
- 1508.2 Act.
- 1508.3 Affecting.
- 1508.4 Categorical exclusion.
- 1508.5 Cooperating agency.
- 1508.6Council.
- 1508.7 Cumulative impact.
- 1508.8 Effects.
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- 1508.13 Finding of no significant impact.
- 1508.14 Human environment.
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- 1508.24 Referring agency.
- 1508.25Scope.
- 1508.26 Special expertise.
- 1508.27 Significantly.
- 1508.28 Tiering.

AUTHORITY: NEPA, the Environmental Quality Improvement Act of 1970, as amended (42 U.S.C. 4371 $et\ seq.),$ sec. 309 of the Clean Air Act, as amended (42 U.S.C. 7609), and E.O. 11514 (Mar. 5, 1970, as amended by E.O. 11991, May 24, 1977).

SOURCE: 43 FR 56003, Nov. 29, 1978, unless otherwise noted.

§1508.1 Terminology.

The terminology of this part shall be uniform throughout the Federal Government.

§1508.2 Act.

Act means the National Environmental Policy Act, as amended (42 U.S.C. 4321, et seq.) which is also referred to as "NEPA."

§1508.3 Affecting.

Affecting means will or may have an effect on.

§1508.4 Categorical exclusion.

Categorical exclusion means a category of actions which do not individually or cumulatively have a significant effect on the human environment and which have been found to have no such effect in procedures adopted by a Federal agency in implementation of these regulations (§1507.3) and for which, therefore, neither an environmental assessment nor an environmental impact statement is required. An agency may decide in its procedures or otherwise, to prepare environmental assessments for the reasons stated in §1508.9 even though it is not required to do so. Any procedures under this section shall provide for extraordinary circumstances in which a normally excluded action may have a significant environmental effect.

§1508.5 Cooperating agency.

Cooperating agency means any Federal agency other than a lead agency which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major Federal action significantly affecting the quality of the human environment. The selection and responsibilities of a cooperating agency are described in §1501.6. A State or local agency of similar qualifications or, when the effects are on a reservation, an Indian Tribe, may by agreement with the lead agency become a cooperating agency.

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§1508.6 Council.

Council means the Council on Environmental Quality established by title II of the Act.

§1508.7 Cumulative impact.

Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

§1508.8 Effects.

Effects include:

(a) Direct effects, which are caused by the action and occur at the same time and place.

(b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

§1508.9 Environmental assessment.

Environmental assessment:

(a) Means a concise public document for which a Federal agency is responsible that serves to:

(1) Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.

(2) Aid an agency's compliance with the Act when no environmental impact statement is necessary.

(3) Facilitate preparation of a statement when one is necessary.

(b) Shall include brief discussions of the need for the proposal, of alternatives as required by section 102(2)(E), of the environmental impacts of the proposed action and alternatives, and a listing of agencies and persons consulted.

§1508.10 Environmental document.

Environmental document includes the documents specified in §1508.9 (environmental assessment), §1508.11 (environmental impact statement), §1508.13 (finding of no significant impact), and §1508.22 (notice of intent).

§1508.11 Environmental impact statement.

Environmental impact statement means a detailed written statement as required by section 102(2)(C) of the Act.

§1508.12 Federal agency.

Federal agency means all agencies of the Federal Government. It does not mean the Congress, the Judiciary, or the President, including the performance of staff functions for the President in his Executive Office. It also includes for purposes of these regulations States and units of general local government and Indian tribes assuming NEPA responsibilities under section 104(h) of the Housing and Community Development Act of 1974.

§1508.13 Finding of no significant impact.

Finding of no significant impact means a document by a Federal agency briefly presenting the reasons why an action. not otherwise excluded (§1508.4), will not have a significant effect on the human environment and for which an environmental impact statement therefore will not be prepared. It shall include the environmental assessment or a summary of it and shall note any other environmental documents related to it $(\S1501.7(a)(5))$. If the assessment is included, the finding need not

repeat any of the discussion in the assessment but may incorporate it by reference.

§1508.14 Human environment.

Human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment. (See the definition of "effects" (§1508.8).) This means that economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment.

§1508.15 Jurisdiction by law.

Jurisdiction by law means agency authority to approve, veto, or finance all or part of the proposal.

§1508.16 Lead agency.

Lead agency means the agency or agencies preparing or having taken primary responsibility for preparing the environmental impact statement.

§1508.17 Legislation.

Legislation includes a bill or legislative proposal to Congress developed by or with the significant cooperation and support of a Federal agency, but does not include requests for appropriations. The test for significant cooperation is whether the proposal is in fact predominantly that of the agency rather than another source. Drafting does not by itself constitute significant cooperation. Proposals for legislation include requests for ratification of treaties. Only the agency which has primary responsibility for the subject matter involved will prepare a legislative environmental impact statement.

§1508.18 Major Federal action.

Major Federal action includes actions with effects that may be major and which are potentially subject to Federal control and responsibility. Major reinforces but does not have a meaning independent of significantly (§1508.27). Actions include the circumstance

where the responsible officials fail to act and that failure to act is reviewable by courts or administrative tribunals under the Administrative Procedure Act or other applicable law as agency action.

(a) Actions include new and continuing activities, including projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies; new or revised agency rules, regulations, plans, policies, or procedures; and legislative proposals (§§1506.8, 1508.17). Actions do not include funding assistance solely in the form of general revenue sharing funds, distributed under the State and Local Fiscal Assistance Act of 1972, 31 U.S.C. 1221 et seq., with no Federal agency control over the subsequent use of such funds. Actions do not include bringing judicial or administrative civil or criminal enforcement actions.

(b) Federal actions tend to fall within one of the following categories:

(1) Adoption of official policy, such as rules, regulations, and interpretations adopted pursuant to the Administrative Procedure Act, 5 U.S.C. 551 et seq.; treaties and international conventions or agreements: formal documents establishing an agency's policies which will result in or substantially alter agency programs.

(2) Adoption of formal plans, such as official documents prepared or approved by federal agencies which guide or prescribe alternative uses of Federal resources, upon which future agency actions will be based.

(3) Adoption of programs, such as a group of concerted actions to implement a specific policy or plan; systematic and connected agency decisions allocating agency resources to implement a specific statutory program or executive directive.

(4) Approval of specific projects, such as construction or management activities located in a defined geographic area. Projects include actions approved by permit or other regulatory decision as well as federal and federally assisted activities.

§1508.19 Matter.

Matter includes for purposes of part 1504:

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§1508.20

(a) With respect to the Environmental Protection Agency, any proposed legislation, project, action or regulation as those terms are used in section 309(a) of the Clean Air Act (42 U.S.C. 7609).

(b) With respect to all other agencies, any proposed major federal action to which section 102(2)(C) of NEPA applies.

§1508.20 Mitigation.

Mitigation includes:

(a) Avoiding the impact altogether by not taking a certain action or parts of an action.

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

(e) Compensating for the impact by replacing or providing substitute resources or environments.

§1508.21 NEPA process.

NEPA process means all measures necessary for compliance with the requirements of section 2 and title I of NEPA.

§1508.22 Notice of intent.

Notice of intent means a notice that an environmental impact statement will be prepared and considered. The notice shall briefly:

(a) Describe the proposed action and possible alternatives.

(b) Describe the agency's proposed scoping process including whether, when, and where any scoping meeting will be held.

(c) State the name and address of a person within the agency who can answer questions about the proposed action and the environmental impact statement.

§1508.23 Proposal.

Proposal exists at that stage in the development of an action when an agency subject to the Act has a goal and is actively preparing to make a decision on one or more alternative

means of accomplishing that goal and the effects can be meaningfully evaluated. Preparation of an environmental impact statement on a proposal should be timed ($\S1502.5$) so that the final statement may be completed in time for the statement to be included in any recommendation or report on the proposal. A proposal may exist in fact as well as by agency declaration that one

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§1508.24 Referring agency.

Referring agency means the federal agency which has referred any matter to the Council after a determination that the matter is unsatisfactory from the standpoint of public health or welfare or environmental quality.

§1508.25 Scope.

exists.

Scope consists of the range of actions, alternatives, and impacts to be considered in an environmental impact statement. The scope of an individual statement may depend on its relationships to other statements (§§1502.20 and 1508.28). To determine the scope of environmental impact statements, agencies shall consider 3 types of actions, 3 types of alternatives, and 3 types of impacts. They include:

(a) Actions (other than unconnected single actions) which may be:

(1) Connected actions, which means that they are closely related and therefore should be discussed in the same impact statement. Actions are connected if they:

(i) Automatically trigger other actions which may require environmental impact statements.

(ii) Cannot or will not proceed unless other actions are taken previously or simultaneously.

(iii) Are interdependent parts of a larger action and depend on the larger action for their justification.

(2) Cumulative actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement.

(3) Similar actions, which when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental

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consequencies together, such as common timing or geography. An agency may wish to analyze these actions in the same impact statement. It should do so when the best way to assess adequately the combined impacts of similar actions or reasonable alternatives to such actions is to treat them in a single impact statement.

(b) Alternatives, which include:

(1) No action alternative.

(2) Other reasonable courses of actions.

(3) Mitigation measures (not in the proposed action).

(c) Impacts, which may be: (1) Direct; (2) indirect; (3) cumulative.

§1508.26 Special expertise.

Special expertise means statutory responsibility, agency mission, or related program experience.

§1508.27 Significantly.

Significantly as used in NEPA requires considerations of both context and intensity:

(a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

(b) Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

(1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

(2) The degree to which the proposed action affects public health or safety.

(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

(6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

(8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

(10) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

[43 FR 56003, Nov. 29, 1978; 44 FR 874, Jan. 3, 1979]

§1508.28 Tiering.

Tiering refers to the coverage of general matters in broader environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as regional or basinwide program statements or ultimately site-specific statements) incorporating by reference the general discussions and concentrating solely on the issues specific to the statement

§1508.28

Presidential Documents

Wednesday, February 16, 1994

Title 3—	Executive Order 12898 of February 11, 1994
The President	Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1–1.Implementation.

1–101. Agency Responsibilities. To the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands.

1–102. Creation of an Interagency Working Group on Environmental Justice. (a) Within 3 months of the date of this order, the Administrator of the Environmental Protection Agency ("Administrator") or the Administrator's designee shall convene an interagency Federal Working Group on Environmental Justice ("Working Group"). The Working Group shall comprise the heads of the following executive agencies and offices, or their designees: (a) Department of Defense; (b) Department of Health and Human Services; (c) Department of Housing and Urban Development; (d) Department of Labor; (e) Department of Agriculture; (f) Department of Transportation; (g) Department of Justice; (h) Department of the Interior; (i) Department of Commerce; (j) Department of Energy; (k) Environmental Protection Agency; (l) Office of Management and Budget; (m) Office of Science and Technology Policy; (n) Office of the Deputy Assistant to the President for Environmental Policy; (o) Office of the Assistant to the President for Domestic Policy; (p) National Economic Council; (q) Council of Economic Advisers; and (r) such other Government officials as the President may designate. The Working Group shall report to the President through the Deputy Assistant to the President for Environmental Policy and the Assistant to the President for Domestic Policy.

(b) The Working Group shall: (1) provide guidance to Federal agencies on criteria for identifying disproportionately high and adverse human health or environmental effects on minority populations and low-income populations;

(2) coordinate with, provide guidance to, and serve as a clearinghouse for, each Federal agency as it develops an environmental justice strategy as required by section 1-103 of this order, in order to ensure that the administration, interpretation and enforcement of programs, activities and policies are undertaken in a consistent manner;

(3) assist in coordinating research by, and stimulating cooperation among, the Environmental Protection Agency, the Department of Health and Human Services, the Department of Housing and Urban Development, and other agencies conducting research or other activities in accordance with section 3–3 of this order;

(4) assist in coordinating data collection, required by this order;

(5) examine existing data and studies on environmental justice;

(6) hold public meetings as required in section 5-502(d) of this order; and

(7) develop interagency model projects on environmental justice that evidence cooperation among Federal agencies.

1–103. Development of Agency Strategies. (a) Except as provided in section 6-605 of this order, each Federal agency shall develop an agency-wide environmental justice strategy, as set forth in subsections (b)-(e) of this section that identifies and addresses disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. The environmental justice strategy shall list programs, policies, planning and public participation processes, enforcement, and/or rulemakings related to human health or the environment that should be revised to, at a minimum: (1) promote enforcement of all health and environmental statutes in areas with minority populations and low-income populations; (2) ensure greater public participation; (3) improve research and data collection relating to the health of and environment of minority populations and low-income populations; and (4) identify differential patterns of consumption of natural resources among minority populations and low-income populations. In addition, the environmental justice strategy shall include, where appropriate, a timetable for undertaking identified revisions and consideration of economic and social implications of the revisions.

(b) Within 4 months of the date of this order, each Federal agency shall identify an internal administrative process for developing its environmental justice strategy, and shall inform the Working Group of the process.

(c) Within 6 months of the date of this order, each Federal agency shall provide the Working Group with an outline of its proposed environmental justice strategy.

(d) Within 10 months of the date of this order, each Federal agency shall provide the Working Group with its proposed environmental justice strategy.

(e) Within 12 months of the date of this order, each Federal agency shall finalize its environmental justice strategy and provide a copy and written description of its strategy to the Working Group. During the 12 month period from the date of this order, each Federal agency, as part of its environmental justice strategy, shall identify several specific projects that can be promptly undertaken to address particular concerns identified during the development of the proposed environmental justice strategy, and a schedule for implementing those projects.

(f) Within 24 months of the date of this order, each Federal agency shall report to the Working Group on its progress in implementing its agency-wide environmental justice strategy.

(g) Federal agencies shall provide additional periodic reports to the Working Group as requested by the Working Group.

1–104. Reports to the President. Within 14 months of the date of this order, the Working Group shall submit to the President, through the Office of the Deputy Assistant to the President for Environmental Policy and the Office of the Assistant to the President for Domestic Policy, a report that describes the implementation of this order, and includes the final environmental justice strategies described in section 1–103(e) of this order.

Sec. 2–2. Federal Agency Responsibilities for Federal Programs. Each Federal agency shall conduct its programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under, such programs, policies, and activities, because of their race, color, or national origin.

Sec. 3–3. Research, Data Collection, and Analysis.

3–301. Human Health and Environmental Research and Analysis. (a) Environmental human health research, whenever practicable and appropriate, shall include diverse segments of the population in epidemiological and clinical studies, including segments at high risk from environmental hazards, such as minority populations, low-income populations and workers who may be exposed to substantial environmental hazards.

(b) Environmental human health analyses, whenever practicable and appropriate, shall identify multiple and cumulative exposures.

(c) Federal agencies shall provide minority populations and low-income populations the opportunity to comment on the development and design of research strategies undertaken pursuant to this order.

3–302. Human Health and Environmental Data Collection and Analysis. To the extent permitted by existing law, including the Privacy Act, as amended (5 U.S.C. section 552a): (a) each Federal agency, whenever practicable and appropriate, shall collect, maintain, and analyze information assessing and comparing environmental and human health risks borne by populations identified by race, national origin, or income. To the extent practical and appropriate, Federal agencies shall use this information to determine whether their programs, policies, and activities have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations;

(b) In connection with the development and implementation of agency strategies in section 1–103 of this order, each Federal agency, whenever practicable and appropriate, shall collect, maintain and analyze information on the race, national origin, income level, and other readily accessible and appropriate information for areas surrounding facilities or sites expected to have a substantial environmental, human health, or economic effect on the surrounding populations, when such facilities or sites become the subject of a substantial Federal environmental administrative or judicial action. Such information shall be made available to the public, unless prohibited by law; and

(c) Each Federal agency, whenever practicable and appropriate, shall collect, maintain, and analyze information on the race, national origin, income level, and other readily accessible and appropriate information for areas surrounding Federal facilities that are: (1) subject to the reporting requirements under the Emergency Planning and Community Right-to-Know Act, 42 U.S.C. section 11001–11050 as mandated in Executive Order No. 12856; and (2) expected to have a substantial environmental, human health, or economic effect on surrounding populations. Such information shall be made available to the public, unless prohibited by law.

(d) In carrying out the responsibilities in this section, each Federal agency, whenever practicable and appropriate, shall share information and eliminate unnecessary duplication of efforts through the use of existing data systems and cooperative agreements among Federal agencies and with State, local, and tribal governments.

Sec. 4–4. Subsistence Consumption of Fish and Wildlife.

4–401. Consumption Patterns. In order to assist in identifying the need for ensuring protection of populations with differential patterns of subsistence consumption of fish and wildlife, Federal agencies, whenever practicable and appropriate, shall collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence. Federal agencies shall communicate to the public the risks of those consumption patterns.

4–402. *Guidance.* Federal agencies, whenever practicable and appropriate, shall work in a coordinated manner to publish guidance reflecting the latest scientific information available concerning methods for evaluating the human health risks associated with the consumption of pollutant-bearing fish or

wildlife. Agencies shall consider such guidance in developing their policies and rules.

Sec. 5–5. Public Participation and Access to Information. (a) The public may submit recommendations to Federal agencies relating to the incorporation of environmental justice principles into Federal agency programs or policies. Each Federal agency shall convey such recommendations to the Working Group.

(b) Each Federal agency may, whenever practicable and appropriate, translate crucial public documents, notices, and hearings relating to human health or the environment for limited English speaking populations.

(c) Each Federal agency shall work to ensure that public documents, notices, and hearings relating to human health or the environment are concise, understandable, and readily accessible to the public.

(d) The Working Group shall hold public meetings, as appropriate, for the purpose of fact-finding, receiving public comments, and conducting inquiries concerning environmental justice. The Working Group shall prepare for public review a summary of the comments and recommendations discussed at the public meetings.

Sec. 6–6. General Provisions.

6–601. Responsibility for Agency Implementation. The head of each Federal agency shall be responsible for ensuring compliance with this order. Each Federal agency shall conduct internal reviews and take such other steps as may be necessary to monitor compliance with this order.

6–602. Executive Order No. 12250. This Executive order is intended to supplement but not supersede Executive Order No. 12250, which requires consistent and effective implementation of various laws prohibiting discriminatory practices in programs receiving Federal financial assistance. Nothing herein shall limit the effect or mandate of Executive Order No. 12250.

6–603. *Executive Order No. 12875.* This Executive order is not intended to limit the effect or mandate of Executive Order No. 12875.

6–604. Scope. For purposes of this order, Federal agency means any agency on the Working Group, and such other agencies as may be designated by the President, that conducts any Federal program or activity that substantially affects human health or the environment. Independent agencies are requested to comply with the provisions of this order.

6–605. *Petitions for Exemptions.* The head of a Federal agency may petition the President for an exemption from the requirements of this order on the grounds that all or some of the petitioning agency's programs or activities should not be subject to the requirements of this order.

6–606. Native American Programs. Each Federal agency responsibility set forth under this order shall apply equally to Native American programs. In addition, the Department of the Interior, in coordination with the Working Group, and, after consultation with tribal leaders, shall coordinate steps to be taken pursuant to this order that address Federally-recognized Indian Tribes.

6–607. *Costs.* Unless otherwise provided by law, Federal agencies shall assume the financial costs of complying with this order.

6–608. *General.* Federal agencies shall implement this order consistent with, and to the extent permitted by, existing law.

6–609. Judicial Review. This order is intended only to improve the internal management of the executive branch and is not intended to, nor does it create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies, its officers, or any person. This order shall not be construed to create any right to judicial review involving the compliance or noncompliance

of the United States, its agencies, its officers, or any other person with this order.

William Dennien

THE WHITE HOUSE, February 11, 1994.

[FR Citation 59 FR 7629]

• Is not a significant regulatory action subject to Executive Order 13211 (66 FR 28355, May 22, 2001);

• Is not subject to requirements of Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) because application of those requirements would be inconsistent with the Clean Air Act; and

• Does not provide the EPA with the discretionary authority to address, as appropriate, disproportionate human health or environmental effects, using practicable and legally permissible methods, under Executive Order 12898 (59 FR 7629, February 16, 1994).

In addition, the SIP is not approved to apply on any Indian reservation land or in any other area where the EPA or an Indian tribe has demonstrated that a tribe has jurisdiction. In those areas of Indian country, the rule does not have tribal implications and will not impose substantial direct costs on tribal governments or preempt tribal law as specified by Executive Order 13175 (65 FR 67249, November 9, 2000).

List of Subjects in 40 CFR Part 52

Administrative practice and procedure, Environmental protection, Air pollution control, Carbon monoxide, Incorporation by reference, Intergovernmental relations, Lead, Nitrogen dioxide, Ozone, Particulate matter, Reporting and recordkeeping requirements, Sulfur dioxide, Volatile organic compounds.

Authority: 42 U.S.C. 7401 et seq.

Dated: October 8, 2019.

Deborah Jordan,

Acting Regional Administrator, Region IX. [FR Doc. 2019–22910 Filed 10–23–19; 8:45 am] BILLING CODE 6560–50–P

DEPARTMENT OF TRANSPORTATION

Pipeline and Hazardous Materials Safety Administration

49 CFR Parts 172 and 173

[Docket No. PHMSA-2018-0025 (HM-264)]

RIN 2137-AF40

Hazardous Materials: Liquefied Natural Gas by Rail

AGENCY: Pipeline and Hazardous Materials Safety Administration (PHMSA), Department of Transportation (DOT).

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: PHMSA, in coordination with the Federal Railroad Administration

(FRA), is proposing changes to the Hazardous Materials Regulations to allow for the bulk transport of Methane, refrigerated liquid, commonly known as liquefied natural gas (LNG), in rail tank cars. This rulemaking proposes to authorize the transportation of Methane, refrigerated liquid by rail in the DOT– 113C120W specification rail tank car.

DATES: Comments must be received by December 23, 2019. To the extent possible, PHMSA will consider late-filed comments.

ADDRESSES: You may submit comments identified by the Docket Number PHMSA–2018–0025 (HM–264) via any of the following methods:

• Federal eRulemaking Portal: http:// www.regulations.gov. Follow the instructions for submitting comments.

• *Fax:* 1–202–493–2251.

• *Mail:* Docket Management System; U.S. Department of Transportation, West Building, Ground Floor, Room W12–140, Routing Symbol M–30, 1200 New Jersey Avenue SE, Washington, DC 20590.

• *Hand Delivery:* To the Docket Management System; Room W12–140 on the ground floor of the West Building, 1200 New Jersey Avenue SE, Washington, DC 20590, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

Instructions: All submissions must include the agency name and Docket Number (PHMSA-2018-0025) or RIN (2137–AF40) for this rulemaking at the beginning of the comment. To avoid duplication, please use only one of these four methods. All comments received will be posted without change to the Federal Docket Management System (FDMS) and will include any personal information you provide. If sent by mail, comments must be submitted in duplicate. Persons wishing to receive confirmation of receipt of their comments must include a selfaddressed stamped postcard.

Docket: For access to the dockets to read background documents or comments received, go to *http:// www.regulations.gov* or DOT's Docket Operations Office (see **ADDRESSES**).

Confidential Business Information: Confidential Business Information (CBI) is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this notice contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this

notice, it is important that you clearly designate the submitted comments as CBI. Pursuant to 49 CFR 105.30, you may ask PHMSA to give confidential treatment to information you give to the agency by taking the following steps: (1) Mark each page of the original document submission containing CBI as "Confidential"; (2) send PHMSA, along with the original document, a second copy of the original document with the CBI deleted; and (3) explain why the information you are submitting is CBI. Unless you are notified otherwise, PHMSA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this notice. Submissions containing CBI should be sent to Michael Ciccarone, Office of Hazardous Materials Safety, Standards and Rulemaking Division, Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 1200 New Jersey Ave. SE, Washington, DC 20590-0001. Any commentary that PHMSA receives which is not specifically designated as CBI will be placed in the public docket for this rulemaking.

Privacy Act: In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without change, including any personal information the commenter provides, to http:// www.regulations.gov, as described in the system of records notice (DOT/ALL– 14 FDMS), which can be reviewed at http://www.dot.gov/privacy.

FOR FURTHER INFORMATION CONTACT: Michael Ciccarone, Standards and Rulemaking Division, (202) 366–8553, Pipeline and Hazardous Materials Safety Administration, or Mark Maday, Federal Railroad Administration, (202) 366– 2535, U.S. Department of Transportation, 1200 New Jersey Avenue SE, Washington, DC 20590– 0001.

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I. Overview

PHMSA, in coordination with FRA, is issuing this NPRM to solicit public comment on potential changes to the Hazardous Materials Regulations (HMR; 49 CFR parts 171–180) that permit the bulk transport of Methane, refrigerated liquid, commonly known as liquefied natural gas (LNG), in rail tank cars. Specifically, this NPRM proposes to authorize the transportation of Methane, refrigerated liquid by rail in certain DOT specification 113 (DOT–113) rail tank cars.¹

LNG has been transported safely by highway and vessel for over 50 years within the United States and is now a critical energy resource for the 21st century; however, the HMR do not authorize the bulk transport of LNG in rail tank cars. Historically, this limitation has not created a major impediment in the transportation of natural gas (either in gas or liquid form), but the expansion in United States energy production has led to significant challenges in the transportation system.

Between 2010 and 2018, the number of LNG facilities in the U.S. increased by 28.7 percent, and total storage and vaporization capacities increased by 21 and 23 percent, respectively.² Over the same period, total liquefaction capacity increased by 939 percent due to new LNG export terminals.³ This data suggests that there may be a demand for greater flexibility in the modes of transportation available to transport

² Based on PHMSA annual report data from 2010– 2018. LNG, which is supported by PHMSA's receipt of a petition for rulemaking (P-1697) from the Association of American Railroads (AAR) proposing amendments to the HMR to allow for the transportation of Methane, refrigerated liquid by rail in DOT-113 rail tank cars. As noted in the petition, some shippers have expressed that there is an interest in the transportation of LNG by rail (domestically and for international export), which would help address these challenges. Additionally, there is an existing request for a special permit that seeks to authorize shipments of LNG in DOT specification 113C120W tank cars subject to certain operational conditions that would be used to transport LNG to ports or the applicant's domestic customers.⁴

Federal hazardous materials law authorizes the Secretary of Transportation to "prescribe regulations for the safe transportation, including security, of hazardous materials in intrastate, interstate, and foreign commerce." 49 U.S.C. 5103(b)(1). The Secretary has delegated this authority to PHMSA in 49 CFR 1.97(b). The HMR are designed to achieve three primary goals: (1) Help ensure that hazardous materials are packaged and handled safely and securely during transportation; (2) provide effective communication to transportation workers and emergency responders of the hazards of the materials being transported; and (3) minimize the consequences of an accident or incident should one occur. The hazardous material regulatory system is a risk management system that is prevention-oriented and focused on identifying safety or security hazards and reducing the probability and consequences of a hazardous material release.

The Administrative Procedure Act (APA), 5 U.S.C. 551, et seq. 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). In accordance with PHMSA's rulemaking procedure regulations in 49 CFR part 106, interested persons may ask PHMSA to add, amend, or repeal a regulation by filing a petition for rulemaking along with information and arguments supporting the requested action (49 CFR 106.95). PHMSA has assessed P-1697⁵ in accordance with 49 CFR 106.105 and determined that the request merits consideration in a rulemaking. In addition, a comment received to a

notification ⁶ of regulatory review issued by DOT's Office of the Secretary of Transportation (OST) in October 2017 further expressed industry support of deregulatory efforts to address the safe transportation of LNG by rail.

PHMSA and FRA share responsibility for regulating the transportation of hazardous materials by rail and take a system-wide, comprehensive approach that focuses on prevention, mitigation, and response to manage and reduce the risk posed to people and the environment. In this rulemaking, PHMSA is seeking public comment on proposed changes to address the safe transportation of LNG by rail.

II. Background

A. Properties and Use of LNG

The proper classification of any hazardous material is required prior to it being offered into transportation. In accordance with §173.115(g), a "cryogenic liquid" means a refrigerated liquefied gas having a boiling point colder than $-90 \degree C (-130 \degree F)$ at an absolute pressure of 101.3 kPa (14.7 psia). Natural gas (methane) has a boiling point of – 162 °C (– 260 °F) which means it must be refrigerated to be liquid—hence, liquefied natural gas. Therefore, LNG meets the definition of Division 2.1, cryogenic liquid and is described by the entry "UN1972, Methane, refrigerated liquid (*cryogenic* liquid), 2.1" in the Hazardous Materials Table (HMT; §172.101).

LNG is natural gas that has been liquefied through condensation at ambient pressure-a process referred to as liquefaction. The resulting LNG takes up about 1/600th of the volume of natural gas in its vapor state. Thus, LNG can be readily and economically stored and transported in specially designed storage tanks, highway cargo tanks, or International Organization for Standardization (ISO) containers. LNG is odorless, colorless, non-corrosive, and non-toxic. It will float on water, causing the water to look like its boiling as the liquid transitions back to vapor. To be consumed, LNG must be vaporized by warming to return it to its gaseous form; this warming and vaporization process is called regasification. The vaporized natural gas is then injected back into a pipeline system, or used to fuel natural gas operated equipment.

There is an international market for LNG, whereas natural gas tends to be a

¹This NPRM is consistent with Section 4(b) of the President's April 10, 2019, "Executive Order on Promoting Energy Infrastructure and Economic Growth," which directs the Secretary of Transportation to publish an NPRM that would propose to treat LNG the same as other cryogenic liquids and permit LNG to be transported in approved rail tank cars. The Executive Order also directs that the NPRM be published within 100 days of date of the order, and that a final rule must be published within thirteen months of the date of the order. See https://www.whitehouse.gov/ presidential-actions/executive-order-promotingenergy-infrastructure-economic-growth/.

зId.

⁴ Docket No. PHMSA 2019–0100 at *https://www.regulations.gov/docket?D=PHMSA-2019-0100.* ⁵ Docket No. PHMSA–2017–0020.

⁶ See Interested Parties for Hazardous Materials Transportation comment in response to DOT's Notification of Regulatory Review, 82 FR 45750 (Oct. 2, 2017), which can be found at Docket No. DOT–OST–2017–0069, https:// www.regulations.gov/docket?D=DOT-OST-2017-0069.

domestic commodity. International trends in the LNG industry directly impact domestic LNG and natural gas trends. LNG supplies regions, both domestic and international, that lack a natural gas source or the infrastructure to receive natural gas via pipeline. LNG production and consumption trends are related to international fuel prices, mainly crude oil, diesel, and coal. The LNG market in the United States grew considerably between 2010 and 2018.7 In that timeframe, the number of LNG facilities in the United States increased by 28.7 percent, and the total storage and vaporization capacities increased by 21 and 23 percent, respectively. Over the same period, total liquefaction capacity increased by 939 percent due to new LNG export terminals.

B. Current Requirements for LNG

The current HMR do not authorize the bulk transport of LNG in rail tank cars.⁸ 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.

The HMR include design, manufacturing, and maintenance standards for packaging (see parts 178– 180). Additionally, the regulations specify which packaging types may be used for specific materials and provide requirements for filling and loading of packages (see part 173). Column (8C) of the HMT provides bulk packaging authorizations for LNG in accordance with § 173.318, Cryogenic liquids in cargo tanks, only, and does not include authorization of LNG for rail tank cars. Additionally, Column (7) contains portable tank instruction T75 (see §172.102(c)(7)), which allows for the transportation of refrigerated liquefied gases in certain United Nations (UN) portable tanks, which can then be moved by rail in accordance with § 174.63. Currently, to transport LNG by rail in a method not authorized, a person must apply for a special permit from the Associate Administrator for Hazardous Materials Safety, PHMSA (see 49 CFR 107.105).

C. Petition for Rulemaking (P–1697)

The Association of American Railroads' Petition for Rulemaking

On January 17, 2017, AAR submitted a petition for rulemaking to PHMSA titled, "Petition for Rulemaking to

⁸ The HMR defines "bulk packaging" as having a capacity of greater than 119 gallons per 49 CFR 171.8. By way of comparison, a single DOT–113C120W tank car has a capacity of approximately 30,000 gallons.

Allow Methane, Refrigerated Liquid to be Transported in Rail Tank Cars'' [PHMSA–2017–0020 (P–1697)] requesting revisions to § 173.319 of the HMR that would permit the transportation of LNG by rail in DOT– 113 tank cars.

In its petition, AAR proposed that PHMSA amend the entry for "UN1972, Methane, refrigerated liquid" in the HMT (see § 172.101) to add a reference to §173.319 in Column (8C), thereby authorizing transport of UN 1972 in rail tank cars. Additionally, AAR proposed that PHMSA amend § 173.319 to include specific requirements for DOT-113 cars used for the transportation of LNG. AAR suggested that the authorized tank car specifications be DOT-113C120W and DOT-113C140W,9 noting that 120W cars should provide 40 days in transportation and 140W cars should provide 45 days before the tank car might begin to vent the commodity from the pressure relief device.¹⁰ AAR further proposed amending § 173.319(d)(2) to include maximum filling densities comparable to those specified for cargo tanks containing LNG in §173.318(f)(3).

AAR noted that the current HMR allow for transport of LNG by highway and expressed the opinion that rail transport of LNG is a safer mode of transportation by comparison. AAR stated that LNG is similar in all relevant properties to other flammable cryogenic liquids, such as ethylene, that are currently authorized for transportation by rail tank car. AAR further stated that they believe the DOT-113 tank car was not previously authorized because of a lack of demand in the market. However, AAR noted that there is commercial interest in transporting LNG by rail tank car domestically, and internationally from the United States to Mexico, and that some railroads are actively exploring LNG as a locomotive fuel, thereby requiring supply of LNG along their networks.

AAR's petition—P-1697—requests a regulatory change that has the potential to reduce regulatory burdens and enhance domestic energy production without having a negative impact on safety; therefore, PHMSA accepted it as having merit for consideration in a rulemaking. PHMSA requests public comment on all relevant aspects of this NPRM, including its potential to reduce regulatory burdens, enhance domestic energy production, and impact safety.

The Center for Biological Diversity's Response to P–1697

On May 15, 2017, the Center for **Biological Diversity (the Center)** submitted a response to P-1697, recommending that PHMSA deny AAR's petition for rulemaking because of potential environmental impacts of LNG. The Center commented that PHMSA should not proceed in evaluating the petition request until the Agency has conducted a National Environmental Policy Act (NEPA) evaluation, prepared an Environmental Impact Statement (EIS) or Environmental Assessment (EA), and provided opportunity for public review and comment in accordance with the Hazardous Materials Transportation Act (HMTA), as applicable.

PHMSA is issuing this NPRM in accordance with the APA and all related Executive Orders and laws, including NEPA. This NPRM provides opportunity for public notice and comment. See section "V. J. Environmental Assessment" of this rulemaking for further discussion of the EA.

D. Regulatory Review

On October 2, 2017, DOT published a notice ¹¹ in the Federal Register expressing Department-wide plans to review existing regulations and other agency actions to evaluate their continued necessity, determine whether they are crafted effectively to solve current problems, and evaluate whether they potentially burden the development or use of domestically produced energy resources. As part of this review process, the Department invited the public to provide input on existing rules and other agency actions that have potential for repeal, replacement, suspension, or modification.

The Interested Parties for Hazardous Materials Transportation (Interested Parties) submitted a comment ¹² requesting the authorization of LNG for rail tank car transport. Specifically, the Interested Parties noted in its comment that LNG shares similar properties to other flammable cryogenic materials currently authorized by rail tank car and has already been moved in the United

⁷ U.S. DOE, EIA: https://www.eia.gov/ todayinenergy/detail.php?id=34032.

⁹ The HMR do not authorize the DOT–113C140W specification tank car for hazardous materials transportation. See section "III. A. Tank Car Specification" of this rulemaking for further discussion.

¹⁰ PHMSA understands this to mean one-way transit time.

¹¹ Notification of Regulatory Review, Docket No. DOT–OST–2017–0069, 82 FR 45750 (October 2, 2017).

¹²Comment from Interested Parties for Hazardous Materials Transportation, Document No. DOT– OST–2017–00692591, https://www.regulations.gov/ searchResults?rpp=25&po=0&s=dot-ost-2017-0069-2591&fp=true&ns=true.

States under a special permit. Additionally, they noted that Transport Canada (TC) authorizes LNG for transportation by rail in DOT–113 equivalent rail cars and that there is an increased commercial demand for rail transport within the United States and between the United States and Mexico.

PHMSA has reviewed the Interested Parties' comment and is proposing to authorize the transport of LNG by rail because it may support Departmentwide safety investments and promote cost saving actions. The PHMSA proposal would amend the HMR to authorize transportation of LNG by rail in a DOT–113 specification tank car. PHMSA requests public comment on the potential regulatory impact of this proposal.

E. International Regulation

The Transport of Dangerous Goods Directorate within TC develops safety standards and regulations, provides oversight, and gives expert advice on dangerous goods incidents to promote public safety in the transportation of dangerous goods by all modes of transport in Canada. TC recently published a new standard on the bulk transport of LNG. TC authorizes LNG for transportation by rail in DOT-113 equivalent rail tank cars (TC-113C120W). PHMSA is not currently aware of LNG being transported via TC-113C120W; however, should that change, PHMSA expects incident and commodity flow data within Canada to be shared with PHMSA and FRA.

In Mexico, the Railway Transport Regulatory Agency's (Agencia Reguladora del Transporte Ferroviario), under the Ministry of Communications and Transportation (Secretaría de Comunicaciones y Transportes or SCT), mission is to promote, regulate, and monitor the railroad industry, and is responsible for regulating all types of cargo movement on trains. Currently, SCT does not provide explicit authorization for the bulk transportation of LNG in rail tank cars.

III. Proposed Changes

LNG's role as an energy resource continues to expand with ongoing innovation and economic development. Historically, the United States transported LNG by highway and exported LNG via ports only. As a result, there was no need for a regulation that authorized transportation via rail tank car. With a growing supply and demand,¹³ rail transportation is being considered as a viable alternative to the transportation of LNG by highway. PHMSA has identified this as an area where there are opportunities to allow industry innovation and to support infrastructure development while maintaining a high level of safety. 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.¹⁴ The HMR provides the framework for the safe transportation of hazardous materials in commerce, and regardless of the future capacity for LNG rail transport, the material itself will be transported in the safe specification tank cars outlined below. Nonetheless, in this NPRM, PHMSA and FRA must consider requirements for both the packaging (i.e., the rail tank car) and operational controls for a train consisting of tank cars loaded with LNG.

A. Tank Car Specification

The DOT-113 specification cryogenic liquid tank car is built to comply with specifications contained in 49 CFR part 179, subpart F and TC regulation TC14877E, Section 8.6, as well as certain requirements of the rail industry as identified in the AAR Manual of Standards and Recommended Practices, Specifications for Tank Cars (M-1002). These rail tank cars are vacuuminsulated and consist of an inner alloy (stainless) steel tank enclosed with an outer carbon steel jacket shell specifically designed for the transportation of refrigerated liquefied gases, such as liquid hydrogen, oxygen, ethylene, nitrogen, and argon. Additionally, the design and use of the DOT-113 specification tank car includes added safety features-such as protection systems for piping between the inner and outer tanks, multiple pressure relief devices (pressure relief valves and vents), thermal integrity tests, and in-transit reporting requirements-that contribute to an excellent safety record throughout its 50 years of service.

In this NPRM, PHMSA is proposing to authorize DOT–113C120W tank cars for use in the transportation of LNG by rail. The HMR currently authorize the DOT– 113C120W specification tank car for another flammable cryogenic liquid which shares similar chemical and operating characteristics with LNG (*i.e.*, ethylene). The DOT–113C120W design specification is similarly suitable for the transport of Methane, refrigerated liquid (LNG). We anticipate that DOT-113 specification tank cars will need to be manufactured to satisfy the demand for transporting LNG as the current fleet of these tank cars is used for the transportation of ethylene and other cryogenic liquids.

DOT–113 specification rail tank cars are constructed in accordance with the requirements of 49 CFR, part 179, subpart F, "Specification for Cryogenic Liquid Tank Car Tanks and Seamless Steel Tanks." These cars are built to a double pressure vessel design with the commodity tank (inner vessel) constructed of ASTM A 240/A 240M, Type 304 or 304L stainless steel, and the outer jacket shell (outer vessel) typically is constructed of carbon steel. This design provides an increased crashworthiness when compared to a single vessel design rail tank car. The rail tank car is manufactured with an insulated annular space holding a vacuum between the two pressure vessels. This vacuum area and the insulation significantly reduce the rate of heat leak from the atmosphere to the liquid inside the tank car thus minimizing the heating of the cryogenic (*i.e.*, refrigerated) material in the tank car while being transported. For these reasons, PHMSA has determined the DOT-113C120W specification tank car is an acceptable packaging to transport Methane, refrigerated liquid (LNG) by rail. This determination is based upon the design of the DOT cryogenic tank car specification, which includes added safety features designed to address the hazards presented by cryogenic liquids, and has a demonstrated safety record.

In addition to requesting a rule change to allow DOT-113C120W tank cars to transport LNG, AAR requested that PHMSA add a new tank car specification, the DOT-113C140W, for transportation of bulk quantities of LNG. AAR stated that the advantage to the DOT-113C140W tank car is that it is similar in design and construction to the DOT-113C120W specification, but would allow for an additional transportation timeframe of 5 days for cryogenic materials. This claim assumes that the new specification would use a thicker inner tank material that would allow for a higher inner tank test pressure (140 psig) and higher pressure relief device settings. These design changes could have the potential to increase the time in transportation by 5 days.

Currently, the HMR does not authorize the DOT–113C140W specification for cryogenic hazardous materials transportation and thus, this

¹³U.S. Energy Information Administration, "Growth in domestic natural gas production leads to development of LNG export terminals," March 4,

^{2016,} accessed at https://www.eia.gov/ todayinenergy/detail.php?id=25232.

¹⁴ For description of potential safety hazards of LNG, see LNG Safety Assessment Evaluation Methods, https://prod.sandia.gov/techlib-noauth/ access-control.cgi/2015/153859r.pdf.

type of regulatory change would require considerably more time and resources to incorporate a new specification proposal into this rulemaking. PHMSA believes the addition of this tank car specification warrants an extensive engineering review and evaluation, including consideration of the risk of release in a derailment and ignition when transported at these higher pressures. PHMSA does not want to delay deregulatory action authorizing the DOT-113C120W tank car for the transport of LNG pending evaluation of the DOT-113C140W tank car. Accordingly, PHMSA is not proposing to authorize the DOT-113C140W specification at this time.

Moreover, the petitioner did not include design specifications for the DOT–113C140W tank car. PHMSA may consider it for future rulemaking after design specifications, engineering details, and data demonstrating an equivalent level of safety are submitted to PHMSA in support of this regulatory change.

PHMSA is proposing to amend the Pressure Control Valve Setting or Relief Valve Setting Table in § 173.319(d)(2) by adding a column for methane as follows:

Maximum start-to-discharge pressure	Maximum permitted filling density (percent by weight)							
(psig)	Ethylene	Ethylene	Ethylene	Hydrogen	Methane			
17	52.8. 10 psig Minus 260 °F 113D60W, 113C60W.	51.1 20 psig Minus 260 °F 113C120W	51.1 20 psig Minus 155 °F 113D120W	6.60. Minus 423 °F 113A175W, 113A60W.	32.5. 15 psig. Minus 260 °F. 113C120W.			

The proposed changes to the table would authorize methane in DOT-113C120W specification tank cars with a start-to-discharge pressure valve setting of 75 psig; a design service temperature of -260 °F; a maximum pressure when offered for transportation of 15 psig; and a filling density of 32.5 percent by weight. The maximum offering pressure of 15 psig is consistent with the 20-day transportation requirement for cryogenic materials and the estimated 3 psig per day pressure increase during transportation. The filling density is similar to the filling density requirements for cryogenic materials transported in a cargo tank motor vehicle. These requirements will provide a 15 percent vapor volume outage (at the start-to-discharge-pressure of the pressure relief valve) for the rail tank car during transportation.

B. Operational Controls

AAR's Circular OT–55 is a detailed protocol establishing recommended railroad operating practices for the transportation of hazardous materials that was developed by the rail industry through the AAR.¹⁵ The recommended practices were originally implemented by all Class I rail carriers operating in the United States, with short-line railroads following on as signatories. As a result, Circular OT–55 is comprehensive in its reach, applying to all train movements that fit within the terms of the circular. The circular outlines operational controls for trains meeting the industry definition of a "Key Train," including speed restrictions, track requirements, storage requirements, and the designation of "Key Routes." ¹⁶ Circular OT–55 defines a "Key Train" as any train with:

• One tank car load of Poison or Toxic Inhalation Hazard (PIH or TIH) (Hazard Zone A, B, C, or D), anhydrous ammonia (UN1005), or ammonia solutions (UN3318), or;

• 20 car loads or intermodal portable tank loads of any combination of hazardous material, or;

• One or more car loads of Spent Nuclear Fuel (SNF), High Level Radioactive Waste (HLRW).

While PHMSA is not proposing to incorporate by reference Circular OT–55 or to adopt the requirements for "Key Trains" in the HMR in this rulemaking, the railroad industry's voluntary adoption of the circular is an important consideration for PHMSA in assessing what operational controls are necessary. In accordance with the "Key Train" definition and the changes being considered in this NPRM, Circular OT– 55's operational controls would apply to the bulk transport of LNG by rail in a

train consist that is composed of 20 car loads or intermodal portable tank loads in which LNG is present along with any combination of other hazardous materials. Therefore, bulk transport of LNG would be subject to the industry standard even if only one rail tank car of the 20-car consist contained LNG, regardless of the classes of hazardous materials contained in the remaining 19 rail cars. Due to the operational controls introduced for "Key Trains," Circular OT-55 provides an additional level of safety regardless of what combination of hazardous materials the train consist is transporting. As such, PHMSA and FRA believe this industry standard helps ensure the safe transportation of all hazardous materials, including LNG.

PHMSA and FRA considered other options for operational controls such as mirroring the operational controls adopted for high-hazard flammable trains (HHFT)¹⁷ or adopting the "Key Train" requirements into the HMR. Additional operational controls, while not limited to the following, might include limitations on train length, controls for train composition, speed restrictions, braking requirements, and routing requirements.

Train Length and Train Composition. PHMSA and FRA have not restricted train length in the past; however, PHMSA solicits comment on whether

¹⁵Circular OT–55, "Recommended Railroad Operating Practices for Transportation of Hazardous Materials," *https://www.railinc.com/rportal/ documents/18/260773/OT-55.pdf.*

¹⁶ Circular OT-55 defines a "Key Route" as "any track with a combination of 10,000 car loads or intermodal portable tank loads of hazardous materials, or a combination of 4,000 car loadings of PIH or TIH (Hazard zone A, B, C, or D), anhydrous ammonia, flammable gas, Class 1.1 or 1.2 explosives, environmentally sensitive chemicals, Spent Nuclear Fuel (SNF), and High Level Radioactive Waste (HLRW) over a period of one year."

¹⁷ As defined in § 171.8, a high-hazard flammable train means 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.

there is a reasoned basis for limiting the length of a train transporting LNG tank cars, and what that limitation would look like. Moreover, PHMSA solicits comment on whether there is a reasoned basis for limiting the amount of LNG tank cars that can be in one consist, or where the LNG tank cars may be placed within the train. For example, the National Transportation Safety Board issued a Safety Recommendation (R-17-001) 18 to PHMSA to: (1) Evaluate the risks posed to train crews by hazardous materials transported by rail; (2) determine the adequate separation distance between hazardous materials cars and locomotives and occupied equipment that ensures the protection of train crews during normal operations and accident conditions; (3) and collaborate with FRA to revise 49 CFR 174.85 to reflect those findings. To date, PHMSA has initiated a literature review to help identify gaps and changes in factors from previous and current studies and ultimately determine the adequate separation distance of train crews from hazardous materials in a train

Speed Restrictions and Braking *Requirements.* The HHFT regulations include a speed restriction of 50 miles per hour (mph) for all HHFTs with an additional speed restriction of 40 mph for those HHFTs traveling within a highthreat urban area (§ 174.310(a)(2)). The HHFT regulations also include advanced braking requirements for HHFTs, requiring all HHFTs operating in excess of 30 mph to be equipped and operated with distributed power system or a two-way end-of-train device (§ 174.310(a)(3)), which helps to propagate a quicker application of the air brake system throughout the entire train, particularly in emergency braking situations.

Routing Requirements. Section 172.820 prescribes additional planning requirements for transportation by rail, including route analysis, requiring railroads to address safety and security risks for the transportation along routes where commodity data is collected. This requirement applies to a rail carrier transporting one or more of: (1) More than 2,268 kg (5,000 lbs.) in a single carload of a Division 1.1, 1.2 or 1.3 explosive; (2) A quantity of a material poisonous by inhalation in a single bulk packaging; (3) A highway routecontrolled quantity of a Class 7 (radioactive) material, as defined in §173.403; or (4) A high-hazard

flammable train (HHFT) as defined in § 171.8.

PHMSA recognizes that there may be other operational controls or combinations of controls to consider and encourages comments on such controls. However, for this rulemaking, PHMSA and FRA decided not to propose additional operational controls because there is not sufficient data about the potential movements of LNG by tank car. While PHMSA expects LNG will initially move in smaller quantities (*i.e.*, a few tank cars) as part of manifest trains, it is uncertain whether LNG will continue to be transported in those quantities or if LNG by rail will shift to be transported using a unit train model of service, and if so, how quickly that shift will occur.

Finally, PHMSA notes that there is an existing special permit application to transport LNG by tank car. PHMSA is seeking comment on the draft special permit and environmental assessment, see 84 FR 26507 and Docket No. PHMSA-2019-0100, and will consider information provided to the special permit docket that is pertinent to the issue of operational controls in this rulemaking or potential future rulemakings. In conclusion, we invite comment on PHMSA's and FRA's reliance on existing regulations and the operational controls in Circular OT-55 (not incorporated into the HMR) and whether additional operational controls may be warranted based on an assessment of risk. We also encourage commenters to provide data on the safety or economic impacts associated with any proposed operational controls, including analysis of the safety justification or cost impact of implementing operational controls.

IV. Section-by-Section Review

The following is a section-by-section review of the amendments considered in this NPRM.

Section 172.101

Section 172.101 provides the HMT and instructions for its use. PHMSA proposes amending the entry for "UN1972, Methane, refrigerated liquid" in the HMT to add reference to the cryogenic liquids in (rail) tank cars packaging section—§ 173.319 in Column (8C).

Section 173.319

Section 173.319 prescribes requirements for cryogenic liquids transported in rail tank cars. Paragraph (d) provides which cryogenic liquids may be transported in a DOT–113 tank car when directed to this section by Column (8C) of the § 172.101 HMT. PHMSA proposes to amend paragraph (d)(2) to authorize the transport of Methane, refrigerated liquid (LNG). Additionally, PHMSA is proposing to amend the Pressure Control Valve Setting or Relief Valve Setting Table in § 173.319(d)(2) to specify settings for methane in DOT–113C120W tank cars, specifically, a start-to-discharge pressure valve setting of 75 psig; a design service temperature of $-260 \,^{\circ}\text{F}$; a maximum pressure when offered for transportation of 15 psig; and a filling density of 32.5 percent by weight.

V. Regulatory Analyses and Notices

A. Statutory/Legal Authority for This Rulemaking

This rulemaking is published under the authority of Federal Hazardous Materials Transportation Law (Federal hazmat law; 49 U.S.C. 5101 et seq.), and the Federal Railroad Safety Laws (49 U.S.C. ch. 201-213). Section 5103(b) of the Federal Hazmat Law authorizes the Secretary of Transportation to "prescribe regulations for the safe transportation, including security, of hazardous materials in intrastate, interstate, and foreign commerce." Section 20103 of the Federal Railroad Safety Laws, authorizes the Secretary to prescribe regulations and issue orders for every area of railroad safety. The Secretary's authority is delegated to PHMSA at 49 CFR 1.97. This rulemaking proposes to authorize the transportation of LNG by rail in DOT-113C120W tank cars.

B. Executive Order 12866 and DOT Regulatory Policies and Procedures

This rulemaking is considered a significant regulatory action under section 3(f) of Executive Order 12866 ("Regulatory Planning and Review") and was reviewed by the Office of Management and Budget (OMB). This rulemaking is also considered a significant rulemaking under the DOT Regulatory Policies and Procedures of February 26, 1979 [44 FR 11034].

Executive Order 12866 ("Regulatory Planning and Review")¹⁹ requires agencies to regulate in the "most costeffective manner," to make a "reasoned determination that the benefits of the intended regulation justify its costs," and to develop regulations that "impose the least burden on society."

Additionally, Executive Order 12866 requires agencies to provide a meaningful opportunity for public participation, which also reinforces requirements for notice and comment

¹⁸ https://ntsb.gov/safety/safety-recs/_layouts/ ntsb.recsearch/Recommendation.aspx?Rec=R-17-001.

 $^{^{19}}$ See 58 FR 51735, October 4, 1993 for Executive Order 12866.

under the APA.²⁰ Therefore, in this NPRM, PHMSA seeks public comment on revisions to the HMR authorizing the transportation of LNG by rail tank car. PHMSA also seeks comment on the preliminary cost and cost savings analyses, as well as any information that could assist in quantifying the benefits of this rule. Overall, this rulemaking maintains the continued safe transportation of hazardous materials while producing a net cost savings. For additional discussion about the economic impacts, see the preliminary Regulatory Impact Analysis posted in the docket.21

C. Executive Order 13771

This proposed rule is expected to be an Executive Order 13771 deregulatory action. Details on the estimated cost savings of this proposed rule can be found in the rule's economic analysis.²²

D. Executive Order 13132

This rulemaking was analyzed in accordance with the principles and criteria contained in Executive Order 13132 ("Federalism"). This rulemaking may preempt State, local, and Tribal requirements but does not propose any regulation that has substantial direct effects on the States, the relationship between the national government and the States, or the distribution of power and responsibilities among the various levels of government. Therefore, the consultation and funding requirements of Executive Order 13132 do not apply.

The Federal hazmat law, 49 U.S.C. 5101–5128, contains an express preemption provision [49 U.S.C. 5125(b)] that preempts State, local, and Indian tribal requirements on the following subjects:

(1) The designation, description, and classification of hazardous materials;

(2) The packing, repacking, handling, labeling, marking, and placarding of hazardous materials;

(3) The preparation, execution, and use of shipping documents related to hazardous materials and requirements related to the number, contents, and placement of those documents;

(4) The written notification, recording, and reporting of the unintentional release in transportation of hazardous material; and

(5) The design, manufacture, fabrication, marking, maintenance, recondition, repair, or testing of a packaging or container represented, marked, certified, or sold as qualified

²² Ibid.

This proposed rule addresses covered subject item (2) above and preempts State, local, and Indian tribe requirements not meeting the "substantively the same" standard.

Federal preemption also may exist pursuant to section 20106 of the former Federal Railroad Safety Act of 1970 (FRSA), repealed, revised, reenacted, and recodified at 49 U.S.C. 20106. Section 20106 of the former FRSA provides that States may not adopt or continue in effect any law, regulation, or order related to railroad safety or security that covers the subject matter of a regulation prescribed or order issued by the Secretary of Transportation (with respect to railroad safety matters) or the Secretary of Homeland Security (with respect to railroad security matters), except when the State law, regulation, or order qualifies under the section's "essentially local safety or security hazard."

PHMSA invites State and local governments with an interest in this rulemaking to comment on any effect that revisions to the HMR relative to LNG transportation may cause.

E. Executive Order 13175

This rulemaking was analyzed in accordance with the principles and criteria contained in Executive Order 13175 ("Consultation and Coordination with Indian Tribal Governments"). PHMSA does not anticipate that this rulemaking will have substantial direct tribal implications. Therefore, the funding and consultation requirements of Executive Order 13175 are not expected to apply. However, PHMSA invites Indian tribal governments to comment on any effect that revisions to the HMR relative to LNG transportation may cause.

F. Regulatory Flexibility Act, Executive Order 13272, and DOT Policies and Procedures

The Regulatory Flexibility Act (5 U.S.C. 601 et seq.) requires agencies to consider whether a rulemaking would have a "significant economic impact on a substantial number of small entities" to include small businesses, not-forprofit organizations that are independently owned and operated and are not dominant in their fields, and governmental jurisdictions with populations under 50,000. This proposed rulemaking has been developed in accordance with Executive Order 13272 ("Proper Consideration of Small Entities in Agency Rulemaking") and DOT's procedures and policies to promote compliance with the

Regulatory Flexibility Act to ensure that potential impacts of draft rules on small entities are properly considered. The proposed changes are generally intended to provide relief by easing requirements with no anticipated reduction in safety.

Consideration of alternative proposals for small businesses. The Regulatory Flexibility Act directs agencies to establish exceptions and differing compliance standards for small businesses, where it is possible to do so and still meet the objectives of applicable regulatory statutes.

The impact of this proposed rulemaking on small businesses is not expected to be significant. The proposed changes are generally intended to provide regulatory flexibility and cost savings to industry members. However, PHMSA seeks comment on the potential impacts on small entities.

G. Paperwork Reduction Act

Section 1320.8(d), Title 5, Code of Federal Regulations requires that PHMSA provide interested members of the public and affected agencies an opportunity to comment on information collection and recordkeeping requests. This NPRM does not impose new information collection and recordkeeping burdens.

H. Regulation Identifier Number (RIN)

A regulation identifier number (RIN) is assigned to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. The RIN contained in the heading of this document can be used to crossreference this action with the Unified Agenda.

I. Unfunded Mandates Reform Act

This rulemaking does not impose unfunded mandates under the Unfunded Mandates Reform Act of 1995. It does not result in costs of \$100 million or more, adjusted for inflation, to either State, local, or Tribal governments, in the aggregate, or to the private sector and is the least burdensome alternative that achieves the objective of the rulemaking. PHMSA will evaluate any regulatory action that might be proposed in subsequent stages of the proceeding to assess the effects on State, local, and Tribal governments and the private sector.

J. Environmental Assessment

The National Environmental Policy Act of 1969 (NEPA) requires Federal agencies to consider the consequences of major Federal actions and prepare a

²⁰ See 5 U.S.C. 553.

²¹ See Docket No. PHMSA–2018–0025 at *www.regulations.gov.*

detailed statement on actions significantly affecting the quality of the human environment. The Council on Environmental Quality (CEQ) implementing regulations (40 CFR part 1500) require Federal agencies to conduct an environmental review considering (1) the need for the action, (2) alternatives to the action, (3) probable environmental impacts of the action and alternatives, and (4) the agencies and persons consulted during the consideration process (*see* 40 CFR 1508.9(b)).

1. Need for the Action

The purpose of this NPRM is to propose amendments that authorize the transportation of Methane, refrigerated liquid, commonly known as liquefied natural gas (LNG), by rail in a DOT– 113C120W tank car. This proposed rulemaking would facilitate the transportation of LNG by rail in a packaging other than a portable tank. This action would facilitate the transportation of natural gas to markets where pipeline transportation is limited or unavailable.

2. Alternatives Considered

Transportation of hazardous materials in commerce is subject to requirements in the HMR, issued under authority of Federal hazmat law, codified at 49 U.S.C. 5101 *et seq.* To facilitate the safe and efficient transportation of hazardous materials in international commerce, the HMR provide that both domestic and international shipment of hazardous materials may be offered for transportation and transported under provisions of the international regulations.

In proposing this rulemaking, PHMSA is considering the following alternatives:

Alternative 1: No Action Alternative

The No Action Alternative would not adopt the regulatory changes proposed in this NPRM. If PHMSA were to select this alternative, it would not proceed with any rulemaking on this subject and the current regulatory standards would remain in effect. If the current regulatory standards remain in effect, LNG would not be authorized for transportation by tank car. The No Action Alternative would not address AAR's petition for rulemaking or stakeholder comments to the October 2, 2017, notification of regulatory review. LNG transportation by highway and by rail—via a PHMSA special permit²³ or

an FRA approval²⁴—would continue and perhaps increase over time. However, these alternatives typically have limited applicability because they only apply to the parties to the PHMSA special permit or FRA approval. The No Action Alternative would also fail to comply with the April 10, 2019 Executive Order, "Executive Order on Promoting Energy Infrastructure and Economic Growth." That E.O. orders the Secretary of Transportation to propose regulatory changes "no later than 100 days after the date of this order, that would treat LNG the same as other cryogenic liquids and permit LNG to be transported in approved rail tank cars. The Secretary shall finalize such rulemaking no later than 13 months after the date of this order.'

Alternative 2: Authorize LNG in DOT– 113C120W and DOT–113C140W Tank Cars

This alternative would adopt the AAR petition in its entirety, including the authorization of the DOT-113C140W specification tank car into the HMR for the transportation of LNG. As discussed earlier, in the section "III. A. Tank Car Specification" section, the intended advantage to the DOT-113C140W tank car is that it would have a similar design and construction to the DOT-113C120W specification, but would potentially allow for five days of additional transportation time because the tank car would use a thicker inner tank material that would allow for a higher inner tank test pressure (140 psig) and higher pressure relief device settings. PHMSA and FRA believe that a complete engineering review of this specification is warranted, and that more research and supporting data are needed to demonstrate that this additional transportation timeframe benefits safety or justifies the addition of a new tank car specification to the HMR. While PHMSA is not opposed to considering this request for future action, it does not want to delay action on the DOT-113C120W tank car. Accordingly, this alternative was eliminated from full consideration in this rulemaking and draft EA.

Alternative 3: Proposed Alternative

The Proposed Alternative is the current proposal as it appears in this NPRM, applying to transportation of hazardous materials by rail. The Proposed Alternative would authorize the transportation of LNG by rail in a DOT–113C120W specification tank car. See sections "III. Changes Being Considered" and "IV. Section-by-Section Review" of this rulemaking for further discussion on the proposed amendments encompassed in this alternative.

3. Environmental Impacts

Alternative 1: No Action Alternative

If PHMSA were to select the No Action Alternative, current regulations would remain in place and no new enabling provisions would be added. This alternative would not amend the HMR to allow shippers to transport bulk quantities of LNG by rail tank car. As such, the current regulatory requirements would require that LNG continue to be transported by highway, or for rail transportation, be limited to certain PHMSA special permit holders or LNG in portable tanks pursuant to the conditions of an FRA approval. This alternative would prevent the use of a tank car that was designed to address the hazards presented by cryogenic liquids, and has a demonstrated safety record. Authorizing the transport of LNG by tank car via rulemaking has the potential to allow shippers to move a greater quantity of LNG more efficiently, as highway transportation requires the use of more vehicles to move the same amount of material as rail transportation, thereby increasing air pollutants, including greenhouse gases. In 2017, U.S. railroads moved a ton of freight an average of 479 miles per gallon of fuel. On average, railroads are four times more fuel efficient than trucks. Because greenhouse gas emissions are directly related to fuel consumption, moving freight by rail instead of truck reduces greenhouse gas emissions by an average of 75 percent. In addition, emissions of particulate matter and nitrogen oxides are significantly lower for railroads than for trucks.25

Furthermore, highway transportation may present a greater risk of accident and release of LNG for each movement, which creates a danger for both humans and the environment. From 2005 to 2017, there were eight incidents involving Methane, refrigerated liquid

²³ On September 14, 2017, PHMSA announced it had received an application for a special permit to transport LNG by rail in DOT–113 tank cars from

Energy Transport Solutions, LLC. The PHMSAassigned application number is 20534–N. See 82 FR 43285. PHMSA is currently reviewing the application. Additionally, PHMSA issued a notice announcing the availability for public review and comment of the draft environmental assessment for this special permit request to transport LNG by rail tank car. See 84 FR 26507 and Docket No. PHMSA– 2019–0100.

²⁴ FRA has granted approvals to Alaska Railroad and Florida East Coast Railroad allowing for the transportation of LNG by rail in ISO containers provided that the operators comply with certain operational controls.

²⁵ AAR "Overview of America's Freight Railroads" (October, 2018) https://www.aar.org/wpcontent/uploads/2018/05/AAR-Overview-Americas-Freight-Railroads.pdf.

transported by cargo tank motor vehicle (CTMV).²⁶ No injuries or fatalities were reported to PHMSA. Two of the crashes were single vehicle rollovers. Furthermore, the total quantity spilled in these eight incidents was 11,296 gallons. For three of the eight incidents reported, a total of 165 people were evacuated. One of the three incidents (not a crash) involved 102 evacuations and 1,000 gallons spilled. One other incident of the three, a rollover incident, involved 50 evacuations and zero gallons spilled. The last of the three incidents involved 13 evacuations and 4,625 gallons spilled. In any of these incidents injuries or fatalities could have occurred, especially if an ignition source had been present; the gallons spilled and the number of evacuations demonstrate that the incidents presented significant risk to human life and environmental resources in the vicinity of each incident. While PHMSA understands there are limited rail shipments of Methane, refrigerated liquid, compared to highway transportation, PHMSA and FRA have no record of any reported incidents involving Methane, refrigerated liquid in portable tanks transported by rail since 2005.

Alternative 3: Proposed Alternative

PHMSA proposes to amend the HMR to allow the transportation of LNG in DOT-113C120W rail cars. PHMSA understands that authorizing the rail transportation of LNG would reduce greenhouse gas emissions by requiring fewer trips to transport the same amount of material currently being transported by highway. Furthermore, fewer trips are anticipated to result in fewer accidents and spills of LNG during transportation.

PHMSA has collected data on the safety history of the DOT-113 tank car from its own incident database and from AAR, which compiles data provided by FRA. PHMSA has analyzed data regarding DOT–113 damage history. From 1980 to 2017 (a 37-year period), there were 14 instances of damage to DOT–113 tank cars during transportation. Of the 14 instances, there were three instances where a DOT–113 tank car lost lading from breach of both the outer and inner tanks. This is the most serious type of damage. Additionally, there were three instances in which a DOT-113 tank car lost lading from damage or other failure to the valves/fittings. The vast majority of incidents causing damage to the DOT-

113 tank cars did not result in a loss of hazardous materials.

The first derailment that resulted in breach of an inner tank of a DOT-113 tank car took place in May 2011 in Moran, Kansas. Three DOT-113C120 specification tank cars containing refrigerated liquid ethylene sustained damage. Two of the cars were breached in the derailment and initially caught fire. One of the fires consumed the entire contents of the DOT-113 tank car. The two remaining cars, that is, the one that had been breached in the derailment and the other that had been damaged but not breached, were mechanically breached to expedite the burning and consumption of the contents to expedite removal from the site of the derailment. The total quantity of refrigerated ethylene lost was approximately 45,000 gallons and the total damage estimate was calculated at approximately \$231,000 in 2017. The other derailment that caused tank failure of a DOT-113 tank car occurred in October 2014 in Mer Rouge, Louisiana. The rail tank cars were filled with refrigerated liquid argon. One car was a DOT-113A90W specification tank car authorized by Special Permit and the other was an AAR204W tank car. The total quantity of refrigerated liquid argon spilled was 47,233 gallons and the total damage estimate is calculated at approximately \$228,000 (in 2017 dollars). No injuries or fatalities were reported as a result of the release of hazardous materials from either incident. Depending on demand, the numbers of DOT-113 tank cars in operation under the proposed regulatory change could increase well beyond the numbers of DOT-113 tank cars currently in operation.

Though rare, derailments involving DOT-113 tank cars can result in large quantities of hazardous materials released, which can result from venting or breach of the inner tank shell. These releases can be considerably larger than releases from a CTMV that travels by highway. Nonetheless, considering that the DOT-113 tank car has a 50-year service history and with the understanding it is possible there are unreported incidents from years past, the safety history is noteworthy. It is difficult to estimate the failure rate of the DOT-113 tank car in derailments because railroads are not required to report incidents to PHMSA or FRA unless they meet a baseline threshold. 49 CFR 171.16 and 225.19. Incident data suggests that incidents involving rail tank cars can lead to higher consequence incidents; however, PHMSA believes that rail transportation is advantageous considering the

quantity transported compared to miles traveled.

LNG Characteristics and Hazards

With regard to how LNG could respond under accident conditions, when a large amount of LNG is spilled and its vapors come into contact with an ignition source, the vapors will ignite if the vapor concentration in a vapor-air mixture is between 5 and 15 percent and cause the spill to develop into a pool fire (if ignited immediately) or flash vapor fire if the vapor cloud is ignited at some distance from the spill location. Both types of fires present a radiant heat hazard. If there is no ignition source in the immediate vicinity of the release, the spilled LNG will vaporize rapidly forming a cold gas cloud that is heavier than air, which then mixes with ambient air, spreads and is carried downwind. The dispersion of the cloud due to the wind results in its temperature increase of the vapor due to mixing with air that gets entrained into the cloud; but the cloud temperature always remains lower than that of ambient air, because of exchange of heat between the air that is mixing and the virgin cold vapor. Also, the density of the cloud decreases due to continuous mixing with air; however, the cloud density is never lower than that of the ambient air. The result is that the cloud is always heavier than air and disperses hugging the ground (with highest vapor concentrations at ground level). The only way the vapor cloud can become either neutrally buoyant or buoyant is if external heat (such as from solar heating or heating from the ground) is added to the cloud. These heat transfer mechanisms provide insufficient heat to the cloud in normal dispersion before the vapor cloud dilutes to concentration below lower flammability limit, LFL, of 5 percent by volume.

The dispersing cloud is visible as a white cloud due to the condensation of water vapor from the atmosphere and because in the initial stages the dispersing cloud is cold (starting from - 260 degrees Fahrenheit). However, as the overall cloud temperature increases due to mixing with ambient air, and as the cloud temperature increases to above the "wet bulb" temperature corresponding to the relative humidity of the atmospheric air, the condensed water re-evaporates and the cloud becomes non-visible. The flammable region of the vapor cloud is enclosed within the visible vapor cloud if the ambient relative humidity is greater than or equal to 55 percent. For regions with relative humidity less than this value, the flammable cloud is outside

²⁶ See pages 11 and 12 of the Preliminary Regulatory Impact Analysis for further discussion of incidents involving cryogenic liquids.

the visible cloud. An ignition source can only ignite the vapor cloud when it is available and the vapor concentration is in the 5 to 15 percent average vapor concentration in air. Once ignited, the vapors will burn back, generally upwind, to the LNG source. The distance over which an LNG vapor cloud remains flammable is difficult to predict; local weather conditions (wind speed, atmospheric stability or turbulence), terrain, surface cover (*i.e.*, vegetation, trees, and buildings) will influence how a vapor cloud disperses, and how rapidly it dilutes.

If an LNG vapor cloud is ignited before the cloud has been dispersed or diluted to below its lower flammability limit, a flash fire will occur. Unlike other flammable liquids and gases, a LNG vapor cloud will not ignite entirely at once. If ignited, the flash fire that forms has a temperature of about 1,330 °C (2,426 °F). The resulting ignition leads to a relatively slow (subsonic) burning vapor fire which travels back to the release point producing either a pool fire or a jet fire. The radiant heat effects from such a flash fire does not extend to distances significantly larger than the width of the flammable cloud. The slow burning vapor fire will not generate damaging overpressures (i.e., explosions), if unconfined. To produce an overpressure event, the LNG vapors need to be within the flammability range and ignited, and either be confined within a structure or the travelling flame in the open encounters structural obstructions (e.g., houses, trees, bushes, pipe racks, etc.) that can increase the flame turbulence significantly when the flash fire reaches the source of vapor (boiling LNG), if there is still a liquid pool of LNG evaporating at that time, a pool fire will result.

Methane in vapor state can be an asphyxiant when it displaces oxygen in a confined space. When LNG is spilled on the ground, into a confined area, such as bound by a dike, the LNG will initially boil-off rapidly forming a vapor cloud, but the boil-off will slow down as the ground cools due to heat being extracted from it to provide for the evaporation of LNG. If LNG is spilled on water, LNG will float on top of the water, spread in an unconfined manner, and vaporize very rapidly. This rapid vaporization will occur even at water temperatures near freezing since freezing water is significantly warmer than the spilled LNG.

LNG is stored and transported at -260 °F (-160 °C). Due to this extremely low temperature, contact with a cryogenic liquid can cause severe injury to human skin and eyes. It will

also make ordinary metals, including carbon steel, subject to embrittlement and fracture when exposed to these temperatures. Transportation of cryogenic materials require specialized double walled (tank within a tank) containers for transportation.

DOT-113 Tank Car Characteristics

The DOT-113 specification tank car is a specially designed rail tank car for the transport of cryogenic liquids. This tank car design has been in use for over 50 years. As noted above, there are only six documented derailments involving the transportation of the DOT-113 specification tank car that resulted in loss of tank contents.

DOT-113 specification rail tank cars are built to a double pressure-vessel design with the commodity tank (inner vessel) constructed to withstand a burst pressure of 300 psig and fabricated of ASTM A 240/A 240M, Type 304 or 304L stainless steel; the outer jacket shell (outer vessel) is typically constructed of carbon steel and is designed to withstand an external pressure (critical collapsing pressure) of 37.5 psig. See §§ 179.400-8(d) and 179.401-1, respectively. The inner vessel is designed with a minimum thickness of 3/16 inch and the outer shell thickness is greater than 7/16 inch. The rail tank car is manufactured with an insulated annular space holding a vacuum between the two pressure vessels. This vacuum area and the insulation on the outer wall of the inner tank significantly reduce the rate of heat transfer from the atmosphere to the liquid inside the tank car, thus minimizing the heating of the cryogenic (*i.e.*, refrigerated) liquid in the tank car while being transported. Other key safety features of the DOT-113 specification tank car include, but are not limited to, the following:

• Several inches of aluminized Mylar super-insulation surrounding the inner tank.

• A vacuum environment/annular space between the inner and outer tanks for enhanced product pressure and temperature control.

• Specifically, designed loading and unloading equipment (piping, valves, gages, etc.) for use in cryogenic service.

• Safety equipment (pressure relief valves, safety vents, safety shut off valves, and remote monitoring systems) to prevent or limit overpressure issues or non-accident releases.

• Mandated in-transit tracking (time sensitive shipment) and car handling instructions.

Regulations controlling the movement of LNG in the DOT–113C120W packaging would be the same as those that apply to the transportation of other

cryogenic liquids, including ethylene. Regulatory requirements governing these operational practices appear in 49 CFR part 174 and 49 CFR 173.319, which is administered by the FRA. In addition, the AAR has issued Circular OT-55, which sets forth Recommended **Railroad Operating Practices for** Transportation of Hazardous Materials for key trains. Rail carriers require compliance with the standard through AAR Interchange Rules. AAR Circular OT-55 (currently designated as version Q) calls for operational controls for trains carrying certain quantities of hazardous materials, such as LNG unit trains, which are sufficient to address the risks associated with moving LNG in DOT-113 tank cars. The operational controls recommended in OT-55 for the transport of hazardous materials regulate, among other things:

• "Key Trains" are 20 carloads or intermodal portable tank loads of any combination of hazardous materials.

• "Key Trains," including LNGcarrying unit trains, are subject to a maximum speed restriction of 50 mph;

• "Key Routes," which are lengths of track on which either (i) 10,000 car loads or more of hazardous materials or (ii) 4,000 car loadings of flammable gas (such as LNG, which is refrigerated (cryogenic) liquid methane, a Division 2.1 flammable gas) will travel over a one-year period and are subject to additional inspection and equipment requirements;

• Separation distance requirements relating to the spacing of loading and operations, loaded tank cars, and other storage tanks at rail facilities; and

• Community awareness and preparations for emergency planning/ incident response actions.

DOT–113 Specification Tank Car Survivability

Due to its unique design requirements, the DOT-113 specification tank car is inherently more robust than other tank cars transporting other flammable liquids or liquefied gases. In the event of a DOT-113 specification tank car derailment causing only breach of the outer shell, the breach would cause the loss of the insulating vacuum between the inner and outer tank, allowing the inner tank and material to warm and build pressure. The resulting pressure build would lead to the activation of the pressure relief systems on the car and the controlled venting of LNG vapor. While this scenario is concerning, the controlled venting of LNG vapor involves less risk than the uncontrolled release of an entire LNG lading. Additionally, it is highly unlikely that

damage to the tank car involved in a derailment would result in explosion due to a boiling liquid expanding vapor explosion (BLEVE). This event is highly unlikely due to the loading pressure requirements ²⁷ for cryogenic materials, and due to the mandated requirements for redundant pressure relief systems (valves and safety vents) that are built into each car. This rulemaking proposes a 15 psig maximum loading pressure when LNG is offered for transportation in the DOT–113C120W tank car. This loading pressure, along with other safety requirements and operational controls reduce the potential of a BLEVE.

LNG Release Scenarios

Based on the review incident reporting and the 50 year history of transporting cryogenic liquids in DOT– 113 specification tank cars, there are three (3) possible release scenarios that could occur during the transport of LNG by rail tank car. Ranked in order of probability, they are:

1. Non-accident release (NAR) from service equipment. Probability—Low; Consequence—Low

2. Outer tank damage resulting vapor release from Pressure Relief Device (PRD). Probability—Low; Consequence—Low to High (in the event that ignition of vented vapors led to failure/explosion of the tank car)

3. Inner tank damage resulting in large release. Probability—Low; Consequence—High

Although Scenario 3 has a low probability, a breached inner tank during a transportation accident could have a high consequence because of the higher probability of a fire due to the formation of a flammable gas vapor/air mixture in the immediate vicinity of the spilled LNG. This probability is based on the likelihood of ignition sources (sparks, hot surfaces, etc.) being generated by other equipment, rail cars, or vehicles involved in a transportation accident that could ignite a flammable vapor cloud.

Hazard Distances

As with any incident involving a hazardous material in transportation, the actual hazard distance created by a material that is spilled or burning will be influenced by many factors. These factors include, but are not limited to the following:

- Spill Size
- Weather (Wind, Temperature, Humidity, Precipitation)
- Terrain Contours (Hills, Valleys)
- Surface Cover (Vegetation, Structures)
- Soil (Dirt, Clay, Sand)

As stated previously, hazard distance of a vapor cloud dispersion of LNG is difficult to predict. Local weather conditions, terrain, surface cover (*i.e.*, vegetation, trees, and buildings) will influence how a vapor cloud disperses, and how rapidly it diffuses.

Similarly, the actual hazard distance that radiant heat from a pool fire of LNG would impact is dependent on the same factors that influence a vapor cloud. Additionally, the impact of radiant heat from a fire on occupied structures will be influenced by local building codes that govern building setback requirements from railroad right-of-way. Depending on the jurisdiction, setbacks for occupied structures could be within fifty (50) feet of either side of a railroad track.

Regardless of the scenario, the recommended protective action distances ²⁸ identified in the PHMSA Emergency Response Guidebook (ERG) for LNG would be appropriate for the initial protection of the public during an incident involving LNG. However, these protective distances may encompass occupied structures along rail tracks, depending on the location of a failure and the proximity of occupied structures to a breached tank car.

Cascading Failure of Multiple DOT–113 Tank Cars

As stated previously, DOT-113 specification tank cars are inherently more robust when compared to other specification tank cars, due to their unique design, materials of construction, and their specific purpose to transport cryogenic liquids. The special design of the DOT-113 tank car reduces the probability of cascading failures of other undamaged DOT-113 specification tank cars being transported in a block or unit train configuration.

In the scenario where multiple DOT– 113 specification tank cars are transported in a block or unit train configuration, fire/radiant heat exposure or cryogenic temperature exposure could potentially lead to the release of material or failure of otherwise undamaged tank cars.

Fire/Radiant Heat Exposure

In a scenario involving fire/radiant heat exposure, an undamaged DOT–113 specification tank car exposed to a radiant heat source could eventually build pressure that would trigger the activation of the tank car's PRD.

As stated previously, this scenario would result in the controlled venting of LNG vapor to the environment. Ignition of these vapors could occur if an ignition source is present, but would be contained to the proximity of the release point of the vapors from the tank car. Additionally, as stated previously, it is highly unlikely that an undamaged DOT-113 tank car involved in a derailment would result in explosion due to a BLEVE. This event is highly unlikely due to the design of the tank car, the loading pressure requirements for cryogenic materials, the mandated requirements for redundant pressure relief systems (valves and safety vents) and insulation systems that are built into each car. It is not possible to state with certainty whether a BLEVE²⁹ is possible in the case of a LNG tank car derailment, and what conditions need to be present for such an event to occur. However, a recent full-scale test with a double walled portable cryogenic tank filled with liquid nitrogen (and PRDs operated as designed) and exposed to a greater than 200-minute engulfing propane pool fire was neither destroyed nor did a BLEVE occur. The number of cars that could be impacted by this type of exposure would be dependent on multiple factors. Some of these include, but are not limited to: The number or LNG cars in the consist, the locations of those tank cars, type of fire, exposure distance, and defensive actions of responders. Exposure to radiant heat from an LNG pool fire or being caught within the flash vapor fire could result in fatalities, serious injuries, and property damage. These risks also exist in the transportation of LNG via highway, existing rail transportation, and pipeline. However, given the safety history of the DOT-113C120W tank cars, it is expected that the risk of tank car failure and ignition is low.

^{27 49} CFR 173.319.

²⁸ For a large spill, consider initial downwind evacuation for at least 800 meters. If a tank car is involved in a fire, isolate for 1600 meters in all directions; also, consider evacuation for 1600 meters in all directions.

²⁹ A BLEVE is not caused by a combustion explosion of a flammable material. As the name implies, it is the explosion caused by rapidly evolving vapor in relatively small space which leads to significant increase in pressure which may violently damage/destroy a container. When a container with a liquid in it is exposed to a fire and no pressure relief (or partial intermittent relief) occurs the liquid within it can be heated to superheat temperature conditions. If this is followed by a small breach of the container (due to, say, wall metal failure), the rapid depressurization that results leads to an extremely rapid boiling of the liquid, and release of a significant mass of vapor, in microseconds to milliseconds, into the container. This results in very high pressures inside the container leading to its burst, causing an "explosion" (an explosion is the release of energy in an extremely short duration of time). Whether such phenomena occur in a double walled tank car exposed to an external fire is uncertain.

Cryogenic Temperature Exposure

In a scenario involving cryogenic temperature exposure, the risk to an undamaged DOT-113 specification tank car is the embrittlement of the car's steel due to exposure to the extremely cold temperatures of the material. This type of exposure could lead to the failure of the tank car's outer carbon steel tank, but not the inner stainless steel tank. As stated previously, if a DOT-113 specification tank car has its outer tank compromised, the car would lose its insulating vacuum and would eventually start to build pressure within the product tank. This pressure build would eventually lead to the activation of the tank car's PRDs and the controlled venting of LNG vapors.

Air Pollution and Greenhouse Gases

The rulemaking could result in the manufacture of additional DOT-113C120W tank cars. Depending on demand, this manufacture process could result in minor increases in the emission of air pollution and increased emission of greenhouse gases (GHGs), due to the steel and insulating materials that the tank car is comprised of. Also, the transportation of rail tank cars filled with LNG would result in air pollution and GHG emissions associated with increased use of diesel-powered trains. However, transportation of LNG via rail instead of via highway would reduce the emission of air pollution and the emission of GHGs. In general, highway transportation requires proportionally more fuel and results in proportionally more emissions than rail transportation. According to AAR, moving freight by rail instead of truck lowers GHG emissions by 75%. Railroads move approximately one-third of U.S. exports and intercity freight volume in the United States. Despite the large volume of freight moved, U.S. Environmental Protection Agency data show freight railroads account for only 0.5% of total U.S. greenhouse gas emissions and just 2% of emissions from transportationrelated sources.³⁰ Furthermore, removing barriers for the transportation of LNG could promote the use of LNG over more polluting energy sources.

The failure of one or more DOT– 113C120W tank cars filled with LNG would release a large amount of either burned methane or unburned methane hydrocarbons into the atmosphere. Unburned methane hydrocarbons are a potent GHG and a pollutant. However, as described above, the likelihood of such a failure is very low, given the safety record of DOT–113C120W tank cars. Nonetheless, unburned methane enters the atmosphere in the production and transportation of methane on a more frequent basis.

While the authorization of the DOT-113 specification tank car for LNG service will facilitate the transportation of LNG, natural gas and LNG is currently transported via pipeline, vessel, highway, and rail. Increased transport of LNG by rail may result in fewer GHG emissions when compared to transport by highway or construction of new pipeline infrastructure. Also, facilitating LNG transport by rail may discourage the polluting and wasteful practice of natural gas flaring during the production of oil by allowing the natural gas to reach a viable market. This rulemaking may further decrease GHG emissions by facilitating the utilization of natural gas over more polluting sources of energy. Nonetheless, any action that facilitates the use of a fossil fuel arguably could contribute to the emission of GHGs, which are the principle cause of global climate change. As a regulator of hazardous materials packaging safety, PHMSA lacks the expertise to perform a quantitative prediction of how this rulemaking could affect GHG emissions. The selection of either the no action alternative or the proposed action alternative could both increase and decrease GHGs directly and indirectly depending on various economic variables.

4. Agencies Consulted

PHMSA has coordinated with the Federal Motor Carrier Safety Administration and FRA in the development of this proposed rulemaking. PHMSA will consider the views expressed in comments to the NPRM submitted by members of the public, State and local governments, and industry.

5. Conclusion and Proposed FONSI

PHMSA believes that the amendments proposed in this NPRM will ultimately reduce the environmental impact of the transportation of LNG. PHMSA proposes to make a finding that the proposed amendments would not result in a significant environmental impact. PHMSA welcomes any views, data, or information related to safety or environmental impacts that may result if the proposed requirements are adopted, as well as additional information on possible alternatives and their environmental impacts. PHMSA proposes to find that the proposed regulations allowing the transport of LNG via DOT-113C120W tank car will

not result in a significant environmental impact.

K. Privacy Act

In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, including any personal information the commenter provides, to *http:// www.regulations.gov*, as described in the system of records notice (DOT/ALL– 14 FDMS), which can be reviewed at *http://www.dot.gov/privacy*.

L. Executive Order 13609 and International Trade Analysis

Under Executive Order 13609 ("Promoting International Regulatory Cooperation"), agencies must consider whether the impacts associated with significant variations between domestic and international regulatory approaches are unnecessary or may impair the ability of American business to export and compete internationally. See 77 FR 26413 (May 4, 2012). In meeting shared challenges involving health, safety, labor, security, environmental, and other issues, international regulatory cooperation can identify approaches that are at least as protective as those that are or would be adopted in the absence of such cooperation. International regulatory cooperation can also reduce, eliminate, or prevent unnecessary differences in regulatory requirements.

Similarly, the Trade Agreements Act of 1979 (Pub. L. 96–39), as amended by the Uruguay Round Agreements Act (Pub. L. 103-465), prohibits Federal agencies from establishing any standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. For purposes of these requirements, Federal agencies may participate in the establishment of international standards, so long as the standards have a legitimate domestic objective, such as providing for safety, and do not operate to exclude imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards.

PHMSA participates in the establishment of international standards in order to protect the safety of the American public, and we have assessed the effects of the proposed rule to ensure that it does not cause unnecessary obstacles to foreign trade. Accordingly, this rulemaking is consistent with Executive Order 13609 and PHMSA's obligations under the Trade Agreement Act, as amended. This

³⁰ https://www.aar.org/issue/freight-rail-and-theenvironment/.

rulemaking does not negatively impact international trade.

M. National Technology Transfer and Advancement Act

The National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) directs Federal agencies to use voluntary consensus standards in their regulatory activities unless doing so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., specification of materials, test methods, or performance requirements) that are developed or adopted by voluntary consensus standards bodies. This rulemaking does not incorporate by reference any voluntary consensus standards; however, the development of this proposed rule is based on the applicability of the operational controls in AAR Circular OT-55 to the bulk transport of LNG by rail in a train consist that is composed of 20 car loads or intermodal portable tank loads in which LNG is present along with any combination of other hazardous materials.

N. Executive Order 13211

Executive Order 13211 ("Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use") [66 FR 28355; May 22, 2001] requires Federal agencies to prepare a Statement of Energy Effects for any "significant energy action." Under the executive order, a "significant energy action" is defined as any action by an agency (normally published in the Federal Register) that promulgates, or is expected to lead to the promulgation of, a final rule or regulation (including a notice of inquiry, ANPRM, and NPRM) that (1)(i) is a significant regulatory action under Executive Order 12866 or any successor order and (ii) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (2) is designated by the Administrator of the Office of Information and Regulatory Affairs as a significant energy action.

This NPRM is a significant action under Executive Order 12866, but it is not expected to have an annual effect on the economy of at least \$100 million. Further, this action is not likely to have a significant adverse effect on the supply, distribution or use of energy in the U.S. For additional discussion of the anticipated economic impact of this rulemaking, please review the preliminary RIA. PHMSA welcomes any data or information related to energy impacts that may result from this NPRM, as well as possible alternatives and their energy impacts. Please describe the impacts and the basis for the comment.

§172.101—HAZARDOUS MATERIALS TABLE

List of Subjects

49 CFR Part 172

Hazardous materials table, Hazardous materials transportation, Labeling, Markings, Packaging and containers.

49 CFR Part 173

Hazardous materials transportation, Incorporation by reference, Packaging and containers, Cryogenic liquids, Reporting and recordkeeping requirements.

In consideration of the foregoing, PHMSA proposes to amend 49 CFR chapter I as follows:

PART 172—HAZARDOUS MATERIALS TABLE, SPECIAL PROVISIONS, HAZARDOUS MATERIALS COMMUNICATIONS, EMERGENCY RESPONSE INFORMATION, TRAINING REQUIREMENTS, AND SECURITY PLANS

■ 1. The authority citation for part 172 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.81, 1.96 and 1.97.

■ 2. In § 172.101, in table § 172.101 HAZARDOUS MATERIALS TABLE, revise the entry for "UN1972, Methane, refrigerated liquid" to read as follows:

§ 172.101 Purpose and use of the hazardous materials table.

	Hazardous materials descriptions and proper shipping names	Hazard class or division	Identification Nos.	PG	Label codes	Special provisions (§ 172.102)		(8)		(!	9)	(10	0)
Sym- bols							Packaging			Quantity limitations		Vessel stowage	
							(3170.)			175.75)			
							Exceptions	Non-bulk	Bulk	Passenger aircraft/rail	Cargo air- craft only	Location	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Methane, refrig- erated liquid (cryogenic liquid) or Natural gas, refrigerated liq- uid (cryogenic liquid), with high methane con- tent).	* 2.1	UN1972	•	2.1	* T75, TP5	None	+ None	* 318, 319	Forbidden	* Forbidden	D	40
				+		+					+		

PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

■ 3. The authority citation for part 173 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.81, 1.96 and 1.97.

■ 4. In § 173.319, revise paragraph (d)(2) to read as follows:

§173.319 Cryogenic liquids in tank cars.
* * * * * *

(d) * * *

(2) *Ethylene, hydrogen (minimum 95 percent parahydrogen), and methane, cryogenic liquids* must be loaded and shipped in accordance with the following table:

Maximum start-to-discharge pressure	Maximum permitted filling density (percent by weight)							
(psig)	Ethylene	Ethylene	Ethylene	Hydrogen	Methane			
17	52.8. 10 psig Minus 260 °F 113D60W, 113C60W.	51.1 20 psig Minus 260 °F 113C120W	51.1 20 psig Minus 155 °F 113D120W	6.60. Minus 423 °F 113A175W, 113A60W.	32.5. 15 psig. Minus 260 °F. 113C120W.			

* * * * *

Issued in Washington, DC, on October 16, 2019, under authority delegated in 49 CFR 1.97.

Drue Pearce,

Deputy Administrator, Pipeline and Hazardous Materials Safety Administration. [FR Doc. 2019–22949 Filed 10–23–19; 8:45 am] BILLING CODE 4910-60–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS-R4-ES-2018-0082; FXES11130900000-178-FF0932000]

RIN 1018-BC11

Endangered and Threatened Wildlife and Plants; Removal of the Interior Least Tern From the Federal List of Endangered and Threatened Wildlife

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), propose to remove the inland population of the least tern (Interior least tern) (Sterna (now Sternula) antillarum), from the Federal List of Endangered and Threatened Wildlife. The Interior least tern is a bird that nests adjacent to major rivers of the Great Plains and Lower Mississippi Valley. This proposed action is based on a thorough review of the best available scientific and commercial data, which indicate that the Interior least tern has recovered and no longer meets the definition of an endangered or a threatened species under the Endangered Species Act of 1973, as amended (Act). Our review shows that threats identified for the species at the time of listing, *i.e.*, habitat loss, curtailment of range, predation, and inadequacy of regulatory mechanisms, have been eliminated or

reduced, and the Interior least tern has increased in abundance and range. We also announce the availability of a draft post-delisting monitoring (PDM) plan for the Interior least tern. We seek information, data, and comments from the public regarding this proposed rule and the associated draft PDM plan.

DATES: We will accept comments received or postmarked on or before December 23, 2019. Comments submitted electronically using the Federal eRulemaking Portal (see ADDRESSES, below) must be received by 11:59 p.m. Eastern Time on the closing date. We must receive requests for public hearings, in writing, at the address shown in FOR FURTHER INFORMATION CONTACT by December 9, 2019.

ADDRESSES: Written comments: You may submit comments on this proposed rule and the associated draft PDM plan by one of the following methods:

(1) *Electronically:* Go to the Federal eRulemaking Portal: *http://www.regulations.gov.* In the Search box, enter FWS–R4–ES–2018–0082, which is the docket number for this rulemaking. Then, click on the Search button. On the resulting page, in the Search panel on the left side of the screen, under the Document Type heading, click on the Proposed Rule box to locate this document. You may submit a comment by clicking on "Comment Now!"

(2) *By hard copy:* Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R4–ES–2018– 0082, U.S. Fish and Wildlife Service, MS: BPHC, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We request that you send comments only by the methods described above. We will post all comments on *http:// www.regulations.gov.* This generally means that we will post any personal information you provide us (see *Public Comments*, below, for more information).

Document availability: The proposed rule, draft PDM plan, and supporting

documents are available at *http://www.regulations.gov* under Docket No. FWS-R4-ES-2018-0082.

FOR FURTHER INFORMATION CONTACT:

Stephen Ricks, Field Supervisor, U.S. Fish and Wildlife Service, Mississippi Ecological Services Field Office, 6578 Dogwood View Parkway, Jackson, MS 39213; telephone (601) 321–1122. Individuals who use a telecommunications device for the deaf (TDD), may call the Federal Relay Service at (800) 877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Act, we are required to conduct a review of all listed species at least once every 5 years (5-year review) to review their status and determine whether they should be classified differently or removed from listed status. In the Act, the term "species" includes "any subspecies of fish or wildlife or plants, and any distinct population segment [DPS] of any species of vertebrate fish or wildlife which interbreeds when mature." Therefore, we use the term "species" to refer to the Interior population of the least tern in this proposed rule. In our 2013 5-year review for the Interior least tern, we recommended removing the Interior least tern from the List of Endangered and Threatened Wildlife (i.e.,

"delisting" the species). However, to change the status of a listed species under the Act, we must complete the formal rulemaking process. Therefore, we are publishing this proposed rule in the **Federal Register** and seeking public comments on it. Within 1 year of the publication of this proposed rule, we will make a final determination on the proposal.

What this document does. This document proposes to delist the Interior least tern (Sterna (now Sternula) antillarum).

The basis for our action. Under the Act, we may delist a species if the best scientific and commercial data indicate

DEPARTMENT OF TRANSPORTATION

Pipeline and Hazardous Materials Safety Administration

49 CFR Parts 172, 173, 174, 179, and 180

[Docket No. PHMSA-2018-0025 (HM-264)]

RIN 2137-AF40

Hazardous Materials: Liquefied Natural Gas by Rail

AGENCY: Pipeline and Hazardous Materials Safety Administration (PHMSA), Department of Transportation (DOT).

ACTION: Final rule.

SUMMARY: PHMSA, in coordination with the Federal Railroad Administration (FRA), is amending 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. This rulemaking authorizes the transportation of LNG by rail in DOT-113C120W specification rail tank cars with enhanced outer tank requirements, subject to all applicable requirements and certain additional operational controls. The enhancements to the outer tank are indicated by the new specification suffix "9" (DOT-113C120W9).

DATES:

Effective date: This rule is effective August 24, 2020.

Voluntary compliance date:

Voluntary compliance is authorized July 24, 2020.

FOR FURTHER INFORMATION CONTACT:

Michael Ciccarone, Standards and Rulemaking Division, (202) 366-8553, Pipeline and Hazardous Materials Safety Administration, or Mark Maday, Federal Railroad Administration, (202) 366-2535, U.S. Department of Transportation, 1200 New Jersey Avenue SE, Washington, DC 20590-0001.

SUPPLEMENTARY INFORMATION:

Abbreviations and Terms

- AAR Association of American Railroads
- APA Administrative Procedure Act
- ASNT American Society of Non-destructive Testing
- ASTM American Society of Testing and Materials
- AWS American Welding Society
- Brotherhood of Locomotive Engineers BLET and Trainmen
- BLEVE Boiling Liquid Expanding Vapor Explosion
- BNSF Burlington Northern Santa Fe
- CEQ Council on Environmental Quality
- CFR Code of Federal Regulations

- CPUC California Public Utilities Commission
- CTMV Cargo Tank Motor Vehicle
- DOT Department of Transportation DOT-SP Department of Transportation Special Permit
- DP Distributed Power
- EA Environmental Assessment
- **Electronically Controlled Pneumatic** ECP
- Environmental Impact Statement EIS
- E.O. Executive Order
- EOT End of Train
- ERG **Emergency Response Guidebook**
- ETS Energy Transport Solutions, LLC FEMA Federal Emergency Management
- Agency FRA Federal Railroad Administration
- FRSA Federal Railroad Safety Act
- GHG Greenhouse Gas
- GRL Gross Rail Load
- HHFT High-Hazard Flammable Train
- HLRW High Level Radioactive Waste
- HMEP Hazardous Materials Emergency
- Preparedness
- HMT⁻ Hazardous Materials Table
- HMTA Hazardous Materials Transportation Act
- HMR Hazardous Materials Regulations
- IAFC International Association of Fire
- Chiefs
- IAFF International Association of Fire Fighters
- IBR Incorporation by Reference
- IFR Interim Final Rule
- LNG Liquefied Natural Gas
- LPG Liquefied Petroleum Gas
- MLI Multi-Layer Insulation
- NASFM National Association of State Fire Marshals
- NEPA National Environmental Policy Act
- NFPA National Fire Protection Association
- NGO Non-Governmental Organization NJDEP New Jersey Department of
- Environmental Protection
- NPRM Notice of Proposed Rulemaking
- NTSB National Transportation Safety Board NYDEC New York State Department of
- **Environmental Conservation** NYDHSES New York State Division of Homeland Security and Emergency Services
- NYDOT New York State Department of Transportation
- OIRA Office of Information and Regulatory Affairs
- OMB Office of Management and Budget
- PHMSA Pipeline and Hazardous Materials Safety Administration
- PRD Pressure Relief Device
- PRV Pressure Relief Valve
- PSR Physicians for Social Responsibility
- RSI Railway Supply Institute
- RFA Regulatory Flexibility Act
- **Regulatory Impact Analysis** RIA
- RIN Regulatory Identifier Number RSI-CTC Railway Supply Institute
- Committee on Tank Cars SNF Spent Nuclear Fuel
- SI Super Insulation
- TTD Transportation Trades Department,
- AFL-CIO
- The Center The Center for Biological Diversity
- TC Transport Canada
- TDG Transportation of Dangerous Goods
- UMRA Unfunded Mandates Reform Act
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- UN United Nations U.S.C. United States Code
- VCE Vapor Cloud Explosion

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In this final rule, PHMSA is

authorizing the transportation of LNG

Hazardous Materials Transportation law

(Federal hazmat law; 49 U.S.C. 5101 et

seq.), because we have determined that

bulk rail transport is a safe alternative

for this energy product. The final rule

authorizes the transportation of LNG by

rail in DOT–113 tank cars, which have

an established track record of safety in

transporting other cryogenic flammable

thicker and made of steel with a greater

puncture resistance to provide an added

measure of safety and crashworthiness.

Additionally, there will be operational

controls in the form of enhanced

braking requirements, remote

materials. The DOT-113 tank car

authorized for LNG service will be

enhanced with an outer tank that is

by rail tank car, pursuant to Federal

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monitoring, and route analysis, which are intended to exceed current safety requirements for other flammable cryogenic materials.

PHMSA's mission is to protect people and the environment by advancing the safe transportation of energy products and other hazardous materials that are essential to our daily lives. To do this, the agency establishes national policy, sets and enforces standards, conducts research to prevent incidents, and prepares the public and first responders to reduce consequences if an incident does occur. PHMSA and FRA share responsibility for regulating the transportation of hazardous materials by rail and take a system-wide, comprehensive approach that focuses on prevention, mitigation, and response to manage and reduce the risk posed to people and the environment. In line with PHMSA's mission and shared responsibility with FRA for oversight of the rail transport of hazardous materials, PHMSA is issuing this final rule to authorize the transportation of LNG by rail in DOT-113C120W specification rail tank cars with enhanced outer tank material and thickness (those enhancements to be indicated by the specification suffix "9"), subject to operational controls for braking, monitoring, and route analysis.

This authorization conforms to the intent and purpose of the HMR (49 CFR parts 171–180), which are designed to ensure the safe transportation of all hazardous materials packagings (including tank cars). Collectively, the HMR combine packaging design and maintenance, operational controls, package handling, employee training, hazard communication, emergency response information, and security plan requirements to safeguard transportation. These measures help ensure that hazardous contents safely remain within a package during the course of transportation while also providing for public awareness and appropriate response mechanisms. Supplemental to the HMR, PHMSA oversees a Hazardous Materials Emergency Preparedness (HMEP) grant program that provides funding to the emergency response community for training and planning purposes, furthering appropriate response efforts.

The United States leverages domestic technology improvements to transform American life through increased natural gas production and energy independence. As a result, the United States is today the world's largest natural gas producer through economical production from shale and other unconventional formations.¹ Transportation of natural gas, however, can be constrained by the capacity of existing transportation infrastructure, which negatively affects regions with insufficient access to pipelines or ports. This constraint on capacity, coupled with increased natural gas production in the United States, has resulted in the consideration of using rail transport to help efficiently deliver natural gas to domestic U.S. and international markets.

Authorizing the use of proven DOT-113C120W-specification tank cars to transport LNG will allow the rail industry to play a role in the safe, efficient transport of this important energy product for the 21st century. LNG-referred to as "Methane, refrigerated liquid"² within the HMRhas been transported safely by trucks on highways and by marine vessels for over 40 years in the United States, and over 50 years internationally. However, the HMR did not authorize the bulk transport of LNG in rail tank cars prior to this rulemaking action, instead permitting rail transport of LNG only on an *ad hoc* basis as authorized by the conditions of a PHMSA special permit (49 CFR 107.105) or in a portable tank secured to a rail car pursuant to the conditions of an FRA approval. The recent expansion in U.S. natural gas production has increased interest in a programmatic approach to using appropriately the nation's rail infrastructure to facilitate efficient transportation of LNG. In response to that interest, PHMSA, in coordination with the FRA, issues this final rule to amend the HMR to permit the bulk transport of LNG in DOT-113C120W specification rail tank cars with enhanced outer tank requirements (those enhancements to be indicated by the specification suffix "9"), subject to operational controls for braking, monitoring, and routing.

In addition, this final rule satisfies the directive in Executive Order (E.O.) 13868 [84 FR 15495, April 19, 2019] to propose, consistent with applicable law, regulations that "treat LNG the same as other cryogenic liquids and permit LNG to be transported in approved rail tank cars." ³ E.O. 13868 recognizes the

leading role that the United States plays in producing natural gas, the importance of improving the United States' capacity to supply natural gas, including LNG, to domestic and international markets, and the need to continue to transport this energy product in a safe and efficient manner. In issuing this final rule, PHMSA furthers the purposes and policies set forth in E.O. 13868 by enabling an additional safe, reliable, and efficient transportation alternative for bringing domestically produced natural gas to existing, and potentially new, markets.

The present action is based on a longstanding understanding of the properties of LNG and an evidencebased approach to the safety of the DOT-113 tank cars designed and used to transport flammable cryogenic materials. At the same time, in promulgating this final rule, and as it does with other hazardous materials, PHMSA recognizes that there is ongoing and potential future research related to the transportation of LNG by all modes. The Agency will continue to use this research to inform potential future regulatory activity, as appropriate.

In the following table, PHMSA provides an overview of: (1) The requirements for LNG transportation in tank cars pursuant to DOT Special Permit 20534 (DOT-SP 20534),4 issued to Energy Transport Solutions, LLC (ETS) during the Notice of Proposed Rulemaking (NPRM)⁵ comment period to authorize ETS's rail transportation of LNG along specific routes; (2) the requirements proposed in the October 24, 2019 NPRM; and (3) the requirements adopted in this final rule. Requirements related to the thermal performance of the DOT-113C120W tank car are unchanged from the NPRM (75 psig maximum start to discharge pressure; maximum pressure when offered; and design service temperature). But this final rule, after consideration of comments received in the docket and to provide additional operational controls and crashworthiness for LNG tank cars, adopts supplemental requirements to those initially proposed in the NPRM: Remote monitoring of pressure and location for LNG tank cars in

⁴ https://www.regulations.gov/document? D=PHMSA-2019-0100-3006.

¹ CRS, "An Overview of Unconventional Oil and Natural Gas: Resources and Federal Actions," 7– 5700, Summary, (2015).

 $^{^2}$ Use of this description in quotes and with methane capitalized reflects the proper shipping name as listed in the § 172.101 Hazardous Materials Table.

³PHMSA notes that it first announced in the "Spring 2018 Unified Agenda of Federal Regulatory and Deregulatory Actions" [83 FR 27085] that it had initiated a "pre-rule" action on LNG by Rail, and subsequently announced that it would proceed with

an NPRM in the "Fall 2018 Regulatory Plan and the Unified Agenda of Federal Regulatory and Deregulatory Actions" [83 FR 57803]. While these actions notified the public of PHMSA's intention to develop propose a regulatory framework for the safe rail transportation of LNG, PHMSA had not published a proposed rulemaking by the time the President issued E.O. 13868 on April 10, 2018.

⁵ Hazardous Materials: Liquefied Natural Gas by Rail NPRM [84 FR 56964].
transportation; two-way end-of-train (EOT) or distributed power (DP) system for trains transporting 20 or more loaded tank cars of LNG in a continuous block, or 35 or more loaded tank cars of LNG throughout the train; and a requirement that railroads comply with § 172.820 route planning requirements. In addition, to account properly for the properties of LNG, this final rule raises the maximal filling density limit to 37.3% from the proposed 32.5%. Finally, in this final rule PHMSA is also adopting enhanced outer tank requirements compared with the requirements that apply to other DOT–

113C120W-specification tank cars, including a thicker 9/16th inch outer tank made from high quality TC-128B normalized steel. Compliance with these enhanced outer tank requirements will be indicated by the new specification suffix "9" (DOT-113C120W9).

TABLE 1-SUMMARY OF DOT-SP 20534, NPRM PROPOSALS, AND FINAL RULE COMPONENTS

LNG requirements								
Topics	DOT special permit 20534	NPRM	Final rule					
Approval of LNG	Permitted between Wyalusing, PA and Gibbstown, NJ, with no in- termediate stops.	Permitted Nationwide	Permitted Nationwide.					
Remote Monitoring	Required as a condition of the DOT-SP.	Not Required	Required as a Special Provision for LNG.					
Maximum Start to Discharge Pres- sure.	Not Specified	75 psig	75 psig.					
Maximum Pressure when Offered for Transportation.	15 psig	15 psig	15 psig.					
Design Service Temperature Maximum Permitted Filling Density (percent by weight).	Not Specified 32.5%	Minus 260 °F 32.5%	Minus 260 °F. 37.3%.					
When is a two-way end-of-train (EOT) or a distributed power (DP) system required.	Required when a train is trans- porting 20 or more tank cars authorized under this special permit.	Not Proposed	Required when a train is trans- porting 20 or more loaded tank cars of LNG in a continuous block or 35 or more loaded tank cars of LNG throughout the train.					
Route Controls Minimum Wall Thickness of the Outer Tank Shell and the Outer Tank Heads.	Authorized only on one route Shell: ⁷ /16" Tank Head: ¹ /2"	Not Proposed Shell: 7/16" Tank Head: 1/2"	Must comply with 172.820. Shell and Tank Head: Enhanced ⁹ / ₁₆ ".					
Required Outer Tank Steel Type(s)	As specified in AAR Specifica- tions for Tank Cars, Appendix M.	As specified in AAR Specifica- tions for Tank Cars, Appendix M.	AAR TC 128, Grade B normalized steel plate.					

II. NPRM and Background

PHMSA on October 24, 2019, in consultation with the FRA, published the NPRM proposing to authorize the transport of LNG by rail. PHMSA issued the NPRM in response to a petition for rulemaking (P–1697)⁶ from the Association of American Railroads (AAR) and a review of existing regulations.

The NPRM proposed a framework for transporting LNG by rail safely by designating an authorized packaging, and by determining how the packaging would be filled safely. PHMSA chose the DOT-113C120W specification tank car packaging designed for flammable cryogenic material. This packaging has been transporting similar flammable cryogenic materials for decades with no fatalities or serious injuries. As for the filling/loading controls, PHMSA proposed a maximum start-to-discharge pressure of 75 psig, a maximum permitted filling density of 32.5 percent by weight, a maximum pressure when offered for transportation of 15 psig, and a design service temperature of minus 260 degrees Fahrenheit. The maximum offering pressure of 15 psig proposed in the NPRM is consistent with the 20-day transportation requirement for cryogenic materials and the allowable average daily pressure rise of 3 psig per day during transportation.

In the NPRM, PHMSA also proposed operational controls consistent with the existing requirements of the HMR, and invited comment on whether existing regulations and the operational controls in AAR's Circular OT–55 entitled "*Recommended Railroad Operating Practices For Transportation of Hazardous Materials*"⁷ are sufficient. The NPRM also sought comment on the potential need for additional operating controls. Beyond the operational controls already included for other flammable cryogenic materials transported by rail, PHMSA specifically referenced train length and composition, speed restrictions, braking requirements, and routing requirements as potential areas of interest to provide for enhanced operational control requirements. PHMSA also encouraged commenters to provide data on the safety or economic impacts associated with any additional operational controls, including analysis of the safety justification or cost impact of their implementation.

PHMSA also received a request from the Offices of the Attorneys General of New York and Maryland to extend the 60-day comment period for the NPRM an additional 30 days. PHMSA issued a notice ⁸ on December 23, 2019, extending the comment period until January 13, 2020.

⁶ PHMSA-2017-0020-0002.

⁷ The freight rail industry developed the first edition of OT–55, which details railroad operating practices for hazardous materials, in the late 1980s, as part of an inter-industry hazardous materials rail safety task force that also included the Chemical Manufacturers Association (now the American Chemistry Council) and the Railway Progress Institute (now the Railway Supply Institute).

⁸ Hazardous Materials: Liquefied Natural Gas by Rail; Extension of Comment Period [84 FR 70491], https://www.federalregister.gov/documents/2019/ 12/23/2019-27656/hazardous-materials-liquefiednatural-gas-by-rail-extension-of-comment-period.

A. Petition for Rulemaking (P–1697)

1. AAR's Petition for Rulemaking and the NPRM

On January 17, 2017, AAR submitted a petition for rulemaking to PHMSA, entitled "Petition for Rulemaking to Allow Methane, Refrigerated Liquid to be Transported in Rail Tank Cars" (P– 1697), requesting revisions to the Hazardous Materials Table (HMT; §172.101) and §173.319 of the HMR that would permit the transportation of LNG by rail in DOT-113 tank cars. The Administrative Procedure Act (APA), 5 U.S.C. 551, et seq. 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). PHMSA's rulemaking procedures at § 106.95 allow interested persons to ask PHMSA to add, amend, or repeal a regulation by filing a petition for rulemaking along with information and arguments supporting the requested action. In May 2018, PHMSA accepted P–1697 in accordance with § 106.105 by notifying AAR that the request merited consideration in a future rulemaking.9

In its petition, AAR proposed that PHMSA amend the entry for "United Nations (UN) 1972, Methane, refrigerated liquid" in the HMT to add a reference to § 173.319 in Column (8C) authorizing transport in rail tank cars. Additionally, AAR proposed that PHMSA amend § 173.319 to include specific requirements for DOT-113 tank cars used for the transportation of LNG, and suggest that the authorized tank car specifications be DOT-113C120W and DOT-113C140W.¹⁰ AAR further proposed amending §173.319(d)(2) to include maximum filling densities comparable to those specified for cargo tanks containing LNG in §173.318(f)(3). AAR argued that "LNG should be authorized for rail transportation because it is a safe method of transporting this commodity, LNG shippers have indicated a desire to use rail to transport it, and because railroads potentially will need to transport LNG for their own use as a locomotive fuel." With respect to shipper demand, AAR contended the following:

The only way to transport LNG is by obtaining special approval from PHMSA for rail transport, or by transporting it via highway; and that notwithstanding the requirement for a special approval, customers have expressed interest in shipping LNG by rail from Pennsylvania to New England, and between the U.S. and Mexico. Authorizing transportation of LNG by rail likely would stimulate more interest. In addition, several railroads are actively exploring LNG as a locomotive fuel. If railroads are to use LNGpowered locomotives, they would need to supply LNG along their networks. Transporting LNG in tank cars would be an optimal, if not essential, way to transport LNG to those locations.

Furthermore, with respect to rail as a safe method of transportation, AAR noted:

Rail is undeniably safer than over-the-road transportation of LNG, and transport via that mode should be facilitated. The reason the hazardous materials regulations do not currently authorize the transportation of LNG by rail is simply that there was a lack of demand for rail transport of LNG when PHMSA authorized DOT-113 tank cars for the transportation of cryogenic liquids and listed the cryogenic liquids that could be transported in those cars. There was no determination that rail was an unsuitable mode of transporting LNG.

In the NPRM, PHMSA noted that AAR's requested action fits generally into the existing structure of the HMR, which combines packaging design and maintenance, operational controls, package handling, employee training, hazard communication, emergency response information, and security plan requirements to ensure safe transportation of hazardous materials. In the NPRM, PHMSA also requested public comment on the proposals present in AAR's petition, including their potential to reduce regulatory burdens, enhance domestic energy production, and impact safety.

2. The Center for Biological Diversity's Response to P–1697

On May 15, 2017, the Center for **Biological Diversity (the Center)** submitted a comment to P-1697, recommending that PHMSA deny AAR's petition for rulemaking because of potential environmental impacts of transporting LNG. The Center commented that PHMSA should not proceed in evaluating the petition request until the Agency has conducted a National Environmental Policy Act (NEPA) evaluation, prepared an **Environmental Impact Statement (EIS)** or Environmental Assessment (EA), and provided opportunity for public review and comment in accordance with Federal hazmat law, as applicable. PHMSA regulations do not require PHMSA to conduct a NEPA evaluation at the time it responds to a petition, and PHMSA has not taken such actions historically as part of its decision whether to accept or deny a petition for rulemaking. As result, PHMSA did not prepare an EA or EIS prior to

responding to P–1697. This decision was made with the knowledge that PHMSA would be required to conduct a NEPA analysis as part of a potential rulemaking.

When PHMSA published the NPRM, it prepared a draft EA, see Section V. J. "Environmental Assessment" of the NPRM. A final EA for the rulemaking is included in the rulemaking docket as part of the analysis for the final rule.

B. Regulatory Review

On October 2, 2017, DOT published a notice¹¹ in the Federal Register expressing Department-wide plans to review existing regulations and other agency actions to evaluate their continued necessity, determine whether they are crafted effectively to solve current problems, and evaluate whether they potentially burden the development or use of domestically produced energy resources. As part of this review process, DOT invited the public to provide input on existing rules and other agency actions that have potential for repeal, replacement, suspension, or modification.

The Interested Parties for Hazardous Materials Transportation (Interested Parties) submitted a comment ¹² supporting the authorization of LNG for rail tank car transport. Specifically, the Interested Parties noted in its comment that LNG shares similar properties to other flammable cryogenic materials currently authorized by rail tank car and

¹²Comment from Interested Parties for Hazardous Materials Transportation, Document No. DOT-OST-2017-0069-2591, at: https:// www.regulations.gov/document?D=DOT-OST-2017-0069-2591. The Interested Parties is a volunteer-run coalition of organizations that share an interest in legislative and regulatory issues related to the safe and secure domestic and international transportation of hazardous materials. Interested Parties members include associations representing hazardous materials shippers, carriers, packaging manufacturers and other related groups, including the Agricultural Retailers Association; American Chemistry Council; American Fuel & Petrochemical Manufacturers; American Trucking Associations; American Pyrotechnics Association; Association of HazMat Shippers; The Chlorine Institute; Compressed Gas Association; Council on the Safe Transportation of Hazardous Articles; Dangerous Goods Advisory Council; The Fertilizer Institute; Gases and Welding Distributors Association; Institute of Makers of Explosives; International Liquid Terminals Association; International Vessel Operators Dangerous Goods Association; Medical Device Battery Transport Council; National Association of Chemical Distributors; National Private Truck Council; National Tank Truck Carriers; Plastics Industry Association; Petroleum Marketers Association of America; **Radiopharmaceutical Shippers & Carriers** Conference; Railway Supply Institute, Inc.; Reusable Industrial Packaging Association; Sporting Arms Ammunition Manufacturers Institute; The Sulphur Institute; and the Utility Solid Waste Activities Group.

⁹ PHMSA–2017–0020–0005.

¹⁰ The HMR do not authorize the DOT– 113C140W specification tank car for hazardous materials transportation. *See* section "III. A. *Tank Car Specification*" of the NPRM for further discussion.

¹¹ Notification of Regulatory Review, Docket No. DOT–OST–2017–0069 [82 FR 45750].

has already been moved in the United States under a special permit. Additionally, they noted that Transport Canada authorizes LNG for transportation by rail in DOT–113equivalent rail cars and that there is increased commercial demand for rail transport of LNG within the United States and between the United States and Mexico.

After consideration of the issues, PHMSA is acting on the comment from the Interested Parties by amending the HMR to allow for bulk transport of LNG by rail in a DOT–113 specification tank car. Additionally, this action supports the objectives of the Notification of Regulatory Review because it is expected to "promote [the] clean and safe development of our Nation's vast energy resources, while avoiding regulatory burdens that unnecessarily encumber energy production, constrain economic growth, and prevent job creation."

C. DOT Special Permit 20534

On August 21, 2017, PHMSA received an application for a special permit from ETS to authorize the transportation in commerce of "Methane, refrigerated liquid" in DOT–113C120W tank cars.

Upon completion of its preliminary evaluation of the application, PHMSA published for public comment a Notice of Draft Environmental Assessment for a Special Permit Request for Liquefied Natural Gas by Rail in the Federal **Register** on June 6, 2019.¹³ The notice requested comment on potential safety, environmental, and any additional impacts that should be considered as part of the special permit evaluation process. The docket for the draft Environmental Assessment enclosed a draft special permit. The notice was initially published with a 30-day comment period and was extended an additional 30 days after requests from numerous stakeholders, including nongovernmental organizations (NGOs) and private individuals. The extended comment period closed on August 7, 2019 and PHMSA received 2,994 comments.

On December 5, 2019, PHMSA granted DOT–SP 20534 to ETS authorizing the transportation of LNG in DOT–113C120W tank cars between Wyalusing, Pennsylvania, and Gibbstown, New Jersey, with no intermediate stops, and subject to certain operational controls. Some of the operational controls required by the

special permit had not been proposed in the draft special permit; PHMSA introduced those additional operational controls in response to comments received and additional documentation provided by the applicant, as well as to further reduce risk by supplementing the robust safety regime established by the HMR. Those information requests also were intended to increase PHMSA and FRA's knowledge of ETS's operations to inform later decisions on DOT-SP 20534 and the HMR. Specifically, PHMSA added the following requirements to the special permit:

(1) Each tank car must be operated in accordance with § 173.319 except for the identified maximum permitting filling density, maximum operating pressure, and remote sensing equipment as specified in the special permit;

(2) Shipments are authorized between Wyalusing, Pennsylvania, and Gibbstown, New Jersey, with no intermediate stops.

(3) Within 90 days after issuance, the grantee shall prepare and submit a plan providing per shipment quantities, timelines, and other actions to be taken for moving from single car shipments to multi-car shipments, and subsequently to unit trains (20 or more tank cars).

(4) Trains transporting 20 or more tank cars authorized under this special permit must be equipped and operated with a two-way end of train device as defined in 49 CFR 232.5 or distributed power as defined in 49 CFR 229.5.

(5) Prior to the initial shipment of a tank car under this special permit, the grantee must provide training to emergency response agencies that could be affected between the authorized origin and destination. The training shall conform to NFPA-472, a voluntary consensus standard developed by the National Fire Protection Association (NFPA) establishing minimum competencies for responding to hazardous materials emergencies, including known hazards in emergencies involving the release of LNG, and emergency response methods to address an incident involving a train transporting LNG.

(6) While in transportation, the grantee must remotely monitor each tank car for pressure, location, and leaks.

Following issuance of DOT–SP 20534, PHMSA published a notice ¹⁴ in the **Federal Register** that PHMSA had added DOT–SP 20534 and documents supporting the special permit decision-the Special Permit Evaluation Form and Final Environmental Assessment—to the docket for the HM– 264 NPRM (Docket No. PHMSA-2018-0025) for consideration by the public because of the overlapping subject matter. PHMSA invited comments on DOT-SP 20534 operational controls to be submitted to the HM-264 rulemaking docket by December 23, 2019.15 PHMSĂ noted it would consider any additional comments on the operational controls included in DOT-SP 20534, which was posted to the HM-264 rulemaking docket to aid in determining appropriate operational controls for this final rule. PHMSA encouraged commenters to provide data on the safety or economic impacts associated with operational controls in the special permit, including analysis of the safety benefits and the potential cost-benefit impact of implementing those or other operational controls.

III. Amendments to the HMR Adopted in This Final Rule

In this final rule, PHMSA is authorizing LNG, a well characterized and understood material, for transportation in a specific rail car packaging that has a long, safe record carrying similar cryogenic materials, including flammable materials. Additionally, to provide an additional level of safety and in response to comments, PHMSA is adopting certain supplemental packaging integrity enhancements and operational controls.

A. Existing HMR Requirements for Rail Transport of Flammable Cryogenic Material

Federal hazmat law, 49 U.S.C. 5103, requires PHMSA ¹⁶ to designate material or a group or class of material as hazardous when it determines that transporting the material in commerce in a particular amount and form may pose an unreasonable risk to health and safety or property, and to prescribe regulations for the safe transportation of hazardous material in commerce. Transportation includes the movement of that hazardous material and any loading, unloading, or storage incidental to the movement.¹⁷ These statutory provisions are implemented within PHMSA regulations at 49 CFR parts 171 to 180 (*i.e.*, the HMR).

The HMR prescribe a comprehensive suite of requirements for hazardous material classification, hazard communication, emergency response

¹³ Hazardous Materials Safety: Notice of Availability of the Draft Environmental Assessment for a Special Permit Request for Liquefied Natural Gas by Rail [84 FR 26507].

¹⁴ Hazardous Materials: Notice of Issuance of Special Permit Regarding Liquefied Natural Gas [84 FR 67768].

¹⁵ On December 23, 2019, PHMSA extended the comment period to January 13, 2020 [84 FR 70491].

¹⁶ The authority was delegated by the Secretary of Transportation in 49 CFR 1.97.

^{17 49} U.S.C. 5102(13).

information, training, packaging, and material handling. These requirements are designed to prevent the release of hazardous materials in transportation, and in the event of a release, to provide emergency responders and the public with necessary information to protect themselves and mitigate the consequences of the release to the greatest extent possible. The HMR are a proven hazardous material regulatory system well suited to manage the risks of LNG transportation in rail tank cars. The robust requirements already in place in the HMR for packaging, rail car handling, hazard communication and training address many of the safety concerns related to the transportation of LNG by rail. Moreover, PHMSA works closely with other Federal and State partners to enforce the requirements of the HMR.

1. Packaging

Selecting proper packaging for a hazardous material is a critical step in the HMR safety system. Hazardous materials packaging must be chemically and physically compatible with the material contained in the package, also known as the lading. The packaging must be able to withstand all conditions normally encountered during transportation, which include humidity and pressure changes, shocks, and vibrations. The HMR authorize many types of packagings for hazardous materials, ranging in size from 1 milliliter glass sample tubes, to 30,000gallon railroad tank cars. Different modes of transportation (highway, air, rail, and vessel) and varying volumes of hazardous materials present different challenges, and require a variety of packaging designs to account for different conditions encountered in transportation. Tank cars used for rail transportation must be designed to withstand exposure to weather, in-train forces and switching, vibrations, dynamic forces, and exposure to the lading they transport.

Cryogenic materials pose unique challenges for selecting appropriate transportation packaging. The lading's extreme cold properties render most types of packaging material too brittle to maintain containment during transportation. Therefore, all cryogenic packagings in the HMR are required to be constructed from specific steel alloys with physical properties that enable them to retain their strength and ductility at the lading's extreme low temperatures.

Another challenge that must be considered is ensuring that the lading remains at these cold temperatures during transportation. Temperature

maintenance of the lading prevents expansion and overpressure conditions, or possible activation of the transportation vessel's pressure relief device. To help ensure that neither scenario occurs during transportation, all bulk packagings authorized in the HMR for transportation of flammable cryogenic materials (*e.g.*, DOT–113 tank cars, MC-338 cargo tanks, and UN T75 portable tanks) are built as a "tankwithin-a-tank" design. The inner tank contains the cryogenic material. The space between the inner and outer tanks is evacuated to a high degree of vacuum (absolute pressure less than 75 microns of mercury or 0.0001 atmospheres). The outer surface of the inner tank is wrapped with a high-grade insulation consisting of multiple layers of a thin reflecting material such as an aluminum foil sandwiched between a thin nonconducting paper type material. Alternately, the physical insulation may also be made of fine grained perlite particles filling the void space between the inner and outer tanks. The combined effect of vacuum in the annular space between the inner and outer tanks together with the physical insulation substantially reduces the heat transfer from the atmosphere to the lading, thus effectively maintaining the lading temperature within safe limits during transportation. Furthermore, the outer tank shields the inner tank from physical damage, exposure to the elements, and in-train forces, while providing structural support to the packaging.

Tank car design is a mature field, and the requirements for designing and building a tank car able to withstand the conditions encountered during transportation are codified in part 179 of the HMR. An industry publication, AAR Manual of Standards and Recommended Practices, Section C-III, Specifications for Tank Cars, Specification M-1002 (AAR Specifications for Tank Cars), is incorporated by reference into the HMR. HMR tank specifications and standards are aligned with authoritative design and construction standards found in the ASME Boiler & Pressure Vessel Code (BPVC), Section VIII, Division 1 Rules for Construction of Pressure Vessels, and welding requirements found in ASME BPVC Section IX, Welding and Brazing Qualifications. The inner and outer tanks are designed to ASME BPVC Section VIII Division 1 using the design margins and loading conditions for pressure vessels. The ASME BPVC Section VIII Division 1 design margin and loading conditions determine the design thickness of both the inner and outer tanks. However, the HMR

prescribe minimum thicknesses requirements for both tanks. American Welding Society (AWS) standards are used during manufacturing to ensure that the welding performed has quality control systems and is performed by qualified personnel. The DOT-113 tank car requirements in the HMR incorporate elements of rigorous engineering standards, including the ASME BPVC as well as the AAR Specifications for Tank Cars, M–1002. M-1002 in turn draws on wellestablished industry standards of the AWS, ASTM, American Society of Nondestructive Testing (ASNT) as well as ASME, for design, materials, fabrication, testing and inspection requirements. The ASME BPVC, Section VIII, Division 1, has become the international benchmark standard for pressure vessel design for a multitude of industries, including transportation. These standards impose criteria for forming, fabricating, inspecting, and testing pressure vessels and their components and for qualifying welders, welding operators, and welding procedures to ensure the soundness of pressure vessels. Starting from these rigorous design principles, the specification requirements in part 179 of the HMR add design requirements to address conditions encountered in transportation and not necessarily applicable to stationary storage. For example, the HMR require the use of specific steels that balance toughness, strength, and weldability with being able to withstand extremely low temperatures.

Like other bulk packagings, cryogenic packagings authorized in the HMR, including DOT-113 tank cars, have requirements for safety relief devices, also referred to as pressure relief devices (PRDs). PRDs are designed to vent the contents of the tank in a controlled manner to prevent the inner tank from suffering a catastrophic failure or explosion due to pressure-increasing events, such as exposure to fire. DOT-113 tank cars have two different PRDs: (1) A pair of reclosing pressure relief valves (PRVs), which operate on a temporary basis to relieve inner tank pressure and bring it back to safe levels; and (2) a pair of non-reclosing safety vents (rupture disk) that open at a pressure higher than the start to discharge pressure of the PRVs and remain open once the disk ruptures. The latter devices are a failsafe in the event the primary PRVs fail to perform as intended.

The HMR explicitly authorize LNG for transportation in UN T75 insulated portable tanks that are loaded onto railroad flat cars and MC–338 cargo tanks, which are both tank-within-atank designs. Both bulk packagings have an established safety record for LNG and other flammable cryogenic materials over many years of transportation, demonstrating the high level of safety provided by the tank-within-a-tank design. On May 4, 1963, the Interstate Commerce Commission Safety and Service Board published final rule Order 57 [28 FR 4495], which authorized the transportation of liquefied hydrogen in a DOT–113 tank car. The DOT-113 specification itself was adopted into the HMR on December 1, 1962 in final rule Order 56 [27 FR 11849]. Prior to adoption, the DOT-113 design had been authorized to transport liquefied hydrogen by special permits, documents issued by PHMSA and its predecessor agencies that permit a variance from the requirements of the HMR provided an equivalent level of safety is maintained. PHMSA and its predecessor agencies have used special permits to evaluate new transportation technologies and practices prior to authorizing them for broader use. Liquefied ethylene, a flammable cryogenic material with physical properties (including flammability range and cryogenic state) similar to LNG, has been authorized for transportation in DOT-113C120W tank cars since the publication of final rule HM-115. Cryogenic Liquids [48 FR 27674, June 16, 1983]. The DOT-113C120W tank car was authorized by special permit prior to adoption in the HMR.

It is essential to ensure that cryogenic lading remains below a maximum temperature during transportation. The HMR address this currently by requiring tank car owners to ensure the thermal integrity of DOT-113 packages through measurement of thermal performance throughout the life of the tank. Specifically, the HMR prohibit the transportation of a DOT-113 if the average daily pressure rise in the tank exceeded 3 psig during the prior shipment. The insulation located in the annular space between the outer and inner tanks can lose its effectiveness over time due to conditions encountered during transportation, through settling of the insulation or through the development of micro vacuum leaks. New multi-layer insulation systems do not suffer settling problems, but are still susceptible to the degradation of vacuum and therefore must be monitored in the same way as older insulation systems. As the effectiveness of the insulation system lessens, more thermal energy can be transmitted to the inner tank and the lading. The rate of thermal energy transfer can be

determined by measuring the pressure the lading exerts on the inner tank at the time the material is offered, and after the material arrives at its destination. If the average daily pressure rise during transportation exceeds 3 psig, the thermal integrity of the tank must be tested. This testing involves measuring either pressure rise or calculated heat transfer over a 24-hour period. When the pressure rise test is performed, the absolute pressure in the annular space of the loaded tank car may not exceed 75 microns of mercury at the beginning of the test and may not increase more than 25 microns during the 24-hour period. If the tank fails the thermal integrity test, it must be removed from hazardous material transportation service until it has been repaired and passes the required thermal integrity tests. This system of thermal integrity management has proven to be an effective way of preventing unsafe pressure increases during transportation for the existing DOT-113 fleet, and PHMSA expects that it will continue to be effective for DOT-113s used in LNG service.

The flammability and lowtemperature hazards presented by LNG in transportation are well understood. The DOT-113C120W tank car has a well-established safety record transporting similar cryogenic flammable materials. The construction specifications for the steel used for fabricating the inner tank of the DOT-113C120W tank car requires it to withstand a (design) service temperature of -260 °F, which is also the temperature of LNG at atmospheric pressure (*i.e.*, LNG is not cooled below this temperature). The austenitic steel required for the inner tank retains all necessary strength and ductility at – 260 °F, and is suitable for use to – 423 °F the shipping temperature of liquefied hydrogen, a far lower temperature than it would be exposed to in LNG service.

2. Hazard Communication

Once the lading has been properly packaged, the HMR prescribe an extensive system of multi-layered hazard communication tools designed to provide information on the type and location of hazardous materials present to transportation employees, emergency responders, and the public. The discussion below will focus on hazard communication requirements specific to rail transportation, but similar requirements exist for highway, vessel, and air transport, with variations to account for specific challenges applicable to each mode of transportation.

The HMR require that a tank car containing a hazardous material conspicuously display placards on each side and each end of the car. The diamond-shaped placards are designed to be instantly recognizable to any trained emergency responder or transportation employee. Placards allow for quick identification of the DOT hazard class or division of the material being transported by their color, symbol, and the numeral entered in the bottom corner of the placard. Specifically, for DOT-113 tank cars transporting flammable gases such as LNG, the placard must also be placed on a white square background to increase the contrast and visibility of the placard in accordance with § 172.510(a)(3), and as a visual signal of the special handling procedures for DOT-113 tank cars transporting flammable gases. Tank cars must additionally be marked on each side and each end with the UN ID number of the hazardous material being carried. This marking is typically displayed on a white rectangle in the center of the placard. Moreover, tank cars loaded with flammable gases, like LNG, are required to be marked on two sides with the key words of the proper shipping name, or the common name of the material being transported. Therefore, a tank car transporting LNG will be marked with the words "Methane, refrigerated liquid" or "Natural gas, refrigerated liquid" on two sides of the tank car.

The train crew is required to maintain a document which identifies the position in the train of each rail car containing a hazardous material. The crew is also required to maintain emergency response information for each hazardous material carried in the train. This emergency response information must include specific information related to the material being transported, including:

- Immediate hazards to health;
- Risks of fire or explosion;
- Immediate precautions to be taken in the event of an accident or incident;
- Immediate methods for handling

fires;

 $^{\odot}\,$ Initial methods for handling spills or leaks in the absence of fire; and

 Preliminary first aid measures. As one method of compliance with these requirements, train crews often carry the DOT Emergency Response Guidebook (ERG),¹⁸ a joint publication of PHMSA, Transport Canada, the Secretariat of Communication and Transport of Mexico, and interested parties from government and industry,

¹⁸ https://www.phmsa.dot.gov/sites/ phmsa.dot.gov/files/docs/ERG2016.pdf.

to supplement emergency response information provided by the person shipping the hazardous material. The ERG is intended for use by emergency services personnel to provide guidance for initial response to hazardous materials transportation incidents. The ERG cross-references specific materials with incident response information, including firefighting instructions and evacuation distances. The ERG is made widely available, as PHMSA provides millions of free copies of the ERG to emergency responders in every State, and several commercial publishers have copies available for purchase. Smartphone applications of the ERG are also available. The ERG includes instruction to handle incidents involving flammable cryogenic materials such as LNG.

Finally, the document carried by the train crew is required to display clearly the emergency response telephone number for each hazardous material transported in the train. The phone number must be easily recognizable to the train crew, or any other person using the train document in an emergency. The telephone number must be of a person who either: (1) Is knowledgeable of the hazardous material being shipped, and has comprehensive emergency response and incident mitigation information for that material; or (2) has immediate access to a person who possesses such knowledge and information. The emergency response telephone number must be monitored at all times the material is in transportation. A telephone number that requires a call back (such as an answering service, answering machine, or beeper device) does not meet this requirement. The emergency response telephone number may be monitored by the person offering the hazardous material, or an agency or organization capable of, and accepting responsibility for, providing the comprehensive emergency response and incident mitigation information.

The railroad industry has also developed its own electronic hazard communication aids, beyond the requirements of the HMR. Specifically, the AAR, in conjunction with its members and Railinc (an AAR technology subsidiary), has developed and deployed an application called AskRail.¹⁹ The AskRail app links to the freight railroad industry's train and railcar information database maintained by Railinc. AskRail provides an emergency responder who has registered to use the service with detailed information about the type and location of all cars carrying hazardous materials in a train including emergency response guidance.

This existing system of hazard communication under the HMR, supplemented by industry efforts such as AskRail, accurately communicates the hazards presented by hazardous materials to emergency responders, transportation employees, and the public and contributes to proper emergency response when accidents occur in transportation.

3. Training

The HMR requirements for safe transportation of hazardous materials also encompass training for all hazmat employees involved in the transportation of hazardous material. See part 172 subpart H. Training is the cornerstone of compliance with the HMR, because only properly trained employees can ensure the applicable HMR requirements are followed appropriately. All hazmat employees must be trained and tested by their employer to perform their HMR-related functions correctly and safely. This includes employees who prepare a hazardous material package for transportation, transport hazardous materials (*e.g.*, the train crew), or unload hazardous material. See §171.8. In accordance with §172.704, training must cover:

General awareness of HMR requirements;

• Function-specific training applicable to the particular functions performed by the employee (*e.g.*, proper loading procedures for flammable cryogenic material);

• Safety;

• Security awareness; and

• In-depth security training, when applicable.

Training must be documented in accordance with § 172.704(d), and repeated at least every 3 years.

4. Security Plans

The HMR also address security requirements for certain high-risk hazardous materials. Offerors and carriers of materials listed in §172.800 must develop and adhere to a transportation security plan for hazardous materials. Security plans are required of any offeror or carrier of flammable gas in a quantity over 792 gallons, which is far below the volume of a single tank car of LNG or similar flammable cryogenic material. Security plans must include an assessment of transportation security risks for shipments of the hazardous materials, including site-specific or locationspecific risks associated with facilities at which the hazardous materials listed in § 172.800 are prepared for transportation, stored, or unloaded incidental to movement, and appropriate measures to address the assessed risks. Specifically, security plans must address three elements:

• *Personnel security.* Measures to confirm information provided by job applicants hired for positions that involve access to and handling of the hazardous materials covered by the security plan.

• Unauthorized access. Measures to address the assessed risk that unauthorized persons may gain access to the hazardous materials covered by the security plan or transport conveyances being prepared for transportation of the hazardous materials covered by the security plan.

• En route security. Measures to address the assessed security risks of shipments of hazardous materials covered by the security plan en route from origin to destination, including shipments stored incidental to movement.

Properly implemented security plans decrease the risk that a shipment of hazardous material, including LNG, can be used in an attack against persons or critical infrastructure within the United States.

5. Preparing a Packaging for Transportation

Hazardous materials packages must be prepared and filled in such a way to ensure that there can be no detectable release of hazardous materials to the environment during conditions normally incident to transportation. Specifically, for LNG, there are several existing requirements in the HMR that address the proper filling of a DOT-113 tank car to ensure safe transportation of the commodity. These package preparation requirements include:

• As provided in § 173.31, when the car is offered into transportation, the offeror must inspect the tank car and all closures prior to movement (*i.e.*, the pre-trip inspection); and

• Filling density restrictions and loading pressure restrictions in § 173.319 for cryogenic material.

The filling and loading restrictions in § 173.319 are based on the physical properties of each flammable cryogenic material and are designed to ensure that during transportation, the inner tank will not experience a pressure rise that triggers the PRVs to activate.

6. Route Planning

The HMR address requirements for rail route planning in § 172.820. Trains

¹⁹ https://public.railinc.com/products-services/ askrail.

meeting the following criteria are required to assess the safety and security risks along transportation routes (§ 172.820(c)) and perform an alternative route analysis (§ 172.820(d)):

(1) More than 2,268 kg (5,000 lbs.) in a single carload of a Division 1.1, 1.2 or 1.3 explosive;

(2) Â quantity of a material poisonous by inhalation in a single bulk packaging;

(3) A highway route-controlled quantity of a Class 7 (radioactive) material, as defined in § 173.403 of this subchapter; or

(4) A high-hazard flammable train (HHFT) as defined in § 171.8 of this subchapter.

Historically, there has been considerable public and Congressional interest in the safe and secure rail routing of security-sensitive hazardous materials (such as chlorine and anhydrous ammonia). The Implementing Recommendations of the 9/11 Commission Act of 2007 20 directed the Secretary, in consultation with the Secretary of Homeland Security, to publish a rule governing the rail routing of security-sensitive hazardous materials. On December 21, 2006, PHMSA, in coordination with FRA and the Transportation Security Administration (TSA) of the U.S. Department of Homeland Security (DHS), published an NPRM under Docket HM-232E (71 FR 76834), which proposed to revise the current requirements in the HMR applicable to the safe and secure transportation of hazardous materials by rail. Specifically, the HM-232E NPRM proposed to require rail carriers to compile annual data on specified shipments of hazardous materials, use the data to analyze safety and security risks along rail routes where those materials are transported, assess alternative routing options, and make routing decisions based on those assessments.

In the HM-232E NPRM, PHMSA solicited comments on whether the proposed requirements should also apply to flammable gases, flammable liquids, or other materials that could be weaponized, as well as hazardous materials that could cause serious environmental damage if released into rivers or lakes. Commenters who addressed this issue indicated that rail shipments of Division 1.1, 1.2, and 1.3 explosives; PIH materials; and highwayroute controlled quantities of radioactive materials pose significant rail safety and security risks warranting the enhanced security measures

²⁰ https://www.congress.gov/110/plaws/publ53/ PLAW-110publ53.pdf. proposed. Commenters generally did not support enhanced security measures for a broader list of materials than were proposed in the NPRM.

PHMSA adopted the NPRM's proposed security measures in an April 16, 2008 Interim Final Rule (IFR) (73 FR 20752) which was subsequently amended by a November 26, 2008 final rule (73 FR 72182). The 2008 IFR and final rule imposed a series of rail routing requirements in § 172.820. Carriers must compile annual data on certain shipments of explosive, PIH, and radioactive materials; use the data to analyze safety and security risks along rail routes where those materials are transported; assess alternative routing options; and make routing decisions based on those assessments. In accordance with §172.820(e), the carrier must select the route posing the least overall safety and security risk. The carrier must retain in writing all route review and selection decision documentation. Additionally, the rail carrier must identify a point of contact on routing issues involving the movement of covered materials and provide that contact information to the appropriate State, local, and tribal personnel.

PHMSA proposed in the August 1, 2014 NPRM, in § 174.310(a)(1), to modify the rail routing requirements specified in § 172.820 to apply to any HHFT. The routing requirements discussed in the NPRM reflect the practices recommended by the NTSB in recommendation R–14–4,²¹ and are in widespread use across the rail industry for security-sensitive hazardous materials. An overwhelming majority of commenters expressed support for additional routing requirements for HHFTs and thus, PHMSA finalized the proposed requirements.²²

In this final rule, PHMSA makes any railroad that transports a quantity of LNG in a tank car subject to the route planning requirements in § 172.820.

7. Operational Controls

In addition to requirements for packaging, hazard communication, training, and security plans that must be met before the hazardous material is offered for transportation, the HMR contain operational controls requirements for the safe transportation of hazardous materials in tank cars. These requirements include specific provisions for handling flammable cryogenic materials similar to LNG, including loading and unloading requirements for tank cars in §§ 173.31 and 174.67, which help prevent movement of tank cars during loading/ unloading operations, help prevent other rail equipment from approaching tank cars during loading/unloading through use of derails, bumpers, or lining switches to prevent entry, and include specific instructions that tank car unloading personnel are required to follow, such as attendance of the unloading operation and care of tools used for unloading.

Other operational controls include an unloading requirement in §174.204 that requires that tank cars containing a flammable cryogenic material must be unloaded directly from the car to permanent storage tanks of sufficient capacity to receive the entire contents of the car. Finally, switching restrictions in §174.83(b) prohibit a DOT-113 specification tank car displaying a Division 2.1 (flammable gas) placard, including a DOT-113 specification tank car containing a residue of a Division 2.1 material (e.g., LNG), from being cut off while in motion, coupled into with more force than is necessary to complete the coupling, or struck by any car moving under its own momentum. These special handling requirements protect DOT-113 tank cars from experiencing unnecessary impact forces during switching. Compliance with these switching restrictions is highlighted by the special white background for the flammable gas placard required by §172.510 for DOT-113, and a marking requirement for the tank car which indicates that the cars may not be humped or cut off while in motion (see § 179.400-25).

Additionally, three operational controls currently address the expedited movement of a tank car transporting hazardous materials, delivery of tank cars containing gases and cryogenic material, and notification of delays in transit. First, §174.14 requires that a carrier must forward each shipment of hazardous materials promptly and within 48 hours (Saturdays, Sundays, and holidays excluded), after acceptance at the originating point or receipt at any yard, transfer station, or interchange point, except that where biweekly or weekly service only is performed, a shipment of hazardous materials must be forwarded on the first available train. Furthermore, § 174.14(b) states that a tank car loaded with any Division 2.1 material (which would include LNG), may not be received and held at any point, subject to forwarding orders, to defeat the purpose of this requirement for the expedited movement of a hazardous material, or to

²¹ https://www.ntsb.gov/publications/_layouts/ ntsb.recsearch/Recommendation.aspx?Rec=R-14-004.

²² 80 FR 26644.

defeat the requirements of § 174.204 for tank car delivery of gases such as cryogenic liquids. Section 174.204 prohibits tank cars containing Class 2 materials from being unloaded unless the shipment is consigned for delivery to an unloading facility on private tracks, and prohibits the storage of Division 2.1 (flammable) cryogenic material. If a tank car containing Class 2 material cannot be delivered to a private track for unloading, the regulation does allow the car to be unloaded on a rail carriers tracks provided the lading is piped directly from the tank car to permanent storage tanks. Finally, in accordance with § 173.319, the shipper must notify FRA whenever a tank car containing any flammable cryogenic material is not received by the consignee within 20 days from the date of shipment.

8. Risk Based Framework

The HMR address the risks inherent in the transportation of hazardous materials through comprehensive packaging, hazard communication, training, security planning, and material- and mode-specific operational controls.

The HMR regulate 435 million shipments of hazardous materials every vear and by all modes of transportation, with an average of 20 hazardous material incidents resulting in death and serious injury each year, most of which occur in the highway mode. The existing HMR requirements are robust and will adequately address the risks posed by transportation of LNG in DOT-113C120W tank cars. However, in this final rule, PHMSA is adopting certain additional safety measures designed to further reduce those risks. These safety measures are discussed in detail in the following section.

B. The DOT–113C120W Specification Tank Car

PHMSA considers the existing DOT-113C120W tank car a suitable packaging for transportation of LNG by rail. The inner tank is capable of withstanding the cryogenic temperatures and chemical properties of LNG, and the thermal protection system is capable of maintaining LNG at a safe pressure and temperature throughout transportation. However, in this final rule, to improve crashworthiness and in response to comments received, PHMSA requires that DOT-113C120W tank cars used for LNG transportation must be constructed with a thicker outer tank, and that the outer tank be constructed of a higher quality steel currently required for construction of DOT-117A and PIH/TIH tank car tanks. PHMSA has determined

that the thicker outer tank in DOT–117A and PIH/TIH tank cars improved crashworthiness. The DOT–117A crashworthiness improvement results are discussed below. Additionally, PHMSA is adopting the proposals for maximum offering pressure as proposed in the NPRM, but is amending the maximum filling density to 37.3%.

1. Suitability of the DOT–113C120W Tank Car for LNG

The DOT-113C120W tank car has a long history of safe transportation of flammable cryogenic material similar to LNG. The safe history of DOT-113C120W tank cars used for the transportation of other cryogenic materials such as ethylene since 1983 (and earlier under special permits) is a key factor in determining that this tank car design is appropriate for the transportation of LNG. Please see our discussion of the history of the DOT-113 specification in "Section III.A. Existing HMR Requirements for Rail Transport of Flammable Cryogenic Gas" for further details.

DOT–113C120W rail tank cars are vacuum-insulated tank-within-a-tank designs (similar to a thermos bottle) consisting of an inner alloy stainless steel tank enclosed within a carbon steel outer tank specifically designed for the transportation of cryogenic material, such as liquid hydrogen, oxygen, ethylene, nitrogen, and argon. Additionally, the design and use of the DOT-113 specification tank car includes added safety features—such as protection systems for piping between the inner and outer tanks, multiple PRDs (pressure relief valves and vents), and insulation—that contribute to an excellent safety record throughout its 50 years of service. The HMR currently authorize the DOT-113C120W specification tank car, the same specification being authorized for LNG in this rule, for another flammable cryogenic material, ethylene, which has chemical properties similar to those of LNG.

The DOT–113 tank car requirements in the HMR incorporate elements of rigorous engineering standards, including the ASME BPVC as well as the AAR Specifications for Tank Cars, M-1002. M-1002 in turn draws on wellestablished industry standards of the American Society for Testing and Materials (ASTM), American Society of Non-destructive Testing (ASNT), as well as ASME, for design, materials, fabrication, testing and inspection requirements. The ASME BPVC, Section VIII, Division 1, is the international benchmark standard for pressure vessel design for a multitude of industries,

including transportation. Starting from these rigorous design principles, the specification requirements in part 179 of the HMR add design requirements to address conditions encountered in transportation and not necessarily applicable to stationary storage. For example, the HMR require the use of specific steels that balance toughness, strength, and weldability with being able to withstand extremely low temperatures.

When cryogenic ethylene is transported in DOT-113C120W specification tank cars, it is offered at cryogenic service temperature (defined in \$173.115(g) as colder than -90 °C), as LNG would be in this final rule. The delimiter letter "C"-as used in "DOT-113C120W"-indicates the car is designed for a loading and shipping temperature as low as -260 °F (-162°C) (see the specification requirements in § 179.401–1 for DOT–113C120W tank cars). Negative 260 °F corresponds to the temperature at which LNG converts from a gas to a liquid. The HMR do not permit the filling of a tank car below its service temperature (see §173.319(a)(4)(ii)). However, should the inner tank experience colder temperatures, the 300-grade austenitic stainless steels, 304/304L, permitted for the inner tank, are authorized to withstand the much lower service temperature of cryogenic hydrogen, 423 °F.

Similarly, the standard heat transfer rate assigned to the DOT-113C120W tank car in §179.401–1, a maximum of 0.4121 Btu per day per pound of water capacity, is consistent with the requirements for the other bulk packages authorized for LNG in the HMR (MC 338 cargo tanks and UN T75 portable tanks), and packages authorized by DOT Special Permits. The specific design properties of the DOT-113C120W, including service temperature and thermal performance, make it an appropriate packaging for safe transportation of LNG, in the same way that the packaging is currently used to transport cryogenic ethylene.

2. Materials of Construction for DOT– 113 Tank Cars

In the United States, storage vessels for LNG are designed and constructed in accordance with ASME BPVC Section VIII *Rules for Construction of Pressure Vessels,* Division 1. To maintain the low temperature, LNG storage tanks are usually made with an inner and outer tank with insulating material between and a vacuum applied to the annular space.

a. Inner Tank

ASTM A240/240M 300-grade austenitic stainless steels, 304/304L, are the only steels authorized in the HMR for constructing the inner tank of a DOT–113 tank car. The major elements in these steels are: Carbon-0.08% (0.03%); manganese—2.00% (both); chromium—18.0-20.00% (both); nickel—8.00–11.00% (8.00–12.00%); and the remainder iron. The role of chromium and nickel in the 304/304L grade steels is to: (1) Retain the Face Centered Cubic (FCC) atomic structure which gives 304/304L its strength, ductility and toughness down to cryogenic temperatures and (2) provide a corrosion resistant passive layer. The tensile strength of 304/304L steel is 70,000-75,000 psi with Charpy V-notch toughness (resistance to brittle failure) values in the range of 80-130 ft. lbs. at – 320 °F (minimum Charpy V-notch failure value is 60 ft. lbs.), below the temperature range encountered during LNG transportation. The service environment of a railroad tank car is dynamic and severe and can result in the accumulation of impact and fatigue damage. Austenitic stainless steels, which are readily weldable using qualified welders and welding procedures, are therefore well-suited for use in the construction and repair of tank cars.

For storage tanks, ASME design criteria allow for the use of 300-grade stainless steels or ASTM A553 Standard Specification for Pressure Vessel Plates, Alloy Steel, Quenched and Tempered 7, 8, and 9% Nickel. Both the 304/304L and A553 steels have similar nickel content limits, but utilize the nickel to achieve strength and toughness in different ways. The A553 steel is a heat treatable, "quench and tempered" type of steel with the nickel helping to form martensite, a strong but brittle metallurgical product. The quench and tempering treatment makes welding A553 difficult, requiring expertise in welding procedure development and operator skill which adds risk to its use for tank cars. By contrast, the nickel content in 304/304L stainless steels facilitates the formation of austenite, a strong, tough and ductile form of steel, which maintains its physical properties at cryogenic temperatures. This, coupled with its excellent weldability, make it the clear choice for cryogenic tank cars.

The inner tank has a minimum thickness requirement of 3/16th inch (after forming) unless increased through a calculated formula in 179.400–8, which increases thickness based on inner diameter of the tank. The calculations used to determine the thickness of the inner tank are aligned with the ASME BPVC Section VIII Division 1 and align with all other tanks used for cryogenic materials. Typically, DOT–113 inner tanks exceed the minimum value of 3/16th inch thickness to conform to ASME calculations and to avoid localized thinning arising from manufacturing processes and the variation in the thickness of steel sourced from steel mills. Therefore, in this final rule, PHMSA maintains the current requirements for inner tanks.

b. Outer Tank

For DOT-113 tank cars, plate materials listed in M–1002 Appendix M must be used for the outer tank. Industry practice has been to fabricate the external tank from ASTM A516-70 steel. A516-70 steel has provided reliable performance in the service history of DOT-113 tank cars. However, PHMSA in this final rule is authorizing rail transport of LNG in DOT-113C120W-specification tank cars with enhanced outer tank thickness and materials (with a specification suffix "9" added to denote those enhancements). Specifically, this final rule requires DOT-113C120W9specification tank cars carrying LNG to have a minimum outer tank thickness of 9/16" (compared to 7/16" for other DOT-113C120W-specification tank cars). Further, those thicker outer tanks must be made of TC-128 Grade B (TC-128B) normalized steel. TC-128B normalized steel is currently used for TIH and flammable liquid tank car designs and its manufacturing process produces a more puncture resistant steel as compared to A516-70 steel. AAR TC-128 Grade B normalized steel is a highstrength, fine-grained carbonmanganese-silicon steel intended for fusion-welded tank car tanks in service at moderate and lower temperatures. By normalizing (heating the steel to 1600 °F and air cooling) TC-128 steel and controlling its chemistry, the outer tank of an LNG tank car made from TC-128 Grade B steel has a reduced probability of tank failure due to cracking and an increased resistance to puncture compared to ASTM A516-70 steel.

The TC-128 Grade B normalized carbon steel used to construct the outer tank for DOT-113C120W9 tank cars does not maintain the same strength and ductility at the cryogenic temperatures of the lading. However, this is not a safety concern for DOT-113 tank cars. Existing DOT-113C120W tank cars used in cryogenic ethylene service have outer tanks constructed of ASTM A516-70 carbon steel. ASTM A516-70 is also not resistant to cryogenic temperatures, and has been used safely in the outer tank of DOT-113C120W tank cars for decades. Similarly, the steel used to construct the outer tanks of other "tankwithin-a-tank" cryogenic packagings, including MC-338 cargo tanks, UN T75 portable tanks, and ocean-going LNG tanker ships, is not resistant to cryogenic temperature.

LNG in these packagings is contained during transportation in an inner stainless-steel tank or tank lined with cryogenic compatible liners, which maintains strength and ductility at cryogenic temperatures, while the outer tank provides accident protection and structural support to the packaging. The only way LNG can be released from the inner tank of a rail tank car to the void space between the inner and outer tanks is if the inner tank is compromised. In a rail accident, a puncture of the inner tank can occur only after the outer tank is breached. In such a scenario, any LNG released from the breach of the inner tank will also be released into the environment and not be contained in the space between the two tanks even if the outer tank is made of stainless steel that maintains strength and ductility at cryogenic temperatures. Therefore, there is no safety advantage in making the outer tank of stainless steel. On other hand, making the outer tank of stainless steel able to withstand cryogenic temperatures in addition to withstanding the in-train forces during transportation, providing puncture resistance, and ensuring structural support for the tank car would be prohibitively expensive (especially if the thickness is the same as or thicker than the adopted 9/16th inch TC-128 Grade B normalized carbon steel design).

As explained further below, PHMSA expects that each of the enhancements provided for in the final rule will improve tank car crashworthiness.

c. Determination of Inner and Outer Tank Requirements

PHMSA is maintaining the requirements for the inner tank. ASTM A 240/A 240M, Type 304 or 304L steel has the correct balance of strength, durability, and weldability for use in transportation applications for cryogenic materials, as demonstrated over many years of use. However, due to the possibility of LNG being transported in blocks of tank cars within each train that are larger than the blocks of tank cars that are typically used for rail transportation of other flammable cryogenic liquids, and in response to comments, PHMSA is authorizing in this final rule rail transportation of LNG

in DOT–113C120W-specification tank cars with enhanced outer tank thickness and materials (those enhancements to be indicated by the specification suffix "9") to obtain improved crashworthiness.

The inner tank design of DOT– 113C120W9 tank cars will be identical to other DOT–113C120W-specification tank cars, and will have the same safety features to vent the contents in the event of an unsafe pressure increase. In essence, the lading retention capabilities of the DOT–113C120W9 and other DOT–113C120W-specification tank cars are identical, with specific enhancements to the outer tank of the tank car design being employed to increase crashworthiness.

The outer tank enhancements for the DOT-113C120W9 incorporate the best available technology for the outer tank of a tank car with little additional manufacturing costs. Increasing wall thickness and the use of normalized steel (which increases the ductility of the steel) of the outer tank wall together provide enhanced crashworthiness for the tank car. Previously, there was limited economic rationale to amend the outer tank characteristics for the DOT-113C120W tank car to incorporate those elements because of the small size of the fleet and the small number of tank cars within each train. The existing level of safety provided by the DOT-113C120W tank car and existing operational controls is sufficient for the current use scenarios, as shown by the safety history of that tank car with over 100,000 shipments.

Currently, because of market demand and usage patterns for ethylene, DOT– 113 tank cars are transported as part of mixed commodity freight trains at one to three cars per train. However, as the number of tank cars within a train increases—in blocks of cars larger than three or in unit trains—there is a higher probability that a car containing a flammable cryogenic material such as LNG will be involved should a derailment or other accident occur.

PHMSA cannot predict the number of DOT-113C120W9 tank cars per train the LNG market will support, but we know that from ETS's application for DOT-SP 20534, that it has plans to operate unit trains of at least 80 cars per train at some point in the future. With the possibility of larger numbers of cars in LNG transportation, PHMSA and FRA have determined that applying improved outer tank requirements is feasible from a manufacturing and economic perspective. Given the feasibility of securing a more robust tank car design within prevailing manufacturing processes across North America, PHMSA determined that the authorization for transporting LNG by rail can achieve an additional safety margin by employing the more robust car design described herein.

If a tank car containing LNG is breached during a derailment, the LNG will behave largely the same way as crude oil or ethanol. The LNG lading will be released as a very cold liquid, creating an LNG pool that could catch on fire. Employing a thicker outer shell will reduce the puncture probability of the inner tank, and thus mitigate the consequences of the derailment. Moreover, a tank car is estimated to have a service life of approximately 50 years. DOT-113 tank cars compliant with the enhanced outer shell requirements are projected to cost 3% more to manufacture. When divided by the large number of carloads that would be carried during a DOT-113's 50-year service life, the 9/16th inch TC-128B normalized steel outer tank is highly cost-effective in that it will mitigate the consequences of derailment involving LNG by reducing the number of tanks punctured in the unlikely event of an accident. See our discussion of modeling crashworthiness in Section III. B. 6. "Finite Element Modeling and Validation" for additional information.

3. Safety History

DOT-113 tank cars have a demonstrated safety record of over 50 years. More than 100,000 rail shipments of cryogenic material in DOT-113 tank cars have taken place with no reported fatalities or serious injuries occurring due to a train-accident caused release of product. Only twice-during the 2011 incident in Moran, KS and the 2014 incident in Mer Rouge, LA—did the inner tank of a DOT–113 tank car release product due to damage sustained during an accident. LNG transportation by rail in currently authorized packaging also has a demonstrated, albeit brief, safety history. Since LNG was authorized to be shipped by rail in T–75 UN containers, PHMSA and FRA have no record of any rail incidents involving these packagings.

4. Crashworthiness Assessment/Field Tests

PHMSA and FRA are confident, based on rigorous modeling, testing, and experience (described in detail in below), that the DOT specification tank cars, enhanced with a 9/16th inch outer tank made of TC-128 Grade B normalized steel, will provide sufficient crashworthiness in accident scenarios compared to tank cars manufactured from 7/16th inch A516–70 steel outer tanks. As part of the analysis conducted for the Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains, (HM-251; 80 FR 26643, May 8, 2015) along with the final rule RIA, PHMSA determined that there was a reduction in the number of tank cars punctured when increasing the outer tank thickness from 7/16th inch to 9/16th inch of TC-128 Grade B normalized steel with a train traveling at 40 mph.

This final rule will require the same increase in thickness of the same type of steel as was required in the HM–251 final rule for DOT–117 tank cars. PHMSA, therefore, expects a similar increase in safety benefits from the use of enhanced outer tank thickness and improved materials.

5. Comparison of Derailments

In the following table, FRA compared three derailment accidents that occurred in relatively similar conditions. All accidents involved trains travelling at similar speeds, in similar weather conditions, and with a similar number of cars derailed. The tank cars that derailed in Guernsey, Saskatchewan, had a tank thickness of 9/16th inch and had 62 percent fewer shell punctures than the tank cars that derailed in Casselton, North Dakota, and 69 percent fewer tank punctures than the tank cars that derailed in Arcadia, Ohio. The tank cars involved in the Casselton and Arcadia derailments had a tank thickness of 7/16th inch. These scenarios validate the extensive modeling and simulations done and provide evidence of the substantial safety benefit of requiring an outer tank thickness of 9/16th inch in the construction of the DOT-113C120W tank car that is being authorized for the transportation of LNG by rail in this rule.

	Derailment location						
	Guernsey, SK	Casselton, ND	Arcadia, OH				
Derailment date Temp at Time of Derailment Train speed (MPH) Type of cars (Specification) Shell Thickness Total cars derailed Total cars breached Head Punctures Shell Punctures Fittings Compromised Fittings Compromised Fire Occurred Thermal Ruptures Approximate size of derailment area. General topography of derailment area.	2/6/2020	12/30/2013 - 18 °C (-1 °F)	2/6/2011. -4 °C (25 °F). 42. DOT 111 Legacy (263K). 7/16th inch. 32. 30. 10. 16. 13. UN 1987 Ethanol. Yes. Yes. 1200'L × 450'W. Flat field, raised RR bed.				

TABLE 3—COMPARISON OF DERAILMENTS

6. Finite Element Modeling and Validation

FRA's Research program, in coordination with PHMSA, funded the development and continued refinement of Finite Element (FE) Models for a variety of tank car specifications as well as computer simulation of impacts and derailments. FE modeling is a widelyused method for evaluating the effects of stresses on components or structures and is used in the fields of structural analysis, heat transfer, and fluid flow. Within the FRA research program, component and full scale tests results are used to validate the computer simulations and their assumptions and boundary conditions. Full scale test results are compared to simulation results, including the overall force-time or force-indentation histories, the puncture/non-puncture outcomes, the rigid body motions of the tank car, the internal pressures within the lading, and the energy absorbed by the tank during the impact.

The Volpe National Transportation Systems Center (Volpe Center) supports the FRA in this research effort, and has performed pre- and post-test FE analyses corresponding to several component and full-scale shell impact tests. Validated models and computer simulations are a necessary alternative to full-scale impact testing which are time consuming, expensive, and challenging to perform.

A primary purpose for a pre-test simulation is to estimate the threshold puncture speed of the test ram car. The puncture speed of the tank car is the speed at which, under the test conditions, the initial kinetic energy of the ram car is equal to the energy necessary to puncture the inner and outer tank. The threshold puncture speed is the maximum speed at which the tank car can be impacted under the prescribed conditions without resulting in a tear to the inner and outer tanks that would allow its lading to escape.

Results of recent tests and simulations demonstrate the potential improvement in crashworthiness from the outer tank enhancements set forth in this final rule. In November 2019 FRA conducted a full-scale impact test of a DOT-113C120W tank car at TTC in Pueblo, CO.²³ According to the test report, the initial kinetic energy imparted to the inner and outer tanks was about 2.8 Million ft.-lbs. Further, it is estimated that the residual energy (after puncture of the inner and outer tanks) was about 25% of the initial energy. Accordingly, the puncture energy of the DOT-113 tank is about 75% of 2.8 Million ft.-lbs., or 2.1 Million ft.-lbs. A separate fullscale impact test was performed on a DOT-117J100W specification tank car equipped with a jacket and thermal protection material. A review of the test report suggests that the tank (made of TC-128B normalized steel) absorbed an energy of about 1.9 Million ft.-lbs., without puncture. The report also notes that under those conditions, the tank was near puncture. PHMSA estimates the puncture capacity of the DOT-117 car to be about 2 Million ft.-lbs. Comparing the puncture capacities of the two tank specifications (DOT-113 @ 2.1 Million ft.-lbs., and the DOT-117 @ 2 Million ft.-lbs.), their performances are very similar, and that the DOT-113 might even have a slightly higher puncture resistance. The two tank cars have about the same cumulative

thickness. Therefore, based on the puncture tests and modeling, PHMSA and FRA anticipate that increasing the outer tank thickness of the DOT–113 from 7/16 to 9/16 (a 28.5% increase), and requiring the use of the more puncture-resistant TC–128B normalized steel, will add about 20–30% to the puncture resistance (*i.e.*, reduction in number of punctures) of the DOT–113C120W9.

The above comparison of testing and simulation results was used to determine the suitability of the DOT-113 tank car for LNG service, as well as to determine the increased safety gained by using a 9/16th inch thick outer tank shell of TC-128 Grade B, normalized steel. Further, a similar model was created in the Hazardous Materials: Enhanced Tank Car Standards and **Operational Controls for High-Hazard** Flammable Trains [HM-251, 80 FR 26643] rulemaking to help evaluate how effectively the increased thickness improved on the DOT-111 tank car (predecessor to the DOT-117). The results of that modeling were factored into design of the current DOT-117 specification tank car which improved on the DOT–111 tank car design.

7. Loading and Preparation for Offering

In this final rule, PHMSA is adopting a 37.3 percent maximum filling density for LNG, which will allow for approximately 2 percent outage below the inlet of the pressure control valve to prevent the venting of liquid material at start-to-discharge pressure, thus ensuring the safe transportation of LNG. In the NPRM, PHMSA proposed a 32.5 percent filling density. However, PHMSA has determined a 37.3 percent maximum filling density is appropriate

²³ Full-Scale Shell Impact Test of a DOT–113 Tank Car, RR 20–03, February 2020.

because it is consistent with outages determined to be safe for LNG in other packagings such as MC-338 cargo tanks and UN T75 portable tanks. This maximum filling density is also more conservative than maximum filling densities set in the HMR for other flammable cryogenic materials, which allows for 0.5 percent outage at the startto-discharge pressure. See §173.319(b)(1). Additionally, a 37.3 percent maximum filling density harmonizes with Canada's Transportation of Dangerous Goods (TDG) regulations which have been in place since 2015.

PHMSA expects that any tank car containing a cryogenic material will be delivered to its destination within 20 days of offering, and requires notification of any car that has not reached its destination within this timeframe. See § 173.319(a)(3). Therefore, PHMSA is adopting a 15 psig maximum offering pressure, as proposed, which is appropriate for the transportation of LNG and is consistent with the level of safety provided to other flammable cryogenic materials. The HMR do not prohibit shippers from offering a tank car of LNG at a lower pressure.

8. Review Approval Provision to Exceed Weight

On May 14, 2010, PHMSA published a final rule amending the HMR to incorporate provisions contained in several widely used or longstanding special permits that have an established safety record. The final rule, Hazardous Materials: Incorporation of Special Permits into Regulations (75 FR 27205, May 14, 2010), in part, amended the HMR to allow certain rail tank cars transporting hazardous materials to exceed the gross weight on rail limitation of 263,000 pounds upon approval of the FRA. On January 25, 2011, the FRA published a notice (76 FR 4250) of FRA's approval pursuant to the Final Rule of the operation of certain tank cars in hazardous materials service that exceed 263,000 pounds and weigh up to 286,000 pounds gross rail load (GRL). In 2002, AAR adopted a revised industry standard related to railroad freight cars weighing over 263,000 pounds GRL and weighing up to 286,000 pounds. This revised industry standard, AAR Standard S–286 (adopted 2002, revised 2003, 2005, 2006), Free/ Unrestricted Interchange for 286,000 pound GRL Cars (S-286), is applicable to rail freight cars manufactured, rebuilt or modified on or after January 1, 2003, and is the existing industry standard for designing, building, and operating rail cars at gross weights over 263,000

pounds and up to 286,000 pounds. S– 286 sets forth industry-tested practices for designing, building, and operating rail cars at gross weights over 263,000 pounds and up to 286,000 pounds. S– 286 provides for the free interchange among carriers of cars built to meet its requirements.

În this rulemaking, DOT–113 tank cars in LNG service will be required to have an outer tank that is 9/16th inch thick (after forming) and made from TC-128 Grade B, normalized steel plate. Depending on the specific design characteristics of a tank car manufactures approved car design, PHMSA and FRA determined that simply the use of 9/16th inch TC-128, Grade B normalized steel for the outer tank would not increase the GRL above 263,000 pounds; however, PHMSA and FRA understand that operators may select certain specification designs that may place the rail car at a GRL over 263,000 pounds.

In an effort to maintain consistency with FRA's current approval (*see* 76 FR 4250, January 25, 2011) of newly manufactured railroad tank cars with a GRL exceeding 263,000 pounds, this final rule will amend the HMR to state that tank cars manufactured for LNG service after (the effective date of this final rule) may be loaded to a maximum GRL of 286,000 provided the tank car meets the following criteria:

1. Tank car is constructed in accordance with S–286.

2. The outer shell and heads are constructed with TC–128 Grade B, normalized steel.

This aligns with the action PHMSA and FRA took when creating the DOT– 117 specification and does not place a new burden on tank car manufacturers. A tank car manufacturer may therefore consider their design "approved" provided it meets the two conditions above, with no application to FRA or PHMSA required.

C. Additional Operational Controls for LNG Transportation

In the NPRM, PHMSA proposed to rely on the operational controls already required in the HMR for the transportation by rail of other flammable cryogenic materials, and invited comment on whether additional operational controls may be warranted. PHMSA encouraged commenters to provide data on the safety or economic impacts associated with any proposed operational controls, including analysis of the safety justification or cost impact of implementing operational controls.

In this final rule, PHMSA is amending the HMR to adopt operational controls beyond the current extensive requirements of the HMR. These additional operational controls consist of requirements for:

• Â two-way end-of-train (EOT) device or distributed power (DP) for trains with 20 continuous tank cars of LNG, or 35 tank cars of LNG throughout the entire train;

• Location and inner tank pressure monitoring for each tank car containing LNG; and

• Compliance with § 172.820 route planning requirements (*i.e.*, rail routing).

PHMSA and FRA believe that the current requirements of the HMR ensure a robust level of safety for the transport of LNG by rail that is further reinforced by widely-adopted voluntary industry standards in AAR Circular OT–55. Additionally, the new operational controls in this final rule will add a still greater margin of safety to address the risks posed by LNG transportation in DOT–113C120W tank cars.

1. AAR Circular OT-55

AAR Circular OT–55 (OT–55) outlines operational controls for trains meeting the industry definition of a "Key Train," including speed restrictions, track requirements, storage requirements, and the designation of "Key Routes," which are subject to additional inspection and equipment requirements. OT–55 defines a "Key Train" as any train with:

• One tank car load of Poison or Toxic Inhalation Hazard (PIH or TIH) (Hazard Zone A, B, C, or D), anhydrous ammonia (UN1005), or ammonia solutions (UN3318);

• 20 car loads or intermodal portable tank loads of any combination of hazardous material, or;

• One or more car loads of Spent Nuclear Fuel (SNF), High Level Radioactive Waste (HLRW).

Key Trains have a maximum speed of 50 mph. If a defect to a rail car (e.g., hanging equipment) is reported by a wayside detector but not confirmed by visual inspection, the maximum speed is reduced to 30 mph. Circular OT–55 defines a "Key Route" as "any track with a combination of 10,000 car loads or intermodal portable tank loads of hazardous materials, or a combination of 4,000 car loadings of PIH or TIH (Hazard zone A, B, C, or D), anhydrous ammonia, flammable gas, Class 1.1 or 1.2 explosives, environmentally sensitive chemicals, Spent Nuclear Fuel (SNF), and High Level Radioactive Waste (HLRW) over a period of one year." OT-55 states that "main tracks on 'Key Routes' must be inspected by rail defect detection and track geometry inspection cars or any equivalent level of inspection no less than two times

each year; sidings are similarly inspected no less than one time each year; and main track and sidings will have periodic track inspections that will identify cracks or breaks in joint bars." Finally, OT-55 states that "wayside defective bearing detectors shall be placed at a maximum of 40 miles apart on "Key Routes," or equivalent level of protection may be installed based on improvements in technology." These recommended practices were originally implemented by all major Class I rail carriers operating in the United States, with smaller short-line railroads following on as signatories.

While PHMSA did not propose to incorporate by reference OT–55 or to adopt the requirements for "Key Trains" in the HMR, the railroad industry's widespread, voluntary adoption of the circular is an important consideration for PHMSA in assessing the need for prescribing additional operational controls by regulation. AAR first published Circular No. OT-55 in January 1990 to document recommended railroad operating practices for the transportation of hazardous materials. The first issue of the circular included recommended mainline and yard operating practices, designation of key routes, proposed separations from hazmat storage areas, training of transportation employees, and implementation of TRANSCAER®. TRANSCAER® is a national community outreach program that works to improve community awareness, emergency planning and incident response for the transportation of hazardous materials, criteria for shipper notification, and procedures for handling time sensitive materials. Over the past 30 years, OT-55 has been routinely revised as needed to incorporate technological developments and other changes in industry practice concerning the safe transportation of hazardous materials. For instance, OT-55 has adopted revisions to AAR's interchange standards, and technology advancements such as the use of electronic emergency response information to provide timely and reliable information to emergency responders.

To further promote compliance with the recommended practices outlined in OT-55, and compliance with Federal transportation laws, the rail industry developed and published the *United States Hazardous Materials Instructions for Rail*, commonly referred to as "HM– 1." The purpose of the HM–1 is to provide the rail industry with uniform hazardous materials operating rules that railroads can implement and consistently apply to support compliance with Federal regulations, and to enhance significantly employee safety and the safety of the communities through which the railroads operate. The HM–1 may be implemented as published, or it may be modified by an individual railroad to be consistent with its unique operating rules and practices.

Through its enforcement activities, FRA verifies that each railroad has established operating rules governing the safe transportation of hazardous materials, and utilizes those instructions to enforce that railroad's compliance with the Federal operating and hazardous materials transportation regulations.

In accordance with the ''Key Train'' definition and the changes being adopted, OT-55's operational controls would apply to the bulk transport of LNG by rail in a train that is composed of 20 car loads or intermodal portable tank loads in which LNG is present along with any combination of other hazardous materials. Due to the operational controls required for "Key Trains," Circular OT-55 provides an additional level of safety regardless of what combination of hazardous materials the train is transporting. PHMSA and FRA believe this industry standard reduces the risk of derailments and collisions and therefore decreases the risk involved in the transportation of all hazardous materials, including LNG.

PHMSA and FRA note that the hazardous materials operating instructions from Circular OT–55–Q, the most recent edition, have been incorporated into railroads' (carriers') operating rules. Furthermore, FRA regularly performs reviews of railroads and their operating rules and are not aware of any instances in which a railroad is failing to adhere to Circular OT–55 when operating "Key Trains."

2. Additional Operational Controls in the Final Rule

In this final rule, PHMSA is adopting several additional operational controls:

(1) Trains with a block of 20 loaded tank cars of LNG, or 35 loaded tank cars of LNG throughout the entire train, are required to be equipped with an EOT device or $DP.^{24}$

(2) Each loaded tank car containing LNG must be monitored for location and tank pressure by the offeror and notify the carrier if the tank pressure rises by more than 3 psig in any 24-hour period.

(3) Each carrier operating trains carrying a loaded tank car of LNG must perform additional planning requirements in accordance with

§172.820 (i.e., rail routing). While the general operational controls in the HMR, as supplemented by the widespread, voluntary practices governing Key Trains in Circular OT-55, provide robust protections against derailment and other accidents (and by extension, a loss of package integrity resulting from the same) involving train configurations with only a handful of tank cars, PHMSA believes that the additional operational controls established by this final rule will ensure safe transportation of LNG regardless of train configuration. As explained earlier, trains currently transport to three DOT-113 tank cars of flammable cryogenic materials (such as ethylene) in mixed commodity freight trains. However, if the market for rail transportation of LNG evolves to include movement of LNG in larger quantities (in blocks of cars or unit configurations) within each train, there is a higher probability that, should a derailment occur, one or more cars containing LNG would be involved and would be breached.

The additional operational controls will decrease the likelihood and severity of derailments (DP/EOT device); decrease the likelihood that an LNG tank car is lost in transport (location monitoring); increase the likelihood that the railroad is notified immediately in the unlikely event that a tank car experiences unsafe conditions during transportation (pressure monitoring); and reduce the severity of the consequences in a derailment scenario by requiring that railroads transport LNG on the safest route available to them (rail routing and risk assessment). Over a DOT-113 tank car's expected 50year service life, the use of DP/EOT devices for block carriage and unit trains, remote monitoring, and riskbased routing of trains transporting LNG will help ensure the transportation safety of LNG on the rail transportation network.

Enhanced braking requirements can result in accident avoidance and can lessen the consequences of an accident by more quickly slowing the train and decreasing the energy of impacts by reducing the number of tank cars affected by a potential derailment. PHMSA decided on the HHFT threshold (*i.e.*, a continuous block of 20 loaded LNG tank cars or 35 loaded LNG tank cars throughout the train) based on the effectiveness of this existing requirement for flammable liquids in rail transportation. PHMSA reviewed the possibility of requiring electronically controlled pneumatic (ECP) braking on cars meeting the above threshold, but determined that ECP

²⁴ See Section IV, B. Operational Controls, 1. Braking and Routing for further discussion.

brakes are not a practical alternative given that ECP brakes are not cost justified when applied to unit train configurations in the HHFT environment. *See* HM–251F; 83 FR 48393 (Sept. 25, 2019).²⁵

Given the availability of existing braking technologies, PHMSA is requiring advanced braking in the form of a two-way EOT device or, alternatively, a linked and operational DP system located at the rear of the train. A two-way EOT device or DP system is more effective than conventional brakes because a locomotive engineer can initiate an emergency brake application from the front and rear of the train, which can reduce stopping distances and lessen intrain forces that can cause or contribute to the severity of certain derailments. These advanced braking requirements are consistent with the current requirements for HHFTs, which apply to Class 3 flammable liquids that are transported in a single block of twenty cars or 35 cars dispersed throughout a single train.²⁶

The requirement to remotely monitor a tank car containing LNG will allow shippers and carriers to better identify adverse conditions and prevent a nonaccidental release of LNG while in transportation. Moreover, the requirements in this final rule allow for flexibility for shippers and carriers in determining how to best monitor the location of the tank cars and pressure within the inner tank. PHMSA and FRA expect that the industry will develop standard practices and implement technologies to meet the HMR performance standard for monitoring.

PHMSA is also adopting routing requirements in § 172.820 to further reduce the risk of a train accident. This amendment requires railroads to evaluate safety and security risk factors when assessing the potential routes to be used to transport LNG. The 27 safety and security risk factors set forth in Appendix D of Part 172 against which carriers evaluate their routes provide a robust framework for identifying and

²⁶ See Section IV, B. *Operational Controls*, 1. *Braking and Routing* for a more detailed discussion.

managing route-based risks associated with LNG transportation by rail. FRA regularly conducts evaluations of a railroad's route risk assessment requirements to ensure adherence to the requirement.

Requirements of the route analysis measures for a rail carrier include:

• Compilation of commodity transportation data;

• Analysis of safety and security risks for transportation route(s);

• Identification and analysis of potential alternate route(s); and

• Based on the above data, selection of the practicable route posing the least overall safety and security risk.

By expanding the existing route analysis and consultation requirements of § 172.820 to include LNG by tank car, PHMSA is incorporating additional safety elements that are available within the overall hazardous materials regulatory scheme. It is worth noting that routing requirements were not mandated in the special permit issued to ETS because the permit is issued to a shipper rather than a rail carrier who is ultimately responsible for the route risk analysis. In this final rule, there is no limitation on specific origins and destinations, thereby necessitating routing and risk analysis under § 172.820. Some of the operational controls included in special permit DOT-SP 20534 were not adopted or were revised in the final rule. The requirement to submit a plan providing per shipment quantities, timelines, etc., was included in DOT-SP 20534 in order to gather more information about the movement of the material. This requirement is not feasible for a broadly applicable regulatory authorization. In this final rule, PHMSA applied the HHFT criteria in reaching its determination to require the same braking requirements for LNG transportation. After review of the comments and the safety history of flammable liquid HHFTs, PHMSA concludes that this is best option to ensure safe movement of LNG. In the final rule, the remote monitoring requirements are different than what was included in the DOT-SP 20534 because PHMSA does not believe that direct monitoring for leaks is necessary. Monitoring for tank pressure and tank car location parameters will sufficiently inform the offeror of the tank car's location and condition and allow notification to the carrier should an undesirable condition occur. For example, registering and notification of an unexpected decrease in pressure could likely indicate a methane release and could be communicated

immediately to the rail carrier and the closest emergency responders.

With respect to train length and weight limitations, PHMSA determined that there should not be a maximum for either in this rulemaking. PHMSA notes that the HMR do not limit the number of shipments a shipper can offer into transportation, nor do the HMR restrict the number or type of hazardous materials rail cars that a carrier can transport in a train. An individual railroad's appropriate train operating lengths are based on multiple factors, including, but not limited to, track profile, train make-up, train dynamics, and crew training. Due to these and other unique factors that influence a specific railroad's operation, PHMSA and FRA conclude that determination of appropriate train lengths is best left to the individual railroads.

Regarding separation distance, which is the number of non-placarded rail cars between a locomotive or occupied caboose and railcars containing hazardous materials (see § 174.85), PHMSA has concluded that it is appropriate to maintain the current requirement at this time, pending further study of the issue. Nonplacarded rail cars are rail cars that do not contain an amount of hazardous material that require placarding (see 49 CFR part 172 subpart F for additional information about placarding requirements). The current requirement for a flammable gas, like LNG, requires a separation distance of five cars between the engine and placarded tank car, when train length permits. If train length does not permit a separation distance of five cars, the tank car(s) must be placed near the middle of the train, but not nearer than the second car from an engine or occupied caboose. These long-standing separation distance requirements protect train crews from the releases of hazardous materials in accident conditions. PHMSA and FRA collaborated under the scope of the Rail Safety Advisory Committee Hazardous Materials Issues Working Group Task No. 15–04 to consider the separation distance issue.

Ultimately, due to an absence of consensus of the Working Group participants, as well as a lack of established incident data, the members did not reach agreement on a change to the existing regulation governing hazardous materials in train separation distances. Moreover, PHMSA worked with the Volpe Center in its review of rail accidents occurring between 2006 and 2015 where there was a release of hazardous materials near the head end of the train (occupied locomotive). The review found no reported crew injuries

²⁵ PHMSA notes that while this rulemaking does not prohibit LNG rail transportation in unit trains, the likelihood is low that there will be LNG unit trains, at least initially. Development of the necessary infrastructure, especially construction of DOT-113C120W9 tank cars, to transport LNG by railroad, particularly by unit trains, demands significant financial investment, long term commitment, and considerable planning. LNG tank car fleets would need to be built, and there is a limit to the construction capacity of the industry. As a result, FRA anticipates that industry will transport LNG in smaller configurations, at least until infrastructure is in place to allow for unit train service.

and therefore no injuries that were potentially preventable with additional buffer cars.

Extensive research exists on separation distance of hazardous materials from train crews and locomotives, and other hazardous materials in a train. PHMSA has initiated a research project in coordination with the John A. Volpe National Transportation Systems Center (Volpe Center) as an initial step in addressing NTSB Safety Recommendations R–17–1 and –2.²⁷ This effort will result in a report that identifies gaps in the existing studies, areas for further research, and what conclusions can be drawn collectively from the existing knowledge base, if any. PHMSA may consider changes to the separation distance requirements in § 174.85 of the HMR for placarded rail cars and tank cars in mixed commodity freight train and unit train configurations pending the outcome of the study.

In consideration of the foregoing, PHMSA is not amending the separation distance requirement in this final rule.

TABLE 4-NPRM COMMENTERS

IV. Summary and Discussion of Comments to the Rulemaking Docket

The NPRM comment period closed on January 13, 2020. PHMSA received 445 comment submissions ²⁸ to the rulemaking docket through the extended comment period. PHMSA considered all comments in the development of this final rule. The comments submitted to this docket may be accessed via *http:// www.regulations.gov*. The following table categorizes the commenters by background:

Commenter background	Count	Description and examples of category		
Non-Government Organizations	27	Environmental Groups (17); Emergency Response Organizations (6); Other (4).		
Governments	15 391	Local (6); State (6); Federal (2); Tribal (1).		
Industry Stakeholders	12	Tank Car Manufacturers (1); Trade Associations (10); Shippers (1).		

PHMSA received comments relating to tank car design, operational controls, emergency response, and potential environmental and economic impacts. These comments are summarized and discussed in greater detail below.

A. Tank Car Design

In the NPRM, PHMSA proposed to authorize DOT–113C120W tank cars for

use in the transportation of LNG by rail and to amend the "Pressure Control Valve Setting or Relief Valve Setting" Table in § 173.319(d)(2) by adding a column for methane as follows:

average daily pressure rise of 0.75 to 1.5

psig as indicated by industry, even if the

FRA notification requirement for tank

cars in transportation for over 20 days

to 30 psig pressure increase—meaning

buffer remaining before venting occurs

time). Please see Section III. B. "The

DOT-113C120W Specification Tank

Car" for additional details on the

offering pressure, set-to-discharge

(or an aggregate 20 to 60 days of holding

pressure, and the revised filling density

requirements for LNG in this final rule.

there would still be a 30 to 45 psig

is reached, the tank would see only a 15

TABLE 5—PROPOSED PRESSURE CONTROL VALVE SETTING OR RELIEF VALVE SETTING

Maximum start-to-discharge pressure	Maximum permitted filling density (percent by weight)							
(psig)	Ethylene	Ethylene	Ethylene	Hydrogen	Methane			
17 45 75 Design service temperature Specification (§ 180.507(b)(3) of this sub- chapter).	52.8. 10 psig Minus 260 °F 113D60W, 113C60W	51.1 20 psig Minus 260 °F 113C120W	51.1 20 psig Minus 155 °F 113D120W	6.60. Minus 423 °F 113A175W, 113A60W	32.5. 15 psig. Minus 260 °F. 113C120W.			

As discussed in the summary of amendments in this final rule in Section III, the start-to-discharge pressure setting, filling density, maximum offering pressure, and the thermal characteristics of the DOT-113 tank car in §173.319 were selected to allow enough holding time (including loading, transit, storage incidental to movement, and unloading) such that the inner tank would not experience a pressure rise sufficient to activate the reclosing PRV during conditions normally incident to transportation. Additionally, if the pressure in the inner tank were to reach the start-to-discharge pressure of the

reclosing PRV, the inlet to the valve would successfully vent vapor to relieve further pressure buildup. That is, the combination of these conditions (the start-to-discharge pressure setting, filling density, maximum offering pressure, and the thermal characteristics of the DOT-113C120W) acts as a safety measure to prevent activation of the PRV under normal conditions of transport. At the maximum offering pressure of 15 psig and the start-todischarge pressure setting of 75 psig for the reclosing PRV adopted in this final rule, the tank car has a 60 psig pressure range before venting occurs. Using an

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²⁷ https://www.ntsb.gov/safety/safety-recs/ recletters/R-17-001-002.pdf

²⁸ Some comment submissions noted additional signatories. Those were considered in the development of the final rule.

PHMSA received numerous comments about the tank car design for the transportation of LNG by rail, which it sorted into the following subtopics:

1. General Suitability of the DOT–

113C120W Specification Tank Car;

2. Crashworthiness Assessment/Field Tests;

- 3. High Nickel Steels;
- 4. Maximum Permitted Filling Density;
- 5. Maximum Pressure When Offered;
- 6. Insulation;
- 7. Maximum Gross Rail Weight; and 8. The DOT–113C140W Tank Car
- Specification.

¹ In this section, PHMSA responds to 15 sets of substantive comments related to tank car design for LNG transportation.

1. General Suitability of the DOT– 113C120W Specification Tank Car

PHMSA received various comments regarding the general safety of the tank car design as proposed in the NPRM. Notably, the Railway Supply Institute Committee on Tank Cars (RSI–CTC) cited the regulatory history of the DOT-113C120W as an indication that DOT previously considered it for the transport of LNG and that the specification itself was originally designed to accommodate cryogenic materials, like LNG. RSI-CTC noted that the Hazardous Materials Regulations Board, a predecessor agency to PHMSA, published a notice in the Federal Register in 1971 as part of the HM-91²⁹ rulemaking docket indicating that the agency was "considering amendment of the Department's Hazardous Materials Regulations to provide for the shipment of ethylene, hydrogen, methane, [and] natural gas . . . in a cold liquefied gas state in certain tank cars." RSI–CTC further commented that the delimiter letter "C" indicates that DOT-113C120W tank cars were specifically designed for the safe transportation of cryogenic materials like LNG. They also pointed out that these cars are subject to additional operating requirements, namely thermal integrity and in-transit reporting requirements, which have led to a strong safety record of over 50 years. Similarly, the International Association of Fire Chiefs (IAFC) agreed with the NPRM's proposal to use DOT-113 tank cars, noting that other refrigerated liquids are transported safely using this specification.

Other commenters expressed concern over the tank car design, stating that there is a lack of testing on the suitability of the tank car for the

transportation of LNG. The Governor of Washington State, on behalf of Washington State, claimed that PHMSA's assertion of a demonstrated safety record for DOT-113 tank cars is baseless without a completed risk assessment, because LNG is not currently authorized for transportation in DOT–113 tank cars and PHMSA and FRA may not be aware of every incident involving these cars. The Surfrider Foundation noted its belief that the proposed tank cars were never designed or intended to be used for the transport of LNG. Likewise, the California Public Utilities Commission (CPUC) expressed concern that PHMSA is moving forward with a deregulatory action without proper evaluation. CPUC also stated that transporting LNG in DOT–113 tank cars poses an unacceptable risk, further noting that an increase in pressure could trigger venting and that exposure of the newly vented gas to a heat source could result in an expanded fire or secondary explosion. Finally, CPUC also stated that the proposed modification to the HMR to authorize a DOT-113 tank car would be untested and that this is inconsistent with PHMSA's mission for safety.

Furthermore, various commenters including the New York State Department of Transportation (NYDOT), the New York State Department of Environmental Conservation (NYDEC), the New York State Division of Homeland Security and Emergency Services (NYDHSES), and the NTSBstated their belief that the limited number of incidents involving DOT-113 tank cars does not provide adequate evidence to ensure that they are safe for the transportation of LNG. These commenters expressed that the sample size of crashes is too small given the low number of DOT-113 tank cars in existence, and therefore, they requested additional research on the suitability of these tank cars for LNG service. Similarly, a group of environmental protection NGOs expressed their belief that PHMSA failed to provide analysis to justify its claim that the current known safety record of DOT-113 rail cars provides a meaningful comparison to their understanding of planned largescale shipments of 100-car trains of LNG throughout the United States. They further commented that PHMSA did not provide adequate data or analysis to support its conclusions about how DOT-113 tank cars and their cargoes will behave in a potential crash on main line rail routes. Additionally, they asserted that PHMSA failed to provide data on the risk of cascading failure of tank cars, noting that the lack of data

undermines PHMSA's statement that highway transportation is less safe than rail transportation. Furthermore, the Center requested that PHMSA consider the specific issues surrounding LNG tank cars, such as the placement of valves and other appendages that may be sheared off during a derailment; the puncture resistance of the tank car and potential jacketing to prevent punctures; the heat resistance of LNG tank cars to prevent explosions from fires during derailments; and braking requirements that are adequate for the weight of LNG tank cars.

With respect to concerns about the potential for explosions, the IAFC noted that the DOT–113 tank car is specifically designed to prevent a boiling liquid expanding vapor explosion (BLEVE) and that in the event of an accident, the LNG would initially spread before either warming or freezing. They further noted that if the released LNG were to catch fire, it would most likely be limited to the contents of the specific tank car that experienced the release, rather than spreading to the other tank cars. However, Earthjustice ³⁰ expressed concern regarding two LNG motor vehicle accidents in Spain where a BLEVE was observed, and Physicians for Social Responsibility (PSR) noted that no test data or mathematical models exist to predict whether and when a LNG tank car exposed to an external fire would undergo a BLEVE.

PHMSA Response

PHMSA agrees with RSI–CTC's comment and notes that the HM–91 rulemaking specifically considered that "methane, liquefied" (as referenced in the rulemaking) could be shipped in a DOT–113C120W specification tank car.

The safety history of DOT-113C120W tank cars is sufficient to draw a conclusion that these tank cars are appropriate for the bulk transportation of LNG. Please refer to our discussion on the DOT-113C120W tank car in Section III. B. "The DOT-113C120W Specification Tank Car" for further details. Also, please note that PHMSA is enhancing this already suitable packaging with additional outer tank requirements to improve crashworthiness. Although the HM-91 rulemaking published October 16, 1971 [36 FR 20166] and docket was subsequently withdrawn, PHMSA subsequently undertook a separate rulemaking published March 1, 1974

²⁹ https://www.phmsa.dot.gov/sites/ phmsa.dot.gov/files/docs/standards-rulemaking/ rulemakings/archived-rulemakings/67251/36fr-20166.pdf.

³⁰Earthjustice's January 14, 2020 comment was filed on behalf for the Center, Clean Air Council, Delaware Riverkeeper Network, Environmental Confederation of Southwest Florida, Mountain Watershed Association, and Sierra Club.

[HM–115, 44 FR 12826] to authorize the transport of a flammable cryogenic material (ethylene) in DOT–113C120W specification tank cars. While methane (*i.e.*, LNG) was not authorized for transport in that later rulemaking, there is no indication in the record that the omission was due to safety concerns.

With respect to Earthjustice's concern, the above BLEVE incidents that occurred in Tivissa, Catalonia, Spain³¹ and Zarzalico, Murcia, Spain³² with cargo tank motor vehicles transporting LNG do not serve as an appropriate comparison to LNG rail tank cars. The tanks involved in these incidents had a single inner steel tank covered by an envelope of polyurethane foam and a lacquered aluminum jacket as opposed to the tank-within-a-tank design of the DOT–113C120W tank car consisting of an inner and outer tank made of steel. Although the cargo tanks involved in the incidents were both constructed of 304L stainless steel, the insulation material and the outer jacket (constructed of 2mm (0.080 in) of aluminum) held no vacuum. Neither the polyurethane insulation nor the thin aluminum, which were used in the construction and design of the outer tanks, are particularly fire resistant. Therefore, these envelopes around the tanks provided little fire protection in the accident scenarios.

Conversely, the DOT-113C120W tank car has a steel outer tank and a multilayer insulation system, and is significantly superior in terms of both impact and fire resistance than the cargo tanks involved in the Spanish incidents. The annular space of the DOT-113 design works in combination with a properly functioning pressure relief system to diminish the likelihood of a high-energy event such as a BLEVE. Also, in the case of the Zarzalico accident, a significant portion of the insulation was destroyed by the fire, and in both cases the tank containing the LNG was directly exposed to the fire. Direct contact by flames resulted in increased pressure in the tank, followed by thermal tears of the unprotected tanks due to a decrease in material properties, rapid release of the contents,

and subsequent ignition of the vapor cloud. Direct contact by flames on the inner tank of a DOT–113 is significantly less likely due to the more robust design of the DOT–113 tank car.

In response to comments from CPUC and members of the public, PHMSA notes that venting of a flammable cryogenic material, other than that caused by an accident, is prohibited, and is unlikely to occur given the DOT-113C120W tank car's safety features and operational controls to expedite the movement of flammable cryogenic materials. Although there may be rare instances as a result of offeror's failure to properly operate or maintain the pressure relief system, this concern is adequately addressed by existing HMR requirements for monitoring the average daily pressure rise, requirements for routine maintenance of PRDs, and the supplemental requirement adopted in this final rule to monitor the pressure in the tank remotely so that the shipper will be aware of issues that may result in venting before the tank car reaches its destination. Please see our discussion of existing operational controls in the HMR and the tank car design features in Section III. "Amendments to the Hazardous Materials Regulations Adopted in this Final Rule" of this final rule for further discussion of the existing framework that ensures safe, expedited movement of flammable cryogenic materials like LNG.

CPUC's comment brought up concerns over potential secondary fires caused by the release of LNG from a tank car due to exposure to fire, and BLEVEs of tank cars exposed to fire. As stated in the NPRM, DOT-113 specification tank cars are inherently more robust when compared to other specification tank cars, due to their unique design, materials of construction, and their specific purpose to transport cryogenic materials. The tank-within-a-tank design of the DOT-113 specification tank car reduces the probability of cascading failures of other undamaged DOT–113 specification tank cars being transported in a block or unit train configuration. While it is possible that ignition of these vapors could occur if an ignition source is present, the fire would be contained to the proximity of the release point of the vapors from the tank car. Additionally, it is highly unlikely that an undamaged DOT-113 specification tank car involved in a derailment would result in explosion due to a BLEVE due to the design of the tank car, the loading pressure requirements for cryogenic materials, the mandated requirements for redundant pressure relief systems (valves and safety vents) and the

insulation systems that are built into each car. It is not possible to state with certainty whether a BLEVE is possible in the case of a LNG tank car derailment, and what conditions need to be present for such an event to occur. However, in a full-scale test ³³ conducted in 2018, a double walled portable cryogenic tank was filled with liquid nitrogen (and PRDs operated as designed) and exposed to a greater than 200-minute engulfing propane pool fire. The tank was neither destroyed nor did a BLEVE occur.

Based on the suitability of the DOT-113 design and material of construction for cryogenic material, safety history of the car, and the existing framework in the HMR for hazard communication and operational control, PHMSA concludes that the DOT-113C120W tank car is a safe packaging to transport LNG by rail. PHMSA has evaluated years of LNG transportation via other modes and packagings, both international and domestic, to help assess the potential risks of LNG by rail resulting in our determination that the containment vessel is an equally safe alternative. PHMSA reaffirms that the DOT-113 tank car is suitable for use in LNG service, as it has a demonstrated safety record of over 50 years in the service of similar flammable cryogenic materials.

2. Crashworthiness Assessment/Field Tests

PHMSA received various comments regarding the crashworthiness and general field testing of the DOT-113C120W tank car. Notably, NTSB and other commenters requested that PHMSA and FRA complete a thorough crashworthiness and safety assessment of the DOT-113C120W tank car specification prior to authorizing it for LNG service. Further, they stated that relying on data for the accident history of similar hazardous materials transported in the small fleet of DOT-113 tank cars (as was done in the NPRM) or making engineering assumptions based on the performance of pressure tank cars with different features and operating parameters (as was done in the Exponent Report³⁴ referenced in the Special Permit 20534 docket) does not provide a statistically significant or valid safety assessment.

³¹ Explosion of a road tanker containing liquefied natural gas. Eula'ia Planas-Cuchi, Nu'ria Gasulla, Albert Ventosa, Joaquim Casal. Journal of Loss Prevention in the Process Industries 17 (2004) 315– 32. https://www.academia.edu/7741565/Explosion_ of_a_road_tanker_containing_liquified_natural_gas.

³² Analysis of the Boiling Liquid Expanding Vapor Explosion (BLEVE) of a Liquefied Natural Gas Road Tanker: The Zarzalico Accident. E Planas, E. Pastor, J. Casal, J.M. Bonilla. Centre for Studies on Technological Risk (CERTEC). Department of Chemical Engineering. Universitat Politècnica de Catalunya. https://core.ac.uk/download/pdf/ 46606613.pdf.

³³ FRA Full Scale Test titled: "Fire Performance of a UN–T75 Portable Tank Phase 1: Loaded with Liquid Nitrogen".

³⁴ The referenced Exponent Report is a study to examine the risks of bulk transportation of LNG by investigation the potential risk profiles for transport of LNG versus liquefied petroleum gas (LPG) by cargo tank motor vehicle and rail tank car. https:// www.exponent.com/knowledge/alerts/2015/08/ bulktransportation/~/media/03b73782ec76446798 c70f6ac403ef84.ashx.

They also called into question how PHMSA determined that the specification DOT-113C120W tank car is an acceptable packaging to transport LNG. They noted their belief that the small number of DOT-113 tank cars in use and the documented 14 incidents referenced in the NPRM, in which three shell breaches occurred between 1980 and 2017, do not provide a demonstrated safety record. The Physicians for Social Responsibility cited the need to develop a new, robust tank car design. The Delaware Riverkeeper Network cited a lack of field tests on the survivability of the DOT–113 tank car loaded with LNG and the lack of simulation of the tank car "hulls." The Puyallup Tribe of Indians stated its belief that PHMSA is in violation of the APA, stating that the NPRM was not supported by a complete and technically sufficient administrative record because there are ongoing and incomplete studies to determine the safety of transporting LNG in DOT–113 tank cars.

Earthjustice questioned the suitability of the DOT-113 tank car noting that ". . . of the three specific derailments of the DOT113C120 tank car noted by the EA, all three ended up either breaching or needing to be breached and losing their entire cargoes. This represents 4.5% of the entire DOT113C120 tank car fleet."

PHMSA Response

As noted previously, PHMSA does not agree that Earthjustice's analysis calls into question the suitability of the DOT-113C120W tank car. PHMSA has concluded that the safety history of DOT-113C120W tank cars is sufficient to demonstrate that these tank cars are appropriate for the transportation of LNG, as the DOT-113 tank car has a demonstrated safety record of over 40 years. Since authorized in the HMR, there have been no train-accident related fatalities or serious injuries in over 100,000 shipments of cryogenic material in DOT-113 tank cars. PHMSA has reviewed the approximately 450 Incident Report Form 5800.1 filings involving releases from DOT-113 (or equivalent AAR204W³⁵) tank cars. Nearly all of these filings resulted from the non-accidental release of product attributed to defective or improperly secured valves and/or associated fittings and not a breach of the tank. The HMR requirements for the design and material of construction for the DOT-113, as well as existing operational controls and

handling requirements for the tank car, have contributed significantly to the strong safety history of the DOT-113.

PHMSA disagrees with the suggestion that the Exponent Report in support of the DOT-SP 20534 is irrelevant to the discussion. That study conducted a quantitative risk assessment addressing unit train movement of LNG in DOT-113 tank cars. The study creates multiple models that estimate the potential damage of an LNG incident. Specifically, transport releases were evaluated along 1-mile long segments with varying population densities. While commenters have claimed that the study does not have a large enough sample size, PHMSA notes that the study used all the available data on DOT-113 incidents. The reason for that perceived lack of data is that DOT-113 tank cars have not been involved in many incidents during the timeframe that DOT-113s have been in use. Given that the study uses all the available data on DOT–113 incidents, PHMSA believes that the study's findings are useful in informing this final rule.

After internal review and in consideration of certain substantive comments received to the NPRM, PHMSA is further enhancing the safety of these tank cars to be equipped with a 9/16th inch thick outer tank and constructed from TC-128 Grade B Normalized steel. This represents a 28% increase in outer tank thickness over the current minimum requirements for a DOT-113C120W tank car in use for other flammable cryogenic materials. PHMSA has concluded that this change will improve the crashworthiness of the tank, thereby improving its effectiveness in retaining LNG contents during a crash scenario. This conclusion is supported by modeling conducted on the DOT-117 specification tank car with a 9/16th inch thick shell and heads used in flammable liquid service when compared with the previous DOT-111 tank cars with 7/16th inch steel. See Section III. B. "The DOT-113C120W Specification Tank Car" for further details on the tank car enhancements added in this final rule.

3. High Nickel Steels for Inner Tanks

The Puyallup Tribe stated that PHMSA failed to provide a sufficient factual basis to support its assertion that the materials used in the fabrication of DOT–113 tank car inner tanks are appropriate for the transportation of LNG. They noted that stationary LNG storage tanks use high nickel steels and that the specifications for American Society of Testing and Materials (ASTM) A240/240M 304, or 304L steels used in DOT–113C120W tank cars provide for a range of nickel content that can equal—but can also extend outside of—the range recommended for stationary LNG tanks. Therefore, they commented that there is no evidence that all steels meeting this specification will have the performance specifications appropriate for storing LNG that is being transported by rail. The Tribe further expressed their belief that PHMSA has not adequately demonstrated why ASTM A240/240M 304, or 304L steel will ensure safe transport of LNG in tank cars.

PHMSA Response

PHMSA disagrees with the Puyallup Tribe that there is no factual basis for the existing requirements for ASTM A240/240M 304, or 304L steels. The ASTM 300 series steels required in part 179 for DOT–113 tank cars have a long, successful history demonstrating the suitability of this steel as the material of construction for the inner tank of DOT– 113 tank cars.

The 300-grade austenitic stainless steels (304/304L), commonly referred to as "18–8 grade" stainless steels, are the only steels authorized in the HMR for use when constructing the inner tank of a DOT–113 tank car. As discussed in *Section III. B. "The DOT–113C120W Specification Tank Car,*" ASTM A240/ 240M 304, or 304L steels have the best balance of toughness, strength, and weldability for transportation, along with being able to withstand extremely low temperatures.

By contrast, ASTM A553 steel, also known as "9% Nickel" alloy steel, has less ductility and requires special welding protocols. A553 steel can be used for static storage vessels which do not have to withstand the dynamic stress conditions experienced by the tank car during movement and the more frequent thermal cycles of loading and unloading experienced by tank cars. In tank cars, the use of A553 steel is not advisable, due to the physical properties of the steel. The HMR have not approved it for use in tank cars, in part, due to problems encountered with welded repairs.

Therefore, in this final rule, PHMSA is maintaining the requirement to construct the inner tank of a DOT-113 tank car from ASTM A240/240M 304, or 304L steels for the inner tank. Please see *Section III. B. "The DOT-113C120W Specification Tank Car*" for further discussion of the properties of 304 and 304L steel and the material of construction requirements for the inner tank of a DOT-113 tank car.

³⁵ The AAR204W is also authorized for the transportation of non-flammable cryogenic materials and has a similar design to a DOT–113.

4. Maximum Permitted Filling Density

AAR, RSI–CTC, and Chart Inc. disagreed with the maximum filling density proposed in the NPRM. Chart Inc. recommended that the filling density be 38.1 percent for a safety relief valve set at 75 psig, thereby corresponding to the 51.1 percent tabulated value for liquid ethylene. Chart Inc. further noted that flammable cryogenic materials in tank cars are required to have a 0.5 percent outage below the inlet of the pressure relief or pressure control valve at the start-todischarge pressure setting of the valve, with the tank car in a level attitude.

RSI-CTC commented that PHMSA did not provide an explanation as to why it is imposing a maximum filling density that results in 15 percent outage rather than the standard 0.5 percent outage identified in existing regulations for other flammable cryogenic materials authorized by rail tank car. They stated that limiting LNG to a maximum filling density of 32.5 percent would require approximately 13 percent more tank cars to move the same volume of commodity, noting that this could increase the risk in transportation. Moreover, they stated that PHMSA's proposed limit is inconsistent with Transport Canada's regulations, which impose a 37.3 percent maximum filling density. To resolve this issue, they recommended that PHMSA consider adopting a maximum filling density of 37.3 percent, which they point out would harmonize the United States and Canada, as well as reduce the overall safety risk by reducing the total number of tank cars required.

PHMSA Response

PHMSA notes the concerns over the proposed filling density and the potential inconsistencies related to the outage requirements for flammable cryogenic materials. The filling density of 32.5% specified in the NPRM was based on a 15% outage (vapor volume) at PRV start to discharge pressure. The AAR Manual of Standards and Recommended Practices, M-1004 "Specifications for Fuel Tenders" requires the LNG filling of tenders used to fuel LNG powered locomotives with 15% vapor volume. The operating demands on tenders combined with the need for more vapor as a fuel and the expected refueling processes make the filling density acceptable for use with fuel tenders. In contrast, tank cars do not require these same considerations, and thus, the filling density should be aligned with other bulk packagings.

After reviewing the comments provided to the NPRM and conducting

further technical analysis, PHMSA agrees that the proposed 32.5 percent filling density unnecessarily limits the amount of LNG that can be loaded into the tank car designed for commercial shipments and not locomotive fueling. Calculations were performed through linear regression analysis of authorized filling densities for cryogenic material in cargo tanks (see § 173.318). The equations derived during that analysis were compared with filling density values currently authorized for tank cars in §173.319 for ethylene and hydrogen. The comparison between cargo tanks and tank cars filling density values held true for ethylene and hydrogen, so the equation was therefore used to derive the filling density for LNG in tank cars. This filling density value was compared to the results of calculations conducted by AAR, Transport Canada, and FRA. A filling density of 37.3% by weight is consistent with these four (AAR, Transport Canada, FRA, PHMSA) analyses.

Therefore, in this final rule PHMSA is adopting a 37.3 percent maximum filling density for LNG, which will require approximately 2 percent outage below the inlet of the PRD at the startto-discharge pressure to prevent the venting of liquid material should the device activate. This represents a greater level of safety than other cryogenic packagings authorized in the HMR and internationally, which only require a 0.5% outage requirement below the PRD inlet at the start-to-discharge pressure. Additionally, a 37.3 percent maximum filling density harmonizes with Transport Canada's TDG regulations. Please see the Section III.B. "The DOT-113C120W Specification Tank Car" discussion for additional discussion of filling density.

5. Maximum Pressure When Offered

RSI–CTC stated that the proposed offering pressure of 15 psig for the Pressure Control Valve Setting or Relief Valve Setting in § 173.319(d)(2) is inconsistent with Transport Canada's requirements, which impose a 10 psig maximum offering pressure, and departs from AAR's practice of assuming a 10 psig maximum offering pressure to determine the individual specification requirements for DOT-113C120W tank cars. They also stated that while PHMSA appears to be relying on § 173.319(e)(1) for its determination that 15 psig is consistent with the 20-day transportation requirement for cryogenic materials and the estimated 3 psig per day maximum pressure increase during transportation, current regulations for DOT-113 tank cars as set forth in part 179, subpart F do not specify a time-intransit limit for cryogenic materials. Rather, RSI–CTC asserted that both DOT's predecessor and the AAR have historically assumed a 30-day hold time in developing the DOT–113C120W specification. Moreover, the commenter noted that the average daily pressure rise limit of 3 psig per day, as set forth in § 179.319, is an operating specification for shippers designed to trigger inspection of the tank vacuum to ensure thermal integrity and should not be imposed as a design requirement to calculate the maximum offering pressure.

PHMSA Response

PHMSA agrees that the HMR do not specify a time-in-transit limit. However, PHMSA requires notification to FRA if a flammable cryogenic material has not reached the consignee within 20 days. FRA closely monitors any situation requiring notification of more than 20 days in transit, and our experience is that rail carriers act to expedite movement of the tank car to its destination or take swift corrective action to reduce the pressure within the tank if necessary. Therefore, PHMSA believes that the 15 psig maximum offering pressure is appropriate for the transportation of LNG and is consistent with the level of safety provided to other flammable cryogenic materials. Further, the HMR do not prohibit shippers from offering a tank car of LNG at a lower pressure. Please see Section III.B. "The DOT-113C120W Specification Tank Car" and III.C. "Additional Operational Controls for LNG Transportation" for additional discussion of offering pressure and the operational controls for the movement of these tank cars.

6. Insulation

Chart Inc. noted in their comment that Mylar is a plastic material that is incompatible with the potential for flammable gas in the annular space. They further stated that common wrapped insulation used in such tanks is often referred to as MultiLayer Insulation (MLI), Super Insulation (SI), or MultiLayer Super Insulation, which consists of alternating layers of aluminum foil and a non-conducting spacer material. Chart Inc. further explained that fiberglass or Perlite powder can be used as a potential alternative in place of or in addition to the MLI or SI.

PHMSA Response

PHMSA agrees that use of the term Mylar in the preamble of the NPRM was inconsistent with the current design and practice. The DOT–113 construction design relies on a performance standard in § 179.400–4 that does not specify the use of Mylar or any other specific type of material to be used for insulation. In the NPRM, PHMSA inadvertently represented "Mylar" as a specification requirement for MLI or SI use on a DOT–113, when in fact, it is not. Please see our discussion of the insulation system and thermal performance monitoring program in Section III of this final rule for more information on DOT– 113 insulation requirements.

7. Maximum Gross Rail Weight

RSI-CTC and AAR commented on the existing allowable gross weight of rail tank cars. They stated the FRA provided notice in the Federal Register of approval of the operation of certain tank cars in hazardous materials service up to 286,000 pounds GRL, further noting that this approval does not address cryogenic tank cars.³⁶ Specifically, RSI-CTC recommended adding language in § 179.13 that would authorize a GRL limitation of up to 286,000 pounds, thereby removing the need for FRA approval and allowing for heavier inner or outer tanks. They further stated that authorizing cryogenic tank cars to operate with 286,000 pounds GRL would not increase the volume of commodity transported (which would still be limited to 34,500 gallons) and would enable manufacturers to increase the weight of the tank car by building it with a thicker outer shell, which would enhance the overall safety of these tank cars in cryogenic service.

PHMSA Response

PHMSA acknowledges that the thicker outer tank, as required in this rulemaking, will have a net impact of increasing the overall weight of a loaded DOT–113C120W9 tank car. The added tank thickness is expected to increase the overall weight of the tank car by approximately 11,050 pounds. See the Table 6 below for a comparison of the DOT-113C120W and DOT-113C120W9 tank car weights. PHMSA estimates the light (empty) weight of a DOT–113 tank car for LNG to be approximately 138,050 pounds and the estimated weight of allowable LNG that can be loaded into the car at roughly 108,000 pounds. This equates to a maximum gross weight on rail of only 246,050 pounds. However, the request to remove the approval requirement for tank cars greater than 263,000 pounds GRL is beyond the scope of this rulemaking, as it is not

specific to LNG and would therefore impact all cryogenic materials transported by tank car. Additionally, while 2011 FRA Notice does not specifically mention cryogenic tank cars, PHMSA and FRA reiterate that the broad language in the FRA's January 2011 approval clearly contemplates application to cryogenic tank cars. Therefore, a DOT–113 tank car manufactured for LNG service after (the effective date of this final rule) is approved for a maximum GRL of 286,000 provided the tank car meets the following criteria:

1. Tank car is constructed in accordance with S-286.

2. The outer shell and heads are constructed with TC–128 Grade B, normalized steel.

Please see our discussion of maximum GRL in *Section III.B.* "*The DOT–113C120W Specification Tank Car*" of this final rule for additional details. PHMSA is adding a new section, § 179.400–26, to the DOT–113 specification requirements to indicate clearly that DOT–113C120W9 tank cars exceeding 263,000 lbs. gross weight are (in light of FRA's January 2011 approval) approved by FRA for a maximum gross weight of 286,000 provided they meet the two conditions above.

The following table provides a comparison of the approximate weight of a DOT113C120W tank car with an outer tank shell thickness of ⁷/₁₆ (*i.e.*, the current standard) vs. ⁹/₁₆ (*i.e.*, the standard adopted in this final rule) is provided in the following table. Note that stiffening ring weight changes with outer tank thickness. In this comparison, a thicker outer tank corresponds to less stiffening ring weight.

TABLE 6—GROSS RAIL WEIGHT CALCULATION

[Approximate weights for a DOT113C120W Tank Car]

Outer Shell Thick- ness.	⁷ /16″	^{9/} 16″.
Inner Tank Thick- ness.	3⁄8″	³ ⁄8″.
Combined Tank Weight.	98,250 lbs	109,500 lbs.
Stiffening Ring Weight.	1,750 lbs.	1,550 lbs.
Fittings/Piping/Hous- ing.	3,800 lbs.	3,800 lbs.
Running Gear	23,200 lbs	23,200 lbs.
Estimated Light Weight.	127,000 lbs	138,050 lbs.

8. DOT–113C140W Tank Car Specification

Consistent with its prior petition, AAR reiterated its suggestion that PHMSA adopt the DOT–113C140W tank car standard. However, AAR noted that PHMSA may require more time to evaluate the new tank car specification, as it is not currently authorized by the HMR. Therefore, AAR suggested that PHMSA proceed with authorizing the DOT–113C120W tank car for LNG service at this time and consider authorizing the DOT–113C140W tank car in a future rulemaking.

PHMSA Response

PHMSA agrees that it would take additional time and resources to create and evaluate a new specification (e.g., the DOT-113C140W) not authorized under the current HMR. Furthermore, PHMSA believes the addition of this tank car specification warrants further engineering review and evaluation, including consideration of safety risks presented by the new design specification. Increased thickness and improved outer tank materials, as required in this final rule, require minimal engineering effort; and insofar as PHMSA regulations establish *minimum* thickness requirements for DOT-113 cars, those regulations have always permitted outer tanks of varying thickness above those lower limits.

In contrast, a new inner tank design with a higher test pressure of 140 psig requires significant engineering effort that is beyond the scope of this rulemaking. An inner tank designed to withstand a test pressure of 140 psig has a thicker wall, and has different pressure relief features that would need to be tested extensively prior to authorization for use in transportation. The designs for the new inner tank, the 140 psig pressure relief system, and the new design's thermal performance would each need to be validated. The inner tank, along with the thermal protection provided by the annular space, is the most safety critical component to retaining the contents of the car during normal conditions incident to transportation. The outer tank, on the other hand, shields the inner tank from physical damage, exposure to the elements, and in-train forces, while providing structural support to the packaging. Unlike a change to the inner tank, the enhancements to the outer tank denoted by the new specification suffix would not require the extensive additional engineering review because PHMSA and FRA have access to testing and modeling data that demonstrate the

³⁶Notice regarding FRA approval for operating certain railroad tank cars in excess of 263,000 pounds gross rail load. January 25, 2011; 76 FR 4350.

crashworthiness improvements from a thicker 9/16th inch outer tank.

9. PHMSA Determination Regarding Tank Car Design

In summary, PHMSA acknowledges the comments received addressing the appropriateness of the DOT–113C120W tank car for LNG transportation. As discussed in this section, and in Section III, PHMSA has concluded that the DOT–113C120W tank car is an appropriate packaging for LNG transportation.

The existing structure of the HMRto include requirements for packaging design-provides for the safe transportation of all hazardous materials. The DOT–113C120W9 tank car is a variation of the DOT-113 specification currently authorized in the HMR for use as a packaging for cryogenic material, including flammable cryogenic material like LNG. The "C" delimiter for this type of tank car indicates a temperature rating for service that is suitable for LNG. Furthermore, the existing HMR include requirements for components specific to flammable cryogenic material services. such as PRDs and thermal insulation systems.

PHMSA believes that transportation of LNG by DOT-113C120Wspecification rail tank car as proposed in the NPRM would be safe if LNG was transported in similar quantities to what is currently done for ethylene. Currently, because of market demand and usage patterns for ethylene, DOT-113 tank cars are transported as part of mixed commodity freight trains at one to three cars per train. However, when transported in larger fleets—in blocks of cars larger than three or in unit trainsthere is a higher probability that cars containing this material will be involved in a derailment when a derailment or other accident occurs. leaving the potential for more hazardous material to be released during an incident. While PHMSA cannot predict the number of DOT-113C120W9 tank cars per train the LNG market will support, the agency does have relevant information from ETS's application for DOT SP 20534, which indicates the company plans to operate unit trains of at least 80 cars per train at some point in the future. Therefore, even though the current outer tank specifications of existing DOT-113s are appropriate for the physical properties of LNG, the potential increased risk involved in transporting LNG in blocks of more than three or in unit trains warrants the additional safety margin that is currently available from the tank car manufacturing industry. As a result,

PHMSA is amending the DOT-113 specification to require tank cars with a minimum outer tank thickness of 9/16th inch constructed from TC-128 Grade B, normalized steel (those enhancements to be indicated by the specification suffix "9"). PHMSA believes that this change will further enhance the safety of the DOT-113 tank car by significantly increasing its crashworthiness.

B. Operational Controls

PHMSA did not propose supplemental operational controls in the NPRM beyond the existing requirements in the HMR, but did invite comment on whether PHMSA and FRA should rely on existing regulations and the operational controls in AAR's Circular OT-55, or if additional operational controls may be warranted based on an assessment of risk. PHMSA encouraged commenters to provide data on the safety or economic impacts associated with any proposed operational controls, including analysis of the safety justification or cost impact of implementing operational controls. Further, PHMSA invited comment on the operational controls included in the special permit described above, due to the overlapping content contained in the NPRM.

Numerous commenters expressed concern about the possible operational controls associated with the transportation of LNG by rail. For example, the International Association of Fire Fighters (IAFF) suggested that PHMSA conduct a more expansive safety assessment of the DOT-113 rail car before making the decision to forgo additional operational controls. In the responses below, PHMSA has sorted these comments into the following subtopics: Braking and Routing Requirements, Maximum Train Length and Weight, Speed Restrictions and AAR Circular OT-55, and Separation Distance. Please also see Section III.C. "Additional Operational Controls for LNG Transportation" for more discussion.

1. Braking and Routing Requirements

NTSB, the Transportation Trades Department, AFL–CIO (TTD), New Jersey Department of Environmental Protection (NJDEP), Members of the New Jersey Senate and Assembly, NYDOT, NYDEC, NYDHSES, IAFF, and others commented that PHMSA should require braking and routing requirements for trains carrying LNG. NTSB specifically commented that PHMSA should require that trains 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."

Conversely, AAR commented that there is no justification for braking and routing requirements for trains carrying LNG shipments to be as restrictive as the requirements for HHFTs. AAR noted that if PHMSA were to apply braking and routing requirements similar to those imposed on HHFTs to trains carrying LNG, the requirements should only apply to a train transporting 20 or more loaded tank cars of LNG in a continuous block, or to a train carrying 35 or more loaded tank cars of LNG throughout the train.

PSR and the Surfrider Foundation expressed concern that the possibility of a terrorist attack has not been properly considered when looking at the security measures for LNG by rail. They further stated that the urban routing of LNG unit trains would make them highly vulnerable to attack by terrorists and that the predictability and visibility of commercial rail traffic through urban settings would make targeting easy and devastating. The Governor of Washington State, on behalf of Washington State, also expressed concern that the NPRM did not address the risk of terrorist attacks.

PHMSA Response

PHMSA agrees that requiring enhanced braking is necessary for trains meeting an LNG analog of the HHFT threshold (*i.e.*, 20 continuous tank cars of LNG or 35 tank cars of LNG throughout the train). PHMSA and FRA determined that this threshold best captures the higher-risk bulk quantities transported in unit trains, while excluding lower-risk manifest trains. PHMSA and FRA have concluded that the HHFT threshold is suitable for the transportation of LNG because these materials have similar risk profiles when transported in such configurations. If a tank car containing LNG is breached during a derailment, the LNG will behave largely the same way as crude oil or ethanol. The LNG lading will be released as a very cold liquid, creating an LNG pool and likely a fire.

The effective use of braking on a train can result in accident avoidance and can lessen the consequences of an accident by diminishing in-train forces. This can reduce the likelihood of a tank car being punctured and decrease the likelihood of a derailment. PHMSA believes that requiring enhanced braking for these train configurations provides a cost-effective way to reduce the number of cars and the energy associated with train accidents. In consideration of the comments received, consistent with comments from NTSB and others, PHMSA is adding a requirement that for a single train with 20 or more loaded tank cars of LNG in a continuous block or a single train carrying 35 or more loaded tank cars of LNG throughout the train, each carrier must ensure that the train is equipped and operated with either an EOT device, as defined in 49 CFR 232.5, or a DP system, as defined in 49 CFR 229.5.

Some public commenters, including Earthjustice, noted that PHMSA did not propose a requirement that trains transporting LNG be equipped with ECP brakes, which they suggest would provide an extra measure of safety. PHMSA and FRA did consider adopting ECP brake requirements in this final rule but ultimately determined that such a braking requirement would not be practical.

Freight railroads in the U.S. overwhelmingly rely on conventional air brakes to comply with FRA regulations for stopping a train.³⁷ This conventional air brake system has been in use since 1869 and has proven to be reliable and effective. Conventional air brakes use air pressure to apply and release the brakes on each car in a train. When air pressure is reduced in a braking application, the air brakes will apply sequentially from the front to the back of the train. ECP brake systems are an alternative braking technology that integrate electronic and pneumatic communications hardware into one package to allow for nearly instantaneous responses to locomotive braking commands throughout an entire train. While some types of ECP brake systems overlay the air brake system, the integrative functions of ECP brakes essentially require the entire train be equipped with operable ECP brakes if the system is to be effective. Except in very rare circumstances where the railroads are capable of keeping and maintaining captive unit train fleets, railroads in the U.S. have not implemented ECP brake systems into their operations.

PHMSA previously considered and adopted ECP brake requirements for a limited subset of HHFTs in its final rule on "Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains," (HM–251; 80 FR 26643, May 8, 2015), based on the potential benefits of those trains' being operated effectively as a captive fleet. However, a subsequent re-evaluation of the HM–251 ECP brake requirements found that even the "captive" unit train configurations operating with ECP brakes are not cost-beneficial in the HHFT environment. (HM–251F; 83 FR 48393; Sep. 25, 2018). As a result, PHMSA removed requirements pertaining to ECP brake systems on high-hazard flammable unit trains.³⁸ PHMSA relies on the analysis in HM– 251F to inform its decision in this final rule to not require ECP brakes on trains transporting LNG.

While PHMSA is not implementing ECP brake requirements, both agencies recognize the importance of advanced braking for trains transporting large quantities of LNG. As result, PHMSA is requiring advanced braking in the form of a two-way EOT device or linked and operational DP system located at the rear of the train. The two-way EOT device or DP system at that rear of the train is more effective than conventional brakes because the rear cars can receive the emergency brake command more quickly, which allows the back of the train to start braking quicker than if the train was only equipped with conventional air brakes. This can reduce stopping distances and lessen in-train forces that can cause or contribute to the severity of certain derailments.

The action taken by PHMSA in this final rule, requiring the use of a twoway EOT device or DP unit at the end of the train for a single train with 20 or more loaded tank cars of LNG in a continuous block or a single train carrying 35 or more loaded tank cars of LNG throughout the train, is consistent with the comments of NTSB, Members of the New Jersey Senate and Assembly, and the Attorneys General for various States. It matches the current requirements for HHFTs, which apply to Class 3 flammable liquids that are transported in a single block of twenty cars or 35 cars dispersed throughout a single train. Given the comments received and the similarity in risk profiles with HHFTs, PHMSA and FRA have determined that the requirement for a two-way EOT device or a DP system in the rear of the train is an acceptable safety measure.

Regarding rail routing requirements, PHMSA agrees that requiring additional planning and route analysis will provide safety benefits to the transportation of LNG by rail. The routing requirement will reduce the severity of the consequences of a derailment by requiring that railroads transport LNG on the safest route available to them. Accordingly, PHMSA is amending § 172.820 to require that a train carrying LNG in a rail tank car be subject to the additional planning requirements of that section. This change will require rail carriers to compile annual data on shipments of LNG and use the data to analyze safety and security risks along rail routes where LNG is transported, assess alternative routing options, and make routing decision based on those assessments.

Regarding the risk of terrorism, 49 CFR part 172, subpart I—Safety and Security Plans, prescribes security requirements for shippers and carriers while a hazardous material is in transportation. Flammables (e.g., LNG) transported in large bulk quantities (i.e., 3,000 liters [792 gallons]) in a single packaging such as a tank car are subject to requirements for development and implementation of plans to address security risks, including preventing unauthorized access to the material, providing for en route security, and personnel security. PHMSA believes these existing requirements adequately address the security risks associated with the transportation of LNG by rail. Please see additional discussion of existing security planning and rail routing requirements in Section III. A. "Existing HMR Requirements for Rail Transport of Flammable Cryogenic Material."

2. Maximum Train Length/Weight

Some commenters suggested limiting the number of LNG tank cars in a train; however, no commenters provided specific recommendations on what would constitute the preferred maximum number of cars. The National Association of State Fire Marshals (NASFM) noted that although 19 cars of LNG would not trigger the "Key Train" requirements, it would be a large enough quantity to present a significant hazard.

AAR noted that research ³⁹ on the safety impact of operating so-called "long" trains suggests that there is no increased risk of derailment, further commenting that the use of fewer, longer trains may reduce derailment rates. AAR further stated that PHMSA should not create a limit on train length within the context of this rulemaking.

Others expressed concern that these tank cars could damage and degrade train tracks, leading to potential future derailments. Additionally, a few commenters noted that PHMSA and FRA should assess and fix damaged

³⁷ 49 CFR part 232.

³⁸ The HM–251 final rule defined a "high-hazard flammable unit train" (HHFUT) as a train comprised of 70 or more loaded tank cars containing Class 3 flammable liquids.

³⁹ See footnote 9, page 3—https:// www.regulations.gov/document?D=PHMSA-2018-0025-0209.

railroad tracks prior to making any determination on whether it is safe to transport LNG by rail.

PHMSA Response

PHMSA appreciates comments regarding potential limitation of maximum weight and length for trains containing LNG. PHMSA has determined that there should not be a maximum for either in this rulemaking. PHMSA notes that the HMR do not limit the number of shipments a shipper can offer into transportation, and do not restrict the number or type of hazardous materials rail cars a carrier can transport in a train. PHMSA and FRA believe that train length is best determined by individual railroads. The function of determining an individual railroad's appropriate train operating lengths is based on multiple factors. The railroads are best positioned to determine the appropriate train lengths and weight based on multiple factors including, but not limited to, the following: Route characteristics, train make-up, train dynamics, and crew training and experience. Furthermore, FRA notes that damage and degradation to railroad tracks due to the transport of DOT-113C120W9 tank cars is unlikely. All routes used to transport hazardous materials have rail infrastructure to handle trains with rail cars with a GRL of 286,000 pounds. Railroads execute a track and rail integrity inspection program that exceed the minimum Federal requirements. In addition, they are implementing technology that enables the inspection of more miles of track per day and identifies defects with greater reliability.

3. Speed Restrictions/AAR Circular OT–55

PHMSA received several comments recommending stricter regulations regarding the transport of LNG by rail, including speed restrictions and other operational controls. Numerous commenters, such as NTSB, NASFM, Delaware Riverkeeper Network, Congressman DeFazio, and the Attorneys General for various States, expressed concern that PHMSA did not propose additional safety regulations for the transport of LNG by rail in the NPRM. NASFM noted that, regardless of current industry practice, the AAR Circular OT–55 is "recommended," rather than mandated by regulation. Earthjustice commented that OT-55 is insufficient to keep LNG safe, stating that there is a lack of transparency on its use. They further noted that without further analysis, PHMSA cannot confirm railroads are following OT-55. They also claimed that even if HHFT-

style operational controls were put in place, the material is still too dangerous and liable to spill in the event of a derailment and potentially cause a BLEVE or vapor cloud explosion (VCE).

Several commenters, including NTSB, recommended that PHMSA implement operational controls similar to the protections currently in place for HHFTs, as provided in § 174.310.

A few commenters, including AAR and RSI-CTC, noted that they agree with PHMSA's determination that AAR's Circular OT–55 provides a "detailed protocol establishing recommended railroad operational practices" for transporting hazardous materials. One commenter further noted that they do not support incorporation of Circular OT–55 $\rm by$ reference because it would disincentivize the development of industry standards that are more rigorous than the Federal requirement. NYDOT, NYDEC, and NYDHSES commented that they would like to see the AAR Circular OT-55 incorporated into the HMR and the HHFT requirements applied to trains carrying LNG.

PHMSA Response

PHMSA notes that AAR's Circular OT–55 is a detailed protocol establishing railroad operating practices for the transportation of hazardous materials, including speed restrictions, which was developed by the rail industry through the AÅR.40 The recommended practices were originally implemented by all Class I rail carriers operating in the United States, with short-line railroads following on as signatories. Also, since Circular OT-55 is an industry practice, new safety procedures can be adopted efficiently and implemented nationally. The industry voluntary approach allows for greater flexibility to stay abreast of fastchanging technology and changes in the market, and facilitates safety by leveraging industry incorporation of OT-55 into their operating rules and cooperation with regulators versus an adversarial enforcement relationship.

Thus, PHMSA believes the operational control recommendations in AAR Circular OT–55 address safety concerns related to train movements of hazardous materials comprehensively, including train speed restrictions in Key Train configuration. OT–55 limits Key Train speed to 50 mph. PHMSA and FRA believe that this maximum speed limit is appropriate for the

transportation of LNG based on its similarity to other Division 2.1 flammables, including cryogenic materials, that are allowed to be transported at a maximum speed of 50 mph, and based on the DOT Specification 113 standards. Additionally, AAR's Manual of Standards and Recommended Practices (MSRP) establishes rail equipment standards, including equipment speed restrictions, that limits tank cars (including DOT-113 tank cars) to an operating speed of 50 MPH. This speed restriction is independent of whether they are aggregated into a Key Train configuration or not.

Further, PHMSA and FRA have verified that railroads are implementing and following Circular OT–55 through their operating rules. PHMSA and FRA believe this industry standard reduces the risk of derailments and collisions and therefore decreases the risk involved in the transportation of all hazardous materials, including LNG. Please see Section III.C. "Additional Operational Controls for LNG Transportation" for a full discussion of the benefits of OT–55.

4. Separation Distance

Commenters, including NTSB and the Brotherhood of Locomotive Engineers and Trainmen (BLET), noted that the transportation of LNG would also increase the safety risk for train crews. The NTSB referenced two safety recommendations issued to PHMSA in response to the December 30, 2013, collision of two Burlington Northern Santa Fe (BNSF) freight trains in Casselton, North Dakota (R-17-1 and -2) that resulted in the derailment of 20 tank cars loaded with crude oil and the release of 476,000 gallons. The safety recommendations reference risks posed to train crews and the separation distance and configuration of hazardous materials cars, locomotives, and occupied equipment to ensure the protection of train crews during both normal operations and accident conditions. In the comment to the NPRM, the NTSB urged PHMSA to implement appropriate train crew separation distance requirements, as recommended by Safety Recommendations R-17-1 and -2, issued March 9, 2017. Specifically, the Safety Recommendations are:

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

⁴⁰Circular OT–55, "Recommended Railroad Operating Practices for Transportation of Hazardous Materials," *https://www.railinc.com/rportal/ documents/18/260773/OT-55.pdf.*

R-17-01

conditions, and collaborate with the Federal Railroad Administration to revise 49 Code of Federal Regulations 174.85 to reflect those findings.

R-17-02

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.⁴¹

AAR commented that there should not be additional buffer car requirements for trains transporting LNG or any other hazardous material. They further noted that it is not justified from a safety and risk standpoint.

PHMSA Response

PHMSA has initiated a research project in coordination with the Volpe Center to address NTSB Safety Recommendations R-17-1 and -2. This effort will result in a report that identifies gaps in the existing studies, areas for further research, and what conclusions can be drawn collectively from the existing knowledge base, if any. PHMSA may consider changes to the separation distance requirements in § 174.85 of the HMR for placarded rail cars and tank cars in mixed commodity freight train and unit train configurations pending the outcome of the study. However, PHMSA is not amending the separation distance requirement in this final rule at this time. See Section III.C. "Additional **Operational Controls for LNG** Transportation" for further discussion of operational controls include consideration of separation distances.

PHMSA and FRA collaborated under the scope of the Rail Safety Advisory **Committee Hazardous Materials Issues** Working Group Task No. 15–04 to address the issue of separation distance. Ultimately, due to an absence of consensus of the Working Group participants, as well as a lack of established incident data, the members did not reach agreement on a change to the existing regulation governing hazardous materials in train separation distances. Moreover, PHMSA worked with the Volpe Center in its review of rail accidents occurring between 2006 and 2015 where there was a release of hazardous materials near the head end of the train (occupied locomotive). The study found no reported crew injuries

and therefore no injuries that were potentially preventable with additional buffer cars.

5. PHMSA Determination Regarding Operational Controls

The existing structure of the HMR to include requirements for operational controls—provides for the safe transportation of all hazardous materials. In the NPRM, PHMSA and FRA considered additional operational controls specific to LNG, such as mirroring the operational controls adopted for HHFTs,⁴² adopting OT–55 or "Key Train" requirements into the HMR, limiting train length, or requiring controls for train composition, speed, braking, and routing.

PHMSA acknowledges the concerns about relying on a widely adopted, voluntary industry standard, rather than imposing regulatory requirements. After internal review and in consideration of certain substantive comments. PHMSA is requiring a two-way EOT device or DP on the rear of any train consisting of 20 or more loaded tank cars of LNG in a continuous block or 35 or more loaded tank cars of LNG throughout the train. Further, PHMSA is requiring that each rail car of LNG must be remotely monitored for pressure and location. Finally, trains consisting of an LNG tank car are subject to route planning and routing analysis requirement. PHMSA believes these operational controls, in conjunction with what is already required under the HMR and the "Key Train" requirements in Circular OT–55, will ensure the safe transportation of LNG. PHMSA and FRA have verified that railroads are following and implementing Circular OT-55 through incorporation into their operating rules. PHMSA does not believe that explicit speed restrictions are necessary given the widespread adoption of Circular OT-55. PHMSA and FRA expect that Circular OT-55 will be evaluated by the rail industry regularly and that additional operational safety measures beyond the minimum requirements of the HMR will be included to address operational concerns, as appropriate. FRA actively works with AAR's Hazardous Materials Committee, which is responsible for reviewing and updating of OT-55. The Committee reviews OT-55 annually and determines if an update is warranted. If a change to OT-55 is needed, the Committee will update the document accordingly and

will published it as an AAR Casualty Prevention Circular (CPC).

C. Environmental Impacts

PHMSA received many comments recommending further analysis of the environmental impacts associated with this rulemaking. Please refer to the Final Environmental Assessment for discussion and response to comments.

D. Economic Analysis

PHMSA received several comments related to the economic analysis of the rulemaking. Please refer to the Final Regulatory Impact Analysis (RIA) for discussion and response to comments.

E. Emergency Response

Several commenters expressed concern about the perceived emergency response ramifications associated with the transportation of LNG by rail tank car. PHMSA has sorted these into the following subtopics: Training for Emergency Responders, Current Emergency Planning, Evacuation Distances, and Modeling Availability.

1. Training for Emergency Responders

Several commenters are concerned that emergency responders lack the training and expertise to respond to an LNG tank car incident, especially in unit train configurations. They commented that the current emergency response requirements may be insufficient to address an incident involving LNG, including the potential for a BLEVE in accident conditions. The Center requested proper training and notification of local responders to the presence of LNG trains. NYDOT, NYDEC, NJDEP, and NYDHSES suggested that PHMSA provide specific training, resources, and support to emergency response personnel, including cooperation with State fire training agencies to ensure training is consistent, effective, and readily available as a requirement in the final rule, similar to the special permit. NFPA cited previous comments they have submitted to regulatory actions regarding emergency response resources. Specifically, NFPA stated that adding a flammable cryogenic material, like LNG, to the existing HHFT rail shipments posed further challenges to the capabilities and resources for local responders. IAFC recommended that PHMSA work with shippers and carriers to develop and deliver critical product, container and emergency response information, and related training materials for the emergency planning and response communities. Furthermore, the Governor of Washington State, on behalf of

⁴¹ "Consist" means the group of rail cars that make up the train.

 $^{^{42}}$ As defined in § 171.8, a high-hazard flammable train means 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.

Washington State, contended that the NPRM did not address crew training and emergency response.

PHMSA Response

PHMSA agrees that proper training and information sharing are necessary ingredients in promoting a safety transportation system and is committed to ensuring emergency responders have the information and tools they need to respond to hazardous materials incidents safely. First, PHMSA notes that Class I railroads typically provide and sponsor training for emergency responders along their routes. Additionally, while large-scale LNG incident response training is available through various organizations,43 the currently available training is not specific to rail transportation, and PHMSA and FRA are working jointly with relevant industry experts to ensure the availability of appropriate training resources for emergency responders that include rail-specific information. For example, FRA has already provided grant funding to TRANSCAER® to develop and refine LNG by rail emergency response training.44 Additionally, PHMSA is developing a **Commodity Preparedness and Incident** Management Reference Sheet similar to that which was created for crude oil transportation. This reference sheet will provide emergency response organizations with a standard incident management framework based on preincident planning, preparedness principles, and best practices. Furthermore, it will address transportation safety and precautions; hazard assessment and risk; rail safety procedures; logistics; and the tools, equipment, and resources necessary to prepare for and respond to incidents.

PHMSA required in DOT–SP 20534 that the grantee provide training, conforming to NFPA 472, to emergency response agencies that could be affected between the authorized origin and destination. However, due to the ongoing efforts to ensure adequate emergency response training described above, such a requirement is not necessary in this final rule.

PHMSA is also engaged in outreach activities to educate and gain input from emergency responders directly. In October 2019, PHMSA and the Federal

Emergency Management Agency (FEMA) National Fire Academy (NFA) held a Town Hall Meeting in Lancaster County, Pennsylvania.⁴⁵ The purpose of the Town Hall Meeting was to seek input from and note concerns of the emergency preparedness community and its stakeholders in the mid-Atlantic region-specifically, Pennsylvania and New Jersey, related to LNG transportation. The meeting consisted of a series of technical presentations on LNG transportation risks and incident response protocols. Then, attendees participated in open discussions related to the topic of general rail transportation of LNG. While attendees provided general inputs on issues related to improving the overall effective response capability in the event of a rail incident of LNG, there was no heightened concern regarding the commodity or mode of transportation. PHMSA found that the emergency responders in attendance were well oriented to the challenges of LNG incident response, as they already have LNG transiting through their communities in other modes of transportation and have improved and adjusted their plans to include LNG.

PHMSA is committed to furthering engagement with emergency responders throughout the country regarding the transportation of LNG by rail through various forms of outreach, to include additional Town Hall Meetings, participation at the annual IAFC conference, trainings, and webinars.

2. Current Emergency Planning

Numerous commenters, to include The Village of Barrington, Illinois, expressed concern for the safety of emergency responders. Several individuals stated their belief that current emergency response plans may be insufficient to address a rail incident involving LNG, further noting that an LNG train derailment could cause severe damage to the surrounding area and that first responders would be unable to control any type of fire or explosions. Additionally, some commenters expressed specific concern that there is no way to extinguish an LNG fire, with the only option to let the fire burn out.

Additionally, the NJDEP requested that emergency response plans be in place to prepare local responders better. They also requested that the emergency response plans include the route and an alternative route analysis, developed with the State and local emergency responders impacted, identifying all sensitive receptors within the 1-mile buffer of the route and any alternative routes, with plans on how to protect public health and safety and the environment. They stated that this information should be shared with the States, providing an opportunity for States to comment on routes and planning.

PHMSA Response

PHMSA directs grant programs that are designed to improve hazardous materials safety. For example, the HMEP grants to States, Territories and Native American tribes enhance their emergency response capabilities when dealing with hazardous materials related transportation incidents. The grants, authorized under 49 U.S.C 5116, assists each recipient in performing their hazardous materials response duties and aid in the development, implementation, and improvement of emergency plans for local communities and training for emergency responders to help communities prepare for a potential hazardous materials transportation incident. The hazmat safety grant programs have helped to foster partnerships with State and local communities through ensuring emergency responders are prepared and trained to respond properly to hazmat transportation incidents nationwide. PHMSA believes that these efforts will prepare emergency responders for the risks regarding LNG transportation. PHMSA will continue to assess the effectiveness of these programs and the preparedness of emergency responders. As previously noted, FRA has provided grant funding to TRANSCAER® to develop and refine LNG emergency response training.

Finally, as discussed in Section III of this final rule, PHMSA is revising § 172.820(a) to add a condition requiring any rail carrier transporting a quantity of LNG in a rail tank car to comply with the additional safety and security planning requirements for transportation by rail, which means the rail carrier is subject to collecting commodity data, performing a route analysis, and determining alternative routes. We are further revising the additional planning requirements to add a new condition for rail carriers to factor in transport of LNG to a routing analysis prior to the onset of transport of any loaded tank car of LNG. Once transport of LNG begins for a carrier, it can revert to the standard requirement to compile commodity flow data no later than 90 days after the end of each calendar year and use that data in analyzing the safety and security risks for the transportation

⁴³ For example, the following organizations provide LNG response training: Texas A&M Extension Service (*https://tex.org/program/lng-emergency-response/*) and Northeast Gas Association (*https://www.northeastgas.org/tql-lng-safety.php*).

⁴⁴ See https://www.transcaer.com/training/ online-training-courses/seconds-count-are-youprepared for additional information on TRANSCAER®.

⁴⁵ See the LNG by Rail Transport Town Hall Meeting Report, at: https://www.regulations.gov/ document?D=PHMSA-2019-0100-3005.

route(s), and subsequently identifying alternative routes.

These actions will strengthen the emergency response planning requirements and will assist in getting needed information to emergency responders.

3. Evacuation Distances

Other commenters cited concerns over the feasibility of imposing evacuation distances in an LNG accident. The IAFF commented that an LNG tank car fire would require the evacuation of all people within a 1-mile radius, stating that this would not be possible in most jurisdictions across the United States. They stated that any fire involving multiple LNG cars would place large numbers of the public at risk while depleting many communities of their emergency response resources. They further commented that consequences would be disastrous unless responders receive extensive training specific to an LNG-by-rail event. PSR commented that in the event of an LNG by rail fire and/or explosion, PHMSA would be unable to adequately define the hazard zone and the risk to nearby populations. PSR stated that first responders, health professionals, planners, and concerned citizens would not know the extent of the hazard zone or the nature and degree of risk it poses. PSR further expressed that the dangers clearly call for greater elaboration, including the response measures necessary to minimize harm and protect human life.

Additionally, the City of Zion Fire and Rescue noted that the Emergency Response Guidebook (ERG) uses the same response guidance for LNG and LPG. They stated that a 1-mile evacuation radius would be inadequate for a large LNG fire and that it would not be feasible to implement a larger evacuation distance. Finally, Earthjustice expressed its belief that Sandia and Lawrence Livermore National Lab testing noted that methane fires behave differently than other hydrocarbon fires, and that LNG has a potential for a "wider than anticipated vapor cloud.'

PHMSA Response

PHMSA disagrees that the 1-mile evacuation distance is not possible and further notes that LNG is currently authorized for transportation by cargo tank and that the recommended 1-mile evacuation distance for LNG tank car fires is consistent with response guidance for cargo tank fires involving LNG. Furthermore, ERG recommends a 1-mile evacuation distance for many hazardous materials; therefore, emergency responders are familiar with this recommended distance, having used this guidance for decades. Additionally, PHMSA updates the ERG regularly in consultation with the response community and other experts, and adjusts recommended protective action distances as part of this process.

PHMSA and FRA are aware of, and have extensively reviewed, the available studies on LNG pool fires and evacuation distances. Specifically, PHMSA has reviewed studies conducted by Sandia National Laboratory ⁴⁶ for DOE, a study conducted by ABSG for FERC ⁴⁷ on the hazard characteristics of LNG released over water, and a study on LNG pool fires on land.⁴⁸

The purpose of the ERG and the evacuation distances contained therein is to assist responders in making initial decisions upon arriving at the scene of a hazardous materials transport incident. The ERG should not be considered as substitutes for emergency response training, knowledge, experience, or sound judgment. The ERG also cannot address all possible circumstances that may be associated with a hazardous material release incident. Additionally, each guide page within the ERG provides guidance for responding to incidents involving multiple different but related hazardous materials. In the current 2016 edition of the ERG, LNG has been assigned to Guide 115, "Gases-Flammable (Including Refrigerated Liquids)." Guide 115 provides generalized response recommendations for over 100 different hazardous materials. Therefore, this guide page should only be used until a specific incident can be assessed and more appropriate response measures implemented.

Based on PHMSA's review of available literature on the properties of LNG releases, the current evacuation distances are appropriate. Therefore, PHMSA will make no change to the current evacuation distances for LNG.

4. Modeling Availability

The Delaware Riverkeeper Network expressed concern that there are no publicly available modeling estimates by PHMSA or private consultants on the downwind distances for an LNG by rail release and how it can travel into trackside communities. They further commented that there is a need for candid emergency event training materials for rail workers and local emergency responders.

PHMSA Response

PHMSA notes that various software programs are available to model the dispersion of gases, including LNG. Moreover, PHMSA sponsored a study by the UK Health and Safety Laboratory to develop a Model Evaluation Protocol that can be used to evaluate the suitability of vapor dispersion models for predicting hazard ranges associated with large spills of LNG.⁴⁹ Finally, the ERG provides an initial evacuation distance for flammable gases including LNG.⁵⁰ Therefore, PHMSA believes that there are sufficient tools available to the emergency response community to ensure adequate modeling in the event of an incident.

5. PHMSA Determination Regarding Emergency Response

The existing structure of the HMR to include requirements for security plans, emergency response information, and training—provides for the safe transportation of all hazardous materials. Notably, 49 CFR part 172, subpart G sets forth the applicability and requirements for emergency response information which must be made immediately available to emergency responders. The HMR currently require the following information to accompany a shipment of LNG by rail:

(1) Immediate hazards to health;

(2) Risks of fire or explosion;

(3) Immediate precautions to be taken in the event of an accident or incident;

(4) Immediate methods for handling fires:

(5) Initial methods for handling spills or leaks in the absence of fire; and

(6) Preliminary first aid measures.

PHMSA believes that the current requirements for emergency response information are appropriate for future movement of LNG by rail. Additionally, PHMSA directs comprehensive grant programs that are designed to improve hazardous materials safety. The hazmat safety grant programs have helped to foster partnerships with local communities and universities to provide resources for emergency preparedness and the implementation of best

⁴⁶ https://www.nrc.gov/docs/ML0933/ ML093350855.pdf.

⁴⁷ https://www.ferc.gov/industries/gas/indus-act/ lng/cons-model/cons-model.pdf.

⁴⁸ https://www.researchgate.net/publication/ 327900878_Experimental_Study_of_LNG_Pool_ Fire_on_Land_in_the_Field.

⁴⁹ Evaluating vapor dispersion models for safety analysis of LNG facilities. M.J. Ivings, SE Grant, S.F. Jagger, C.J. Lea, J.R. Steward and D.M. Webber. (September 2016). https://www.nfpa.org/-/media/ Files/News-and-Research/Fire-statistics-andreports/Hazardous-materials/ RFLNGDispersionModelMEP.ashx.

⁵⁰ See section "III. E. 3, Evacuation Distances" for further discussion.

practices regarding hazardous materials safety nationwide.

F. Comments of General Opposition

PHMSA received hundreds of comments expressing general opposition to the overall intent of the NPRM and the provisions proposed therein to authorize the transportation of LNG in rail tank cars. Many of these commenters voiced general concern about the public health, safety, and/or environmental risks of trains carrying bulk quantities of LNG. There was also opposition to the overall timeline of the rule, and PHMSA's authority to issue it.

Specifically, Theresa Pugh Consulting LLC opposed the transportation of LNG by rail in the lower 48 States, noting that Alaska may be an exception because of extreme circumstances that might require the need for LNG transportation by tank car. PSR and various others expressed concern that LNG by rail would pose risks to people living in proximity to rail lines, especially in densely populated urban and suburban areas. PSR specifically stated that it views issuing a national approval for LNG by rail as premature.

The Guardians of Martin County, Inc. and the Alliance for Safe Trains both expressed concern over LNG trains sharing the same track as passenger trains in Florida. The Guardians of Martin County, Inc. noted the age of infrastructure and population density of the area these trains would pass through. The Alliance for Safe Trains noted that a high-speed rail project will be sharing tracks or riding on parallel tracks to trains carrying LNG. Various commenters, including the Surfrider Foundation, commented that the proposals in the NPRM are extremely dangerous. The Surfrider Foundation stated that LNG is a flammable, volatile, and hazardous material with numerous examples of accidents and safety issues. The Surfrider Foundation further stated that one government study put the hazard range for a vapor cloud at more than 1.5 miles.

The Delaware Riverkeeper Network disagreed with the language in AAR's petition suggesting that DOT and Transport Canada maintain consistent requirements for LNG by rail. They stated that there is insufficient justification to change the HMR because no rail cars of LNG have been transported in Canada to date.

PHMSA Response

PHMSA notes that many of these comments did not contain sufficient information or supporting rationale that could be assessed to determine the provisions authorized in this rulemaking. PHMSA agrees with commenters that the risks related to the transportation of LNG by rail should be assessed and properly mitigated to ensure safety for the public and the environment. As outlined above, PHMSA has assessed the risks posed by the transportation of LNG by rail. PHMSA finds that the design elements of the DOT-113C120W9 rail tank car, the operational controls required in this final rule, combined with the existing HMR requirements that would apply and the voluntary industry standards in AAR Circular OT–55, will provide a safe transportation environment for LNG by rail.

PHMSA acknowledges commenters' general opposition to the transport of LNG on routes that bring this material into close proximity to the public. To address this concern, PHMSA is applying the existing additional planning requirements to the transport of LNG in rail tank cars, which include routing analysis requirements, to factor the risk of LNG transport in route planning. In this final rule, there is no geographical limit to LNG train operations, making routing analysis beneficial. This amendment will require railroads to evaluate safety and security risk factors when assessing the potential routes to be used to transport LNG. The 27 safety and security risk factors required by the route risk assessment provide a robust framework for carrier evaluation of the routes considered for use in LNG transportation.

Trains consisting of, and in some cases made up entirely of, rail cars carrying hazardous materials are moved on the same rail lines as passenger trains across the country. For denselypopulated passenger train corridors (e.g., Northeast Corridor and Florida's east coast) railroads typically operate freight trains (with and without hazmat) at night to maximize efficiency and fluidity (i.e., freight trains will not slow down passenger trains, and freight trains will not be placed in sidings to make way for passenger trains). On cross country routes the passenger and freight trains meet with greater frequency. In both cases, the passenger and, more likely, freight trains will be operating under positive train control, which is specifically intended to prevent collisions, or incidents resulting from misaligned switches, incursions into work zones, and overspeed derailments.

G. Comments From the Puyallup Tribe

PHMSA received comments from the Puyallup Tribe of Tacoma, Washington contending that the rulemaking would have potential direct and disparate

impacts on the Tribe and its members. The Puyallup Tribe submitted that the rulemaking will result in rail transportation of LNG crossing its reservation (located within the metropolitan area of Tacoma, Washington) and adjacent areas when travelling to and from Puget Sound Energy's planned Tacoma LNG facility. The Puyallup Tribe asserted that rail traffic entails a number of hazards for the Tribe and its members, including the following: Safety risks associated with the release of LNG being transported by rail; degradation of air quality in the area due to more diesel trains operating in the vicinity of the reservation; an increase in rail traffic that would frustrate quiet enjoyment of Tribal lands; and increased exposure to rising sea levels from climate change.

At the Puyallup Tribe's request, PHMSA personnel held a meeting with representatives of the Puyallup Tribe at PHMSA's headquarters in Washington, DC on February 12, 2020. Attendees at the meeting discussed the Puyallup Tribe's concerns regarding the Tacoma LNG facility, as well as the Puyallup Tribe's written comments submitted in the docket for this rulemaking. A summary of the February 12, 2020 meeting has been posted to the docket. PHMSA contacted representatives of the Puyallup Tribe and made itself available for additional meetings.

PHMSA Response

PHMSA submits that those of the Puyallup Tribe's concerns predicated on potential rail transport of LNG to and from Puget Sound Energy's Tacoma LNG facility are inapposite. The Tacoma LNG facility is regulated by Washington State and not PHMSA. Further, it does not appear that rail transportation of LNG to the Tacoma LNG facility is currently permitted by the terms of that facility's State authorization; rather, Condition 41 of the Puget Sound Air Agency Authorizing Order specifies that the "sole source of natural gas supply used in all operations" at the Tacoma LNG Facility will be from Canada via pipeline.⁵¹ Nor does the Authorizing Order seem to contemplate rail transportation of LNG from that facility; rather, LNG transported from that facility will be transported by truck, or will be converted to natural gas for supply to customers via Puget Sound

⁵¹ See Puget Sound Clean Air Agency, Order of Approval No. 11386 (Dec. 10, 2019) (Authorizing Order); Final Supplemental Environmental Impact Statement: Proposed Tacoma LNG Project at (Mar. 2019) (Tacoma LNG FSEIS). These and other documents in the Puget Sound Clean Air Agency docket can be found at the following link: https:// pscleanair.gov/460/Current-Permitting-Projects.

Energy's natural gas pipeline distribution system.⁵² Indeed, schematics of the Tacoma LNG facility within the Puget Sound Air Agency docket suggest that rail infrastructure neither exists nor is contemplated at the site.⁵³

H. Comments Beyond the Scope of This Rulemaking

PHMSA also received miscellaneous comments opposing the bulk transport of LNG by any mode of transportation (to include highway or pipeline), as well as numerous comments pertaining to the ethical ramifications of fossil fuel extraction and usage. Commenters questioned the ethics of, and requested an end to, fracking, use of fossil fuels, and the practice of transporting coal in open railcars near waterways. Commenters also expressed concerns with LNG trains sharing railways with high-speed trains, and high-speed trains having at grade crossings citing safety concerns. These comments either did not provide recommendations for regulatory action, exceeded the scope of PHMSA's authority, or were not within the scope of this rulemaking.

V. Section-by-Section Review

The following is a section-by-section review of the amendments in this final rule.

A. Section 172.101

Section 172.101 provides the HMT and instructions for its use. PHMSA is amending the entry for "UN1972, Methane, refrigerated liquid" in the HMT to add reference to the cryogenic liquids in (rail) tank cars packaging section—§ 173.319 in Column (8C). Additionally, PHMSA is amending the entry to add a special provision.

B. Section 172.102

Section 172.102 provides the special provisions and instructions for their applications. PHMSA is amending paragraph (c)(1) to add special provision 440. Special provision 440 requires that each tank car used to transport LNG be remotely monitored for pressure and location. Additionally, the offeror must notify the carrier if the tank pressure rise exceeds 3 psig in a 24-hour period.

C. Section 172.820

Section 172.820 prescribes additional safety and security planning requirements for transportation by rail, specifically, commodity data, a rail routing analysis, and identification of practicable alternative(s). Paragraph (a)

of this section provides the applicability for when a rail carrier must comply with the requirements of this section. In this final rule, PHMSA is revising § 172.820(a) to add a condition requiring any rail carrier transporting a quantity of UN1972 ("Methane, refrigerated liquid" (cryogenic liquid) or "Natural gas, refrigerated liquid" (cryogenic liquid)) to comply with the additional safety and security planning requirements for transportation by rail. Further, PHMSA is revising paragraph (b) to remove the initial compliance date applicable to HHFTs as these dates have since passed (*i.e.*, rail carriers subject to the additional planning requirements because of transporting HHFTs had to complete the initial commodity flow data collection by March 31, 2016, using 2015 data), and adding a new condition for rail carriers to factor in transport of LNG (UN1972) to a routing analysis prior to the onset of transport of any loaded tank car of LNG. Once transport of LNG begins for a carrier, it can revert to the standard requirement in paragraph (b) that requires it to compile commodity flow data no later than 90 days after the end of each calendar year and use that data in analyzing the safety and security risks for the transportation route(s), and subsequently identifying alternative routes.

D. Section 173.319

Section 173.319 prescribes requirements for cryogenic liquids transported in rail tank cars. Paragraph (d) provides which cryogenic liquids may be transported in a DOT-113 tank car when directed to this section by Column (8C) of the § 172.101 HMT. PHMSA is amending paragraph (d)(2) to authorize the transport of "Methane, refrigerated liquid" (i.e., LNG). Additionally, PHMSA is amending the Pressure Control Valve Setting or Relief Valve Setting Table in §173.319(d)(2) to specify settings for methane in DOT-113C120W tank cars, specifically, a start-to-discharge pressure valve setting of 75 psig; a design service temperature of -260 °F; a maximum pressure when offered for transportation of 15 psig; and a filling density of 37.3 percent by weight.

E. Section 174.200

Section 174.200 prescribes the special handling requirements for Class 2 materials transported by rail. PHMSA is amending this section to include the operational requirements for trains containing tank cars of LNG. PHMSA is adding paragraph (d), which states that for a single train of 20 or more loaded tank cars of "Methane, refrigerated liquid" in a continuous block or a single train carrying 35 or more loaded tank cars of "Methane, refrigerated liquid" throughout the train, each carrier must ensure the train is equipped and operated with either an EOT device, as defined in 49 CFR 232.5, or a DP system, as defined in 49 CFR 229.5.

F. Section 179.400–5

Section 179.400–5 prescribes the material requirements for the construction of DOT–113 tank cars. Paragraph (b) states that any steel casting, steel forging, steel structural shape or carbon steel plate used to fabricate the outer jacket or heads must be as specified in AAR Specifications for Tank Cars, appendix M. PHMSA is amending this paragraph to require that for tank cars transporting "Methane, refrigerated liquid," the outer shell must be made of AAR TC 128, Grade B normalized steel plate as specified in § 179.100–7(a).

G. Section 179.400–8

Section 179.400-8 prescribes the requirements for plate thickness on the DOT-113 specification tank car. Paragraph (d) states that the minimum wall thickness for the outer jacket shell, after forming, must be no less than 7/ 16th inch and the outer jacket heads must be no less than 1/2 inch thick. PHMSA is amending paragraph (d) to require DOT-113 tank cars used in LNG service to have an outer shell and tank head thickness, after forming, of 9/16th inch. Additionally, the shell and heads must be made of AAR TC 128, Grade B normalized steel plate as specified in §179.100-7(a).

H. Section 179.400–26

PHMSA is adding § 179.400–26 to provide the authorization for a DOT– 113 tank car to be loaded to a gross weight on rail of up to 286,000 pounds (129,727 kg) upon approval by the Associate Administrator for Safety, Federal Railroad Administration (FRA).

I. Section 180.515

Section 180.515 discusses requirements for marking tank cars as part of their continuing qualification for service. In this final rule, PHMSA is adding the new specification suffix "9" to the DOT-113C120W specification to indicate compliance with enhanced outer tank steel and thickness requirements beyond the standard DOT–113C120W specification. In conformance with this change, PHMSA is adding a new paragraph (d) to § 180.515 to require that the "9" suffix always remain marked as part of the specification DOT-113C120W9 for these enhanced tank cars, to distinguish

⁵² See Tacoma LNG FSEIS at 1, 2–2, 2–4 to 2–5. ⁵³ See Tacoma LNG FSEIS at Figures 1–1 and 1–

^{2.}

standard DOT–113C120W tank cars (such as those currently used to transport ethylene) from enhanced DOT–113C120W9 cars authorized for LNG. PHMSA intends this new paragraph to reduce confusion for tank car users.

VI. Regulatory Analyses and Notices

A. Statutory/Legal Authority for This Rulemaking

This rulemaking is published under the authority of the Federal hazmat law. Section 5103(b) of the Federal hazmat law authorizes the Secretary of Transportation to "prescribe regulations for the safe transportation, including security, of hazardous materials in intrastate, interstate, and foreign commerce." The Secretary's authority regarding hazardous materials safety is delegated to PHMSA at 49 CFR 1.97. This rulemaking authorizes the transportation of LNG by rail in DOT-113C120W tank cars, with certain enhanced outer tank requirements, subject to all applicable requirements and certain additional operational controls.

B. Executive Order 12866 and DOT Regulatory Policies and Procedures

This rulemaking is considered a significant regulatory action under section 3(f) of Executive Order 12866, "Regulatory Planning and Review" [58 FR 51735 (October 4, 1993)], and was reviewed by the Office of Management and Budget (OMB). This rulemaking is also considered a significant rulemaking under the DOT regulations governing rulemaking procedures (49 CFR part 5). E.O. 12866 requires agencies to regulate in the "most cost-effective manner," to make a "reasoned determination that the benefits of the intended regulation justify its costs," and to develop regulations that "impose the least burden on society." Similarly, DOT regulations require that regulations issued by PHMSA and other DOT Operating Administrations "should be designed to minimize burdens and reduce barriers to market entry whenever possible, consistent with the effective promotion of safety" and should generally "not be issued unless their benefits are expected to exceed their costs." § 5.5(f)–(g).

Additionally, E.O. 12866 and DOT regulations require agencies to provide a meaningful opportunity for public participation, which also reinforces requirements for notice and comment under the APA.⁵⁴ Therefore, in the previously published NPRM, PHMSA sought public comment on revisions to the HMR authorizing the transportation of LNG by rail tank car. PHMSA also sought comment on the preliminary cost and cost savings analyses, as well as any information that could assist in quantifying the benefits of this rulemaking. Those comments are addressed, and additional discussion about the economic impacts of the final rule are provided, within the final RIA posted in the docket.⁵⁵

This final rule adopts the proposal in the NPRM, with certain amendments, to allow the transportation of LNG by rail in an authorized tank car. Under current regulatory standards, LNG is not authorized for transportation by tank car. Therefore, this final rule is considered an enabling rule.

In promulgating this final rule, PHMSA is providing a path for potential benefits that would not otherwise be gained in the absence of this rulemaking, such as increased transportation efficiency, increased modal safety, expanded fuel usage, improved accessibility to remote regions, and increased U.S. energy competitiveness. These benefits are described qualitatively in the Final RIA. The final rule essentially prescribes packaging for a flammable cryogenic material (*i.e.*, LNG) for shippers and rail carriers who choose to transport LNG by rail. The discretionary and voluntary decision of a shipper and railroad company to transport LNG by rail, upon implementation of this final rule, requires full compliance with all existing regulations governing the transportation of flammable cryogenic materials, and the operation of freight and other non-passenger train services; as well as the additional requirements adopted under the final rule, namely, enhanced outer tank design and material standards and operational controls supplemental to the existing operational controls in the HMR.

C. Executive Order 13771

This rulemaking is expected to be an Executive Order 13771 deregulatory action. Details on the estimated cost savings of this final rule can be found in the final RIA posted in the docket.⁵⁶

D. Executive Order 13132

This rulemaking was analyzed in accordance with the principles and criteria contained in Executive Order 13132, "Federalism." This rulemaking may preempt State, local, and Tribal requirements but does not amend any regulation that has substantial direct effects on the States, the relationship between the Federal government and the States, or the distribution of power and responsibilities among the various levels of government. Therefore, the consultation and funding requirements of E.O. 13132 do not apply.

Federal hazmat law, 49 U.S.C. 5101– 5128, contains express preemption provisions relevant to this proceeding. As amended by Section 1711(b) of the Homeland Security Act of 2002 (Pub. L. 107-296, 116 Stat. 2319), 49 U.S.C. 5125(a) provides that a requirement of a State, political subdivision of a State, or Indian tribe is preempted—unless the non-Federal requirement is authorized by another Federal law or DOT grants a waiver of preemption under section 5125(e)—if (1) complying with the non-Federal requirement and the Federal requirement is not possible (dual compliance test); or (2) the non-Federal requirement, as applied and enforced, is an obstacle to accomplishing and carrying out the Federal requirement (obstacle test).

Additionally, 49 U.S.C. 5125(b)(1) provides that a non-Federal requirement concerning any of five subjects is preempted when the non-Federal requirement is not "substantively the same as" a provision of Federal hazmat law, a regulation prescribed under that law, or a hazardous materials security regulation or directive issued by the Department of Homeland Security (covered subjects test).⁵⁷ To be "substantively the same," the non-Federal requirement must conform "in every significant respect to the Federal requirement. Editorial and other similar de minimis changes are permitted." The subject areas covered under this authority are:

(1) The designation, description, and classification of hazardous materials;

(2) The packing, repacking, handling, labeling, marking, and placarding of hazardous materials;

(3) The preparation, execution, and use of shipping documents related to hazardous materials and requirements related to the number, contents, and placement of those documents;

(4) The written notification, recording, and reporting of the unintentional release in transportation of hazardous material; and

(5) The design, manufacture, fabrication, marking, maintenance, recondition, repair, or testing of a packaging or container represented, marked, certified, or sold as qualified

^{54 5} U.S.C. 553; 49 CFR 5.5(i).

⁵⁵ See Docket No. PHMSA–2018–0025 at www.regulations.gov. ⁵⁶ Id.

⁵⁷ Unless the non-Federal requirement is authorized by another Federal law or DOT grants a waiver of preemption under 49 CFR 5125(e).

for use in transporting hazardous material.

This rule addresses subject items (2) and (5) above, which are covered subjects, and therefore, non-Federal requirements that fail to meet the "substantively the same" standard are vulnerable to preemption under the Federal hazmat law. Moreover, PHMSA will continue to make preemption determinations applicable to specific non-Federal requirements on a case-bycase basis, using the obstacle, dual compliance, and covered subjects tests provided in Federal hazmat law.

Federal preemption also may exist pursuant to section 20106 of the former Federal Railroad Safety Act of 1970 (FRSA), repealed, revised, reenacted, and recodified at 49 U.S.C. 20106, and the former Safety Appliance Acts (SAA), repealed revised, reenacted, and recodified at 49 U.S.C. 20301-20304, 20306. Section 20106 of the former FRSA provides that States may not adopt or continue in effect any law, regulation, or order related to railroad safety or security that covers the subject matter of a regulation prescribed or order issued by the Secretary of Transportation (with respect to railroad safety matters) or the Secretary of Homeland Security (with respect to railroad security matters), except when the State law, regulation, or order qualifies under the section's "essentially local safety or security hazard." The former SAA has been interpreted by the Supreme Court as preempting the field "of equipping cars with appliances intended for the protection of employees." Southern Ry. Co. v. R.R. Comm'n of Ind., 236 U.S. 439, 446 (1915). The train's power braking system is considered a safety mechanism within the terms of the former SAA. 49 U.S.C. 20302(a)(5).

E. Executive Order 13175

This rulemaking was analyzed in accordance with the principles and criteria contained in Executive Order 13175. "Consultation and Coordination with Indian Tribal Governments" and DOT Order 5301.1, "Department of Transportation Policies, Programs, and Procedures Affecting American Indians, Alaska Natives, and Tribes." The Department assessed the impact of the rulemaking on Indian tribal governments and determined that it would not significantly or uniquely affect Tribal communities or Indian tribal governments because it neither sets national requirements for transporting LNG via rail, nor imposes substantial compliance costs on Indian tribal governments, nor mandates Tribal action.

PHMSA is committed to satisfying its obligations under E.O. 13175 and DOT Order 5301.1 related to Tribal outreach to ensure meaningful and timely engagement of Tribal governments in PHMSA rulemaking. As discussed above, PHMSA personnel have conducted a face-to-face meeting with representatives of the Puyallup Tribe to solicit their concerns during the development of this final rule. PHMSA has addressed those concerns, as well as the written comments submitted by the Puyallup Tribe, in the final rule and final EA. Further, since the February 2020 meeting with the Puyallup Tribe, PHMSA has contacted representatives of the Puyallup Tribe and extended invitations for follow-up meetings with PHMSA leadership. The Puyallup Tribe has not accepted PHMSA's invitation to conduct further meetings.

F. Regulatory Flexibility Act, Executive Order 13272, and DOT Policies and Procedures

This rulemaking complies with the Regulatory Flexibility Act (5 U.S.C. 601 et seq.), which requires agencies to consider whether a rulemaking would have a "significant economic impact on a substantial number of small entities" to include small businesses, not-forprofit organizations that are independently owned and operated and are not dominant in their fields, and governmental jurisdictions with populations under 50,000. This rulemaking has been developed in accordance with Executive Order 13272, "Proper Consideration of Small Entities in Agency Rulemaking", and DOT's procedures and policies to promote compliance with the Regulatory Flexibility Act to ensure that potential impacts of draft rules on small entities are properly considered.

(1) a statement of the need for, and objectives of, the rule.

The amendments to the HMR made in this final rule, which enable LNG to be transported by rail, are intended to provide relief by authorizing the transportation of LNG in tank cars with enhanced crashworthiness features and additional operational controls with no anticipated reduction in safety. This final rule creates options for transporting LNG, which otherwise would be limited to trucks, or maritime transportation modes; or, alternately, regasification and movement by pipeline in a gas state. This rule enables movement by rail, thereby giving shippers an alternate mode that may offer cost or other advantages over existing permitted modes to ship LNG. It lifts the blanket prohibition on movement of LNG by rail tank cars.

(2) a statement of the significant issues raised by the public comments in response to the initial regulatory flexibility analysis, a statement of the assessment of the agency of such issues, and a statement of any changes made in the proposed rule as a result of such comments.

PHMSA addressed public comments filed under the NPRM, as well as the Special Permit. The comments were addressed by topic and addressed accordingly. Please refer to Section IV. "Summary and Discussion of Comments to the Rulemaking Docket," of the preamble.

(3) the response of the agency to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration in response to the proposed rule, and a detailed statement of any change made to the proposed rule in the final rule as a result of the comments.

PHMSA did not receive comments filed on behalf of the Chief Counsel for Advocacy at the Small Business Administration (SBA).

(4) a description of and an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available.

The Regulatory Flexibility Act of 1980 requires a review of proposed and final rules to assess their impact on small entities, unless the Secretary certifies that the rule would not have a significant economic impact on a substantial number of small entities. "Small entity" is defined in 5 U.S.C. 601 as a small business concern that is independently owned and operated, and is not dominant in its field of operation. As far as the railroad industry, the SBA stipulates in its size standards that a "small entity" in the railroad industry is a for profit "line-haul railroad" that has fewer than 1,500 employees, a "short line railroad" with fewer than 1,500 employees, a "commuter rail system" with annual receipts of less than \$16.5 million, or a contractor that performs support activities for railroads with annual receipts of less than \$16.5 million.58

Federal agencies may adopt their own size standards for small entities in consultation with SBA and in conjunction with public comment. Under that authority, FRA has published a final statement of agency policy that formally establishes "small

⁵⁸ U. S. Small Business Administration, "Table of Small Business Size Standards Matched to North American Industry Classification System Codes, August 19, 2019. https://www.sba.gov/sites/default/ files/2019-08/

SBA%20Table%20of%20Size%20Standards_ Effective%20Aug%2019,%202019.pdf.

entities" or "small businesses" as railroads, contractors, and hazardous materials shippers that meet the revenue requirements of a Class III railroad as set forth in 49 CFR 1201.1–1, which is \$20 million or less in inflation-adjusted annual revenues,⁵⁹ and commuter railroads or small governmental jurisdictions that serve populations of 50,000 or less. *See* 68 FR 24891 (May 9, 2003) (codified at 49 CFR part 209, appendix C). PHMSA is using this definition for the rule.

The final rule would be applicable to all railroads, although not all requirements would be relevant to all railroads. Railroads operating on the general system are required to use twoway EOT regardless of type of load unless exempted under 49 CFR 232.407(e). Two-way EOT devices cost approximately \$4,000. As stated in the Final RIA, most Class III railroads, due to their type of train operation, are not required to have two-way EOT devices, except in certain situations. FRA regulations provide exceptions from the requirement to use two-way EOT device in 49 CFR 232.407(e). For Class III railroads that would be required to install two-way EOT devises, the monetary burden of the requirement to purchase and install those devices is less than 1% of the average annual revenue of small railroad entities. Therefore, the impact of this requirement is also minimal.

As further stated in the Final RIA, there are two other types of entities that are subject to the rule in addition to railroad companies: shippers, and tank car manufacturers (to the extent of design specifications). There are three main types of shippers: oil and gas companies, chemical companies and oil and fuel logistics companies. PHMSA estimated the number of small entities that could potentially be impacted by this rule using its own registration data and the Dun and Bradstreet data.

PHMSA first queried pipeline-related entities. The SBA definition of a small entity for those business categories is set at 1,000 employees or, in the case of annual revenue thresholds, is set at \$27.5 million. PHMSA applied the following NAICS codes for this analysis: 211130 Natural Gas Extraction, 213111 Drilling Oil and Gas Wells, 213112 Support Activities for Oil and Gas Operations, 325110 Petrochemical Manufacturing, 325199 All Other Basic Organic Chemical Manufacturing, and 486210 Pipeline Transportation of Natural Gas. PHMSA's queries identified a total of nine small entities: six under 213112 Support Activities for Oil and Gas Operations and three under 486210 Pipeline Transportation of Natural Gas.

PHMSA also conducted a similar but broader query of companies that may potentially ship LNG by rail using PHMSA's PDM system in conjunction with the Dun and Bradstreet data. The query identified several potential subsets of SBA-size small entities; however, there is considerable overlapping in definitions and variation in operations among the codes to render a specific number(s). One possibly relevant NAICS code for this rule is industrial gas manufacturing (NAICS 32512). This industry is comprised of establishments primarily engaged in the manufacturing of organic and inorganic gasses in compressed, liquid or solid forms. The industry has a 529 entities earning a total of almost \$10 billion in annual sales in the U.S. (2018). The companies are comprised mainly of large well-established entities. A small entity within that industry has an annual revenue of \$28.23 billion (2019). The cost burden to shippers of this rule consist of the purchase and installation expense of remote monitoring devices and of a thicker outer tank for DOT-113 Tank Car in LNG Service. As stated in the Final RIA, the current estimated cost of remote monitoring devices is approximately \$2,400-\$4,000 per car depending upon the vendor plus additional costs for monitoring software. The estimated cost of the requirement to install 9/16-inch outer shell on all DOT-113 tank cars in LNG service is an additional \$15,000 to \$20,000 for the additional and higher-quality steel, plus \$3,000-\$5,000 for additional construction expenses. The base cost of an existing 7/16-inch outer tank DOT– 113 is approximately \$725,000. PHMSA concludes that the impact of this rule is less than 1% of average annual revenue for these entities.

Therefore, PHMSA concludes that this rule does not impose a significant burden on small entities in this category.

(5) a description of the projected reporting, recordkeeping and other compliance requirements of the rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record.

PHMSA is revising 49 CFR 172.820 to require any rail carrier transporting a tank car quantity of UN1972 (Methane, refrigerated liquid (cryogenic liquid) or Natural gas, refrigerated liquid (cryogenic liquid)) to comply with the additional safety and security planning requirements for transportation by rail. PHMSA estimates that this rule does not impose a significant information collection and recordkeeping burdens on small entities. Please refer to Section VI.G., "Paperwork Reduction Act," of the preamble for additional information about the potential burdens associated with this requirement.

(6) a description of the steps the agency has taken to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule and why each one of the other significant alternatives to the rule considered by the agency which affect the impact on small entities was rejected.

The Regulatory Flexibility Act directs agencies to establish exceptions and differing compliance standards for small entities, where it is possible to do so and still meet the objectives of applicable regulatory statutes. PHMSA considered three regulatory alternatives (including a "no action" alternative) when developing the NPRM. The alternatives (other than the 'no action' alternative) were designed in accordance with necessary safety, engineering and operational specifications. These specifications, as such, do not provide leeway for variation of design or degrees of stringency. The chemical characteristics of LNG combined with the potential to be transported in blocks of 20 or more tank cars or unit trains require specific packaging (i.e. tank car) which costs approximately \$750,000 per tank car according to PHMSA and FRA estimates. The operational control specifications, as mentioned above, do not impose a significant monetary burden on small entities.

Other entities subject to this rule include rail tank car manufacturers. Although PHMSA does not regulate these entities, it does regulate the design specifications of rail tank cars. PHMSA estimates there are approximately seven rail tank car manufacturers in the U.S., none of which are considered small entities. The impact of the rule, in this case, is potentially positive, since it will generate new purchase order opportunities for those entities.

⁵⁹ The Class III railroad revenue threshold is \$39,194,876 or less, for 2018. (The Class II railroad threshold is between \$39,194,876 and \$489,935,956; and the Class I railroad threshold is \$489,935,956 or more.) *See* Surface Transportation Board (STB), available at *https://www.stb.gov/ econdata.nsf/*

d03c0c2161a050278525720a0044a825/ 1acf737531cf98ce8525841e0055e02e.

G. Paperwork Reduction Act

Section 1320.8(d), Title 5, Code of Federal Regulations requires that PHMSA provide interested members of the public and affected agencies an opportunity to comment on information collection and recordkeeping requests. As detailed in Section V.C. "Section172.820", PHMSA is requiring any rail carrier transporting a tank car quantity of UN1972 (Methane, refrigerated liquid (cryogenic liquid) or Natural gas, refrigerated liquid (cryogenic liquid)) to comply with the additional safety and security planning requirements for transportation by rail. PHMSA currently accounts for burden associated with safety and security planning requirements in OMB Control Number 2137–0612, "Hazardous Materials Security Plans." PHMSA estimates that this revision will lead to the following increase in burden:

Annual Increase in Number of Respondents: 0.

Annual Increase in Number of Responses: 8.

Annual Increase in Burden Hours: 677.

Annual Increase in Salary Costs: \$41,170.

Under the Paperwork Reduction Act of 1995 (Pub. L. 96–511), no person is required to respond to an information collection unless it has been approved by OMB and displays a valid OMB control number. As this revision was not proposed in the NPRM, PHMSA will publish a separate 60-day and 30-day notice to provide an opportunity for public comment on the proposed estimated increase in burden.

Requests for a copy of this information collection should be directed to Steven Andrews or Shelby Geller, Office of Hazardous Materials Standards, Pipeline and Hazardous Materials Safety Administration, 1200 New Jersey Avenue SE, Washington, DC 20590–0001, Telephone (202) 366–8553.

H. Regulation Identifier Number (RIN)

A regulation identifier number (RIN) is assigned to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. The RIN contained in the heading of this document can be used to crossreference this action with the Unified Agenda.

I. Unfunded Mandates Reform Act

Unfunded Mandate Reform Act of 1995 (UMRA), 2 U.S.C. 1501 *et seq.,* requires agencies to assess the effects of Federal regulatory actions on State,

local, and Tribal governments, and the private sector.⁶⁰ For any NPRM or final rule that includes a Federal mandate that may result in the expenditure by State, local, and Tribal governments, in the aggregate of \$100 million or more (or \$169 million adjusted for inflation) in any given year, the agency must prepare, amongst other things, a written statement that qualitatively and quantitatively assesses the costs and benefits of the Federal mandate.⁶¹ A Federal mandate is defined, in part, as a regulation that imposes an enforceable duty upon State, local, or Tribal governments or would reduce or eliminate the amount of authorization of appropriation for Federal financial assistance that would be provided to State, local, or Tribal governments for the purpose of complying with a previous Federal mandate.62

The NPRM concluded that the rulemaking does not impose unfunded mandates because it does not result in costs of \$169 million or more, adjusted for inflation, to either State, local, or Tribal governments, in the aggregate, or to the private sector and is the least burdensome alternative that achieves the objective of the rulemaking.

In response to the NPRM, Theresa Pugh Consulting, LLC argued that the UMRA requires that PHMSA analyze the costs that State, local, or Tribal governments might incur as a result of responding to potential emergencies caused by the transportation of LNG in rail tank cars.

The final rule, as revised based on comments received, does not include a Federal mandate that may result in an aggregate expenditure by State, local, and Tribal governments of \$169 million or more. Additionally, the final rule does not impose a requirement on State, local, or Tribal governments, much less a requirement that the DOT can enforce. In the event State, local, or Tribal governments need additional resources to plan for a potential LNG-related accident, they may request grants from PHMSA's Hazardous Materials Emergency Preparedness funds, established under 49 U.S.C. 5116(h), to support development, improve, and carry out emergency plans.

In conclusion, this final rule does not impose unfunded mandates under the UMRA of 1995. It does not result in costs of \$169 million or more to either State, local, or Tribal governments, in the aggregate, or to the private sector, and it is the least burdensome alternative that achieves the objective of the rulemaking.

J. Environmental Assessment

The National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4321 et seq., requires Federal agencies to consider the consequences of major Federal actions and prepare a detailed statement on actions significantly affecting the quality of the human environment. The Council on Environmental Quality (CEQ) implementing regulations (40 CFR part 1500–1508) require Federal agencies to conduct an environmental review considering (1) the need for the action, (2) alternatives to the action, (3) probable environmental impacts of the action and alternatives, and (4) the agencies and persons consulted during the consideration process (see 40 CFR 1508.9(b)). DOT Order 5610.1C, "Procedures for Considering Environmental Impacts," establishes departmental procedures for evaluation of environmental impacts under NEPA and its implementing regulations.

PHMSA has completed its NEPA analysis. Based on the environmental assessment, PHMSA determined that an environmental impact statement is not required for this rulemaking because it does not constitute an action meeting the criteria that normally requires the preparation of an environmental impact statement. As explained in the final EA, PHMSA has found that the selected action will not have a significant impact on the human environment in accordance with Section 102(2) of NEPA.

PHMSA issued and solicited comments on a draft EA posted to the docket along with the NPRM. The final EA and Finding of No Significant Impact has been placed into the docket addressing the comments received.

K. Privacy Act

In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, including any personal information the commenter provides, to *http:// www.regulations.gov*, as described in the system of records notice (DOT/ALL– 14 FDMS), which can be reviewed at *http://www.dot.gov/privacy*.

L. Executive Order 13609 and International Trade Analysis

Under Executive Order 13609 ("Promoting International Regulatory Cooperation"), agencies must consider whether the impacts associated with significant variations between domestic and international regulatory approaches

^{60 2} U.S.C. 1531.

⁶¹ Id. at 1532.

⁶² Id. at 658(5)(A), 1555.

are unnecessary or may impair the ability of American business to export and compete internationally. *See* 77 FR 26413 (May 4, 2012). In meeting shared challenges involving health, safety, labor, security, environmental, and other issues, international regulatory cooperation can identify approaches that are at least as protective as those that are or would be adopted in the absence of such cooperation. International regulatory cooperation can also reduce, eliminate, or prevent unnecessary differences in regulatory requirements.

Similarly, the Trade Agreements Act of 1979 (Pub. L. 96-39), as amended by the Uruguay Round Agreements Act (Pub. L. 103–465), prohibits Federal agencies from establishing any standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. For purposes of these requirements, Federal agencies may participate in the establishment of international standards, so long as the standards have a legitimate domestic objective, such as providing for safety, and do not operate to exclude imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards.

PHMSA participates in the establishment of international standards to protect the safety of the American public. PHMSA has assessed the effects of the rulemaking to ensure that it does not cause unnecessary obstacles to foreign trade. Insofar as the final rule authorizes rail transportation of LNG to domestic U.S. and other North American markets, it would promote foreign trade. Further, the final rule's authorization of rail transportation of LNG aligns U.S. practice with Transport Canada regulations permitting rail transportation of LNG. Accordingly, this rulemaking is consistent with Executive Order 13609 and PHMSA's obligations under the Trade Agreement Act, as amended.

M. Executive Order 13211

Executive Order 13211 ("Actions **Concerning Regulations That** Significantly Affect Energy Supply, Distribution, or Use") [66 FR 28355; May 18, 2001] requires Federal agencies to prepare a Statement of Energy Effects for any "significant energy action." Under the executive order, a "significant energy action" is defined as any action by an agency (normally published in the Federal Register) that promulgates, or is expected to lead to the promulgation of, a final rule or regulation (including a notice of inquiry, Advance NPRM, and NPRM) that (1)(i) is a significant regulatory action under Executive Order 12866 or any successor order and (ii) is likely to have a significant adverse effect on the supply, distribution, or use of energy (including a shortfall in supply, price increases, and increased use of foreign supplies); or (2) is designated by the Administrator of the Office of Information and Regulatory Affairs (OIRA) as a significant energy action.

This final rule is a significant action under E.O. 12866 because OIRA believes it raises novel, legal, and policy issues arising out of legal mandates; however, it is expected to have an annual effect on the economy of less than \$100 million. Further, this action is not likely to have a significant adverse effect on the supply, distribution or use of energy in the United States. The Administrator of OIRA has not designated the final rule as a significant energy action. For additional discussion of the anticipated economic impact of this rulemaking, please review the final RIA.

List of Subjects

49 CFR Part 172

Education, Hazardous materials transportation, Hazardous waste, Incorporation by reference, Labeling, Packaging and containers, Reporting and recordkeeping requirements.

49 CFR Part 173

Hazardous materials transportation, Incorporation by reference, Packaging and containers, Radioactive materials, Reporting and recordkeeping requirements, Uranium.

49 CFR Part 174

Hazardous materials transportation, Incorporation by reference, Radioactive materials, Railroad safety.

49 CFR Part 179

Hazardous materials transportation, Railroad safety, Reporting and recordkeeping requirements.

49 CFR Part 180

Hazardous materials transportation, Incorporation by reference, Motor carriers, Motor vehicle safety, Packaging and containers, Railroad safety, Reporting and recordkeeping requirements.

In consideration of the foregoing, PHMSA amends 49 CFR chapter I as follows:

PART 172—HAZARDOUS MATERIALS TABLE, SPECIAL PROVISIONS, HAZARDOUS MATERIALS COMMUNICATIONS, EMERGENCY RESPONSE INFORMATION, TRAINING REQUIREMENTS, AND SECURITY PLANS

■ 1. The authority citation for part 172 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.81, 1.96 and 1.97.

■ 2. In § 172.101, revise the table entry for "Methane, refrigerated liquid (cryogenic liquid) or Natural gas, refrigerated liquid (cryogenic liquid), with high methane content)" (UN1972) to read as follows:

§ 172.101 Purpose and use of the hazardous materials table.

* * * *

	Hazardous materials descriptions and	Hazard Identificatio class or No.		PG	Label codes	Special provisions (§ 172.102)	(8) Packaging (§ 173.***)		(9) Quantity limitations (<i>see</i> §§ 173.27 and 175.75)		(10) Vessel stowage		
Haz Symbols de P			Identification										
	proper snipping names		NO.				Exceptions	Non-bulk	Bulk	Passenger aircraft/rail	Cargo aircraft only	Location	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	*	*		*		*	*		*		*		
	Methane, refrig- erated liquid (cryo- genic liquid) or Natural gas, refrig- erated liquid (cryo- genic liquid), with high methane con- tent).	2.1	UN1972		2.1	T75, TP5, 440.	None	None	318, 319	Forbidden	Forbidden	D	40
	*	*		*		*	*		*		*		

§ 172.101—HAZARDOUS MATERIALS TABLE

■ 3. In § 172.102, amend paragraph (c)(1) by adding special provision 440 under "Code/Special Provisions" to read as follows:

§172.102 Special provisions.

* * * (C) * * * (1) * * *

Code/Special Provisions

* * * *

440 When this material is transported by tank car, the offeror must ensure each tank car is remotely monitored for pressure and location. Additionally, the offeror must notify the carrier if the tank pressure rise exceeds 3 psig over any 24hour period.

■ 4. In § 172.820, revise paragraphs (a) and (b)(1) to read as follows:

§ 172.820 Additional planning requirements for transportation by rail.

(a) *General.* Each rail carrier transporting in commerce one or more of the following materials is subject to the additional safety and security planning requirements of this section: (1) More than 2,268 kg (5,000 lbs.) in a single carload of a Division 1.1, 1.2 or 1.3 explosive;

(2) A quantity of a material poisonous by inhalation in a single bulk packaging;

(3) A highway route-controlled quantity of a Class 7 (radioactive) material, as defined in § 173.403 of this subchapter;

(4) A high-hazard flammable train (HHFT) as defined in § 171.8 of this subchapter; or

(5) A quantity of UN1972 (Methane, refrigerated liquid or Natural gas, refrigerated liquid) when transported in a rail tank car.

(b) * * *

(1) Commodity data must be collected by route, a line segment or series of line segments as aggregated by the rail carrier. Within the rail carrier selected route, the commodity data must identify the geographic location of the route and the total number of shipments by UN identification number for the materials specified in paragraph (a) of this section.

(i) A rail carrier subject to additional planning requirements of this section

based on paragraph (a)(5) of this section that has yet to transport UN 1972, must factor in planned shipments of UN 1972 to the commodity data for use in the paragraph (c) route analysis prior to initial transport of the material.

(ii) [Reserved]

PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

■ 5. The authority citation for part 173 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.81, 1.96 and 1.97.

■ 6. In § 173.319, revise paragraph (d)(2) to read as follows:

§173.319 Cryogenic liquids in tank cars.

*

*

* * (d) * * *

(2) Ethylene, hydrogen (minimum 95 percent parahydrogen), and methane, cryogenic liquids must be loaded and shipped in accordance with the following table:

TABLE 1 TO § 173.319(D)—PRESSURE CONTROL VALVE SETTING OR RELIEF VALVE SETTING

Maximum start-to-discharge pressure	Maximum permitted filling density (percent by weight)							
(psig)	Ethylene	Ethylene	Ethylene	Hydrogen	Methane			
17				6.60				
45	52.8							
75		51.1	51.1		37.3.			
Maximum pressure when offered for transportation.	10 psig	20 psig	20 psig		15 psig.			
Design service temperature	Minus 260 °F	Minus 260 °F	Minus 155 °F	Minus 423 °F	Minus 260 °F.			
Specification (<i>see</i> §180.507(b)(3) of this subchapter).	113D60W, 113C60W	113C120W	113D120W	113A175W, 113A60W	113C120W9.			

Note: For DOT 113 cryogenic tank cars, delimiters indicate the following:

A-authorized for minus 423 °F loading;

C-authorized for minus 260 °F loading;

D—authorized for minus 155 °F loading.

The specification suffix "9" indicates the tank car is equipped with (minimum) 9/16 inch TC 128B normalized steel outer jacket and tank heads.

PART 174—CARRIAGE BY RAIL

 7. The authority citation for part 174 continues to read as follows:

Authority: 49 U.S.C. 5101–5128; 33 U.S.C. 1321; 49 CFR 1.81 and 1.97.

■ 8. In § 174.200, add paragraph (d) to read as follows:

§174.200 Special handling requirements.

(d) For a single train of 20 or more loaded tank cars of Methane, refrigerated liquid in a continuous block or a single train carrying 35 or more loaded tank cars of Methane, refrigerated liquid throughout the train consist, each carrier must ensure the train is equipped and operated with either 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.

PART 179—SPECIFICATIONS FOR TANK CARS

■ 9. The authority citation for part 179 continues to read as follows:

Authority: 49 U.S.C. 5101–5128; 49 CFR 1.81 and 1.97.

■ 10. In § 179.400–5, revise paragraph (b) to read as follows:

*

§179.400-5 Materials.

* * *

(b)(1) Any steel casting, steel forging, steel structural shape or carbon steel plate used to fabricate the outer jacket or heads must be as specified in AAR Specifications for Tank Cars, appendix M. (2) For DOT-113C120W9 tank cars, the outer jacket shell and outer jacket heads must be made of AAR TC-128, Grade B normalized steel plate as specified in § 179.100-7(a).

■ 11. In § 179.400–8, revise paragraph (d) to read as follows:

§179.400-8 Thickness of plates.

(d)(1) The minimum wall thickness, after forming, of the outer jacket shell may not be less than 7_{16} inch. The minimum wall thickness, after forming, of the outer jacket heads may not be less than 1/2 inch and they must be made from steel specified in § 179.16(c).

(2) For DOT 113C120W9 tank cars, the minimum wall thickness of the outer jacket shell and the outer jacket heads must be no less than $\frac{9}{16}$ inch after forming, and must be made of AAR TC-128, Grade B normalized steel plate.

(3) The annular space is to be evacuated, and the cylindrical portion of the outer jacket between heads, or between stiffening rings if used, must be designed to withstand an external pressure of 37.5 psig (critical collapsing pressure), as determined by the following formula:

 $P_c = [2.6E(t/D)^{2.5}]/[(L/D) - 0.45(t/D)^{0.5}]$ Where:

- P_c = Critical collapsing pressure (37.5 psig minimum) in psig;
- E = modulus of elasticity of jacket material, in psi;
- t = minimum thickness of jacket material, after forming, in inches;
- D = outside diameter of jacket, in inches;
- L = distance between stiffening ring centers in inches. (The heads may be considered

as stiffening rings located ¹/₃ of the head depth from the head tangent line.)

■ 12. Add § 179.400–26 to read as follows:

§ 179.400–26 Approval to operate at 286,000 gross rail load (GRL).

A tank car may be loaded to a gross weight on rail of up to 286,000 pounds (129,727 kg) upon approval by the Associate Administrator for Safety, Federal Railroad Administration (FRA). *See* § 179.13.

PART 180—CONTINUING QUALIFICATION AND MAINTENANCE OF PACKAGINGS

■ 13. The authority citation for part 180 continues to read as follows:

Authority: 49 U.S.C. 5101–5128; 49 CFR 1.81 and 1.97.

■ 14. In § 180.515, add paragraph (d) to read as follows:

§180.515 Markings.

* * * *

(d) The specification marking for DOT 113 tank cars built in accordance with the DOT 113C120W9 specification must display the last numeral of the specification number (*i.e.*, "DOT 113C120W9").

Issued in Washington, DC, on June 19, 2020, under authority delegated in 49 CFR 1.97.

Howard R. Elliott,

Administrator, Pipeline and Hazardous Materials Safety Administration.

[FR Doc. 2020–13604 Filed 7–23–20; 8:45 am] BILLING CODE 4910–60–P agencies are seeking input on a durable definition of 'waters of the United States' not limited to the scope of the regulatory processes announced on June 9, 2021." The agencies offer the following clarification. During the regional roundtables, the agencies anticipate discussing issues related to "waters of the United States" that will be applicable to the agencies' second rulemaking. The regional roundtables will serve as one part of a robust preproposal outreach and engagement strategy—including but not limited to consultation and engagement with state and tribal co-regulators-to gain an understanding of the scope of potential issues to address in the second rulemaking.

The October 25, 2021 **Federal Register** document also states: "The agencies are inviting stakeholders to organize interested parties and regional participants that comprise up to 15 representatives for these roundtables." The agencies offer the following clarification. The agencies are requesting that stakeholders or organizations nominate an entire group of no more than 15 people (including the organizer) who represent diverse perspectives. Individuals should not nominate themselves alone to the agencies.

The document also states: "Each nomination for a roundtable must include a proposed slate of participants representing perspectives of: Agriculture; conservation groups; developers; drinking water/wastewater management; environmental organizations; environmental justice communities; industry; and other key interests in that region." The agencies offer the following clarification. The agencies will consider nominations that lack representation from one or more of the named stakeholder groups. However, the agencies will give more weight in the selection process to those nominations that include stakeholders representing a more robust and wider range of perspectives.

The **Federal Register** document also stated: "The agencies anticipate coordinating with elected officials that represent the location of selected roundtables." The agencies offer the following clarification. The agencies' intent is to coordinate with relevant states, tribes, and Alaska Native Villages regarding potential participation in selected roundtables.

The **Federal Register** document further stated: "EPA cannot hold inperson public meetings at this time. The agencies will host these roundtables virtually. . . . The agencies also intend to livestream each roundtable to make them available for public viewing." The agencies offer the following clarification. Information on how to access the livestream will be posted on the agencies' websites once the roundtable dates/times have been established.

Additionally, the **Federal Register** document did not include information on roundtable agenda, format, or logistics. The agencies would like to clarify that roundtables will be run by a facilitator and will be scheduled for no more than two and a half hours in duration.

Additionally, the agencies will coordinate with roundtable organizers on further implementation planning once roundtables are selected.

Jaime A. Pinkham,

Acting Assistant Secretary of the Army (Civil Works), Department of the Army.

Radhika Fox

Assistant Administrator, Environmental Protection Agency.

[FR Doc. 2021–24317 Filed 11–5–21; 8:45 am] BILLING CODE 6560–50–P

DEPARTMENT OF TRANSPORTATION

Pipeline and Hazardous Materials Safety Administration

49 CFR Part 172

[Docket No. PHMSA-2021-0058 (HM-264A)]

RIN 2137-AF55

Hazardous Materials: Suspension of HMR Amendments Authorizing Transportation of Liquefied Natural Gas by Rail

AGENCY: Pipeline and Hazardous Materials Safety Administration (PHMSA), Department of Transportation (DOT).

ACTION: Notice of proposed rulemaking.

SUMMARY: PHMSA, in coordination with the Federal Railroad Administration (FRA), proposes to amend the Hazardous Materials Regulations to suspend authorization of liquefied natural gas (LNG) transportation in rail tank cars pursuant to a final rule published in July 2020, pending the earlier of either completion of a separate rulemaking under RIN 2137–AF54 evaluating potential modifications to requirements governing rail tank car transportation of LNG, or June 30, 2024.

DATES: Comments must be received by December 23, 2021. To the extent possible, PHMSA will consider late-filed comments as a final rule is developed.

ADDRESSES: You may submit comments by any of the following methods:

• Federal Rulemaking Portal: http:// www.regulations.gov. Follow the online instructions for submitting comments.

• Fax: 1-202-493-2251.

• *Mail:* Docket Management System; U.S. Department of Transportation, Docket Operations, M–30, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590– 0001.

• *Hand Delivery:* U.S. Department of Transportation, Docket Operations, M–30, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590–0001 between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

Instructions: Include the agency name and docket number PHMSA–2021–0058 (HM–264A) or RIN 2137–AF55 for this rulemaking at the beginning of your comment. Note that all comments received will be posted without change to http://www.regulations.gov including any personal information provided. If sent by mail, comments must be submitted in duplicate. Persons wishing to receive confirmation of receipt of their comments must include a selfaddressed stamped postcard.

Docket: For access to the dockets to read background documents or comments received, go to *http://www.regulations.gov* or the DOT Docket Operations Office (*see* ADDRESSES).

Confidential Business Information: Confidential Business Information (CBI) is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA; 5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this NPRM contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this NPRM, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as "PROPIN." Submissions containing CBI should be sent to Lily Ballengee, U.S. Department of Transportation, 1200 New Jersey Avenue SE, Washington, DC 20590-0001. Any commentary that PHMSA receives which is not specifically designated as CBI will be placed in the public docket for this rulemaking.

FOR FURTHER INFORMATION CONTACT: Lily Ballengee, Transportation Specialist, Standards and Rulemaking Division, Office of Hazardous Materials Safety, (202) 366–8553, 1200 New Jersey Avenue SE, Washington, DC 20590– 0001.
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I. Overview

PHMSA, in coordination with FRA, proposes to suspend recent amendments to the Hazardous Materials Regulations (HMR; 49 CFR parts 171–180) authorizing transportation of "Methane, refrigerated liquid," commonly known as LŇG in DOŤ–113C120W9 specification rail tank cars while it conducts a thorough evaluation of the HMR's regulatory framework for rail transportation of LNG in a companion rulemaking under RIN 2137–AF54, and determines if any modifications are necessary. Transportation of LNG by rail tank car has not occurred and there is considerable uncertainty regarding whether any would occur in the time it takes for PHMSA to consider potential modifications to the existing, pertinent HMR requirements. However, PHMSA's proposed temporary suspension of the HMR provisions authorizing transportation of LNG in rail tank cars guarantees no such transportation will occur before its companion rulemaking has concluded or June 30, 2024, whichever is earlier, thereby: (1) Avoiding any risks to public health and safety or environmental consequences (to include direct and indirect greenhouse gas (GHG) emissions 1) that

are being evaluated in the companion rulemaking and in ongoing research efforts undertaken in collaboration with FRA and external technical experts; (2) assuring timely implementation of any mitigation measures and operational controls for rail tank car transportation of LNG identified in the companion rulemaking or those ongoing research efforts; (3) reducing the potential for economic burdens by ensuring that entities avoid ordering rail tank cars compliant with the current requirements when the companion rulemaking may adopt alternative requirements; and (4) enabling meaningful opportunity for consideration of the perspectives of diverse stakeholders.

PHMSA proposes to add a new special provision 439 that prohibits LNG transportation in rail tank cars until issuance of a final rule concluding the rulemaking proceeding under RIN 2137–AF54, or June 30, 2024, whichever is earlier. Therefore, if the temporary suspension is adopted in a final rule, the HMR will not authorize the transportation of LNG in rail tank cars until completion of the companion rulemaking or June 30, 2024, whichever is earlier. Rail transport of LNG may still be permitted on an *ad hoc* basis as authorized by the conditions of a PHMSA special permit (§ 107.105), or in a portable tank secured to a rail car pursuant to the conditions of an FRA approval (§ 174.63).

II. Background

A. LNG by Rail Final Rule

On May 7, 2018, PHMSA accepted a petition for rulemaking ² from the Association of American Railroads (AAR) to allow the transportation of LNG by rail in DOT–113 tank cars and began drafting a notice of proposed rulemaking (NPRM) in consultation with FRA. On April 10, 2019, Executive Order 13868 ("Promoting Energy Infrastructure and Economic Growth") ³ was published, which directed the Secretary of Transportation to propose

² Docket No. PHMSA–2017–0020–0002.

³84 FR 15495 (Apr. 15, 2019).

regulations that "treat LNG the same as other cryogenic liquids and permit LNG to be transported in approved rail tank cars" and finalize that rulemaking within 13 months.⁴ In October 2019, PHMSA issued the LNG by Rail NPRM, which proposed to amend the HMR to allow LNG to be transported in existing DOT–113 tank cars and sought comments (due within 60 days) on the potential need for additional operational controls.⁵

On December 5, 2019, PHMSA issued a DOT special permit (SP) 20534 to Energy Transport Solutions, LLC (ETS) to allow the transportation of LNG in existing DOT-113 tank cars from Wyalusing, PA, to Gibbstown, NJ, with no intermediate stops.⁶ DOT-SP 20534 includes several safety control measures, including a requirement to conduct remote sensing for detecting and reporting internal pressure, location, and leakage, and a requirement to provide training to emergency response agencies that could be affected prior to the initial shipment of a tank car under the SP. ETS applied for the SP before the LNG by Rail NPRM was initiated. After issuing the SP, PHMSA re-opened the comment period on the proposed rule until January 13, 2020.7

On July 24, 2020, PHMSA published a final rule in the Federal Register revising the HMR to allow for the bulk transport of LNG in rail tank cars.⁸ In the LNG by Rail final rule, the Final Environmental Assessment (FEA), and the Final Regulatory Impact Analysis (RIA), PHMSA evaluated the potential benefits of rail tank car transportation of LNG and weighed them against the potential public safety and environmental risks.9 PHMSA coordinated with FRA to determine that those potential risks from rail tank car transportation of LNG would be at safe levels if such transportation were: (1) In DOT-113C120W specification rail tank cars-indicated by the new specification suffix "9" (DOT-113C120W9)-with

⁶ DOT–SP 20534 expires by its terms on November 30, 2021. However, ETS may request a renewal in accordance with § 107.109. *See https:// cms7.phmsa.dot.gov/approvals-and-permits/ hazmat/file-serve/offer/SP20534.pdf/2017088295/ SP20534.*

¹PHMSA distinguishes between "direct" and "indirect" GHG emissions herein consistent with

the meaning of those terms in pertinent Obama-Administration Council on Environmental Quality (CEQ) guidance. See CEQ, "Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews" at 16 & n. 42 (Aug. 1, 2016); CEQ, "National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions" 86 FR 10252 (Feb. 19, 2021) (encouraging agencies to use CEQ's 2016 guidance until CEQ issues an updated version of that guidance).

⁴ The Secretary has delegated such rulemaking duties to the PHMSA Administrator. *See* 49 CFR 1.97.

⁵84 FR 56964 (Oct. 24, 2019).

⁷⁸⁴ FR 70491 (Dec. 23, 2019).

 $^{^{8}\,85}$ FR 44994 (Jul. 24, 2020) (LNG by Rail final rule).

⁹ See, e.g., id. at 45024; FEA, Docket No. PHMSA–2018–0025–0478; RIA, Docket No. PHMSA–2018–0025–0479.

enhanced outer tank requirements; (2) subject to all applicable then-extant requirements of the HMR; and (3) subject to certain additional operational controls. The LNG by Rail final rule increased the thickness of DOT-113 outer tank shells from 7/16 to 9/16 inch (a 28.5 percent increase) and mandated use of stronger TC-128 Grade B normalized steel. With respect to this increase in tank shell thickness and strength, PHMSA noted that "[w]hen divided by the large number of carloads that would be carried during a DOT-113's 50-year service life, the 9/16th inch TC–128B normalized steel outer tank is highly cost-effective in that it will mitigate the consequences of derailment involving LNG by reducing the number of tanks punctured in the unlikely event of an accident." ¹⁰ The LNG by Rail final rule also required operational controls for transportation of LNG by rail tank car, including routing analysis, improved train braking, and remote monitoring. PHMSA noted that the operational controls added in the final rule were expected to reduce the likelihood of an incident and reduce potential damages if an incident were to occur.¹¹ The LNG by Rail final rule went into effect on August 24, 2020.

On August 20, 2020, the Puyallup Tribe of Indians filed an administrative appeal of the LNG by Rail final rule, alleging, *inter alia*, that the rulemaking disproportionately exposed its members to environmental hazards (including those associated with climate change) and that PHMSA's engagement with the Tribe on the rulemaking was inadequate. PHMSA denied the Tribe's administrative appeal on November 13, 2020.¹²

B. Pending Petitions for Review of the LNG by Rail Final Rule

The LNG by Rail final rule is the subject of several petitions for judicial review. A group of 6 environmental groups, a coalition of attorneys general for 14 States and the District of Columbia, and the Puyallup Tribe of Indians filed separate petitions for review challenging PHMSA's LNG by Rail final rule. All of the petitioners ask the court to vacate the rule, alleging violations of the Hazardous Materials Transportation Act (HMTA; 49 U.S.C. 5101-5127), the Administrative Procedure Act (APA; 5 U.S.C. 553 et seq.), and the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 et seq.). The Puyallup Tribe also alleges violations of the Tribal consultation protocols under the National Historic Preservation Act (54 U.S.C. 300101 et seq.) and Executive Order 13175 ("Consultation and Coordination with Indian Tribal Governments"),13 as well as disparate impacts on the Tribe in violation of Executive Order 12898 ("Federal Actions to Address **Environmental Justice in Minority** Populations and Low-Income Populations")¹⁴ and Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d et seq.).

The petitions have been consolidated within a single proceeding in the U.S. Court of Appeals for the D.C. Circuit. On March 16, 2021, the court granted PHMSA's unopposed motion to place the petitions in abeyance while PHMSA reviewed the LNG by Rail final rule pursuant to Executive Order 13990 ("Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis").¹⁵

C. PHMSA/FRA LNG Task Force

PHMSA established a joint LNG Task Force with FRA in January 2020 as part of its ongoing research efforts on the transportation of LNG. The LNG Task Force helped to identify areas of research that could inform potential future regulatory activity, as appropriate. To assist in identifying appropriate tasks within that effort, the LNG Task Force employed a risk-based framework directed toward:

• "knowing the risk" by improving DOT's knowledge of the types and extent of risk posed by LNG by rail transportation, with a focus on research and testing;

• "predicting the risk" by leveraging modeling and simulation software and tools to analyze LNG by rail operations and potential risk outcomes;

• ^î'reducing the risk'' by relating the possible strategies and technologies that decrease the risk of transporting LNG by rail tank cars, especially through track inspection and operational factors; and

• "preparing for the risk" by focusing on the emergency response community to ensure that—should an incident occur and the risks of LNG materialize emergency responders have the awareness, training, and resources to keep themselves and the public safe.

The LNG Task Force ultimately identified and undertook 15 tasks to synthesize ongoing research and outreach activities. Those tasks are listed in Table 1 below.

TABLE 1—LNG TASK FORCE METHODOLOGY FOR ADDRESSING LNG BY RAIL RISK

Know the risk	Predict the risk	Reduce the risk	Prepare for the risk
 Empirical Review of International LNG Rail Transportation. LNG Loading/Unloading Safety Evalua- tion. Quantitative Risk Assessment of LNG Transportation. Full-Scale Impact Testing on DOT-113 LNG UN T75 Portable Tank Fire-Testing 	 Evaluate Likely Number of Punctures and Derailment Simulation Models. Develop Worst-Case Scenario Model Safety/Security Route Risk Assessment Train Energy and Dynamics Simulator (TEDS). Modal Conversion Between LNG by Truck and Rail. 	 Re-Evaluate Costs and Benefits of ECP Brakes. Evaluation of Train Operational Controls. Automated Track In- spection. 	 Validate Emergency Responder Opinions and Needs. Develop LNG Edu- cational and Outreach Plan.

The LNG Task Force initially projected completion of the above tasks by late 2021. However, much of the LNG Task Force's work was interrupted by the coronavirus disease 2019 (COVID– 19) public health emergency. Consequently, several tasks—including full-scale impact testing, puncture and

¹⁰ Id. at 45005.

derailment simulation modeling, and LNG portable tank pool fire testing—are not expected to be completed until sometime in 2022.

D. Transportation Research Board Study

Pursuant to the "Further Consolidated Appropriations Act, 2020" (Pub. L. 116–

94), PHMSA and FRA partnered with the National Academy of Sciences, Engineering, and Medicine (NASEM) to conduct a study on the transportation of LNG in rail tank cars through a committee of the Transportation

¹¹ *Id.* at 45008.

¹² Docket No. PHMSA–2018–0025–0637. ¹³ 65 FR 67249 (Nov. 9, 2000).

¹⁴ 59 FR 7629 (Feb. 16, 1994).

^{15 86} FR 7037 (Jan. 25, 2021).

Research Board (TRB).¹⁶ The TRB committee commenced work in mid-July 2020.

The TRB study consists of two phases, with each phase culminating in a report with findings and recommendations:

• Phase I reviews the plans and progress of the LNG Task Force to develop a report containing findings regarding the relevance, completeness, and quality of its efforts, and to offer recommendations for addressing any shortcomings.

• Phase II involves a more comprehensive assessment of topics relevant to the safe movement of LNG by rail tank car pursuant to both SP and the HMR. The Phase II Report will contain recommendations to Congress, PHMSA, FRA, industry, emergency responders, and other relevant stakeholders on necessary near- and long-term actions to improve understanding of the risks associated with transporting LNG by rail tank car, mitigate those risks, and prevent and prepare for potential incidents.

The TRB committee issued its Phase I Report on June 15, 2021.¹⁷ Although the Phase I Report generally praised the LNG Task Force's "comprehensive as planned" program for making effective use of a "number of long standing and high quality research and testing programs," the TRB committee noted that the COVID–19 public health emergency resulted in delays in initiation and completion of several tasks. The TRB committee also noted that the interdependency of many of those outstanding tasks complicated its and the LNG Task Force's work in developing a complete understanding of the risks associated with transportation of LNG in rail tank cars. It expressed particular concern regarding the incomplete status of tasks pertaining to full-scale impact testing, portable tank pool fire testing, worst-case scenario analysis, and quantitative risk assessment.¹⁸ The TRB committee also emphasized pending tasks necessary to understand the potential risks to public and worker safety arising from releases

¹⁷ NASEM, "Preparing for LNG by Rail Tank Car: A Review of a U.S. DOT Safety Research, Testing, and Analysis Initiative" (Jun. 2021) (Phase I Report), https://www.nap.edu/read/26221/chapter/ 1. during loading, unloading, and transloading of LNG tank cars, as well as in overcoming limited emergency planning and response training and resources.

The Phase I Report provided recommendations¹⁹ for improving the assumptions, rationale, and methodology employed by the LNG Task Force in executing the outstanding tasks. The recommendations include that PHMSA and FRA should make several changes to the planned portable fire tank testing—including using LNG as the pool fire fuel and not liquefied petroleum gas-and assess the potential for cryogenic damage cascading to adjacent tanks. The report also recommends PHMSA and FRA enhance the modeling for worst-case scenariossuch as using a train speed of 50 milesper-hour (mph) instead of 40 mph-and evaluate explosion hazards from a spill of LNG resulting in vapor dispersion in an environment with confined or congested spaces. Additionally, the report recommends PHMSA and FRA add loading and unloading operations and train assembly classification to the risk assessment for transport of LNG by rail as compared to highway.

The TRB committee plans to complete its work under Phase II in mid-2022.²⁰

E. Executive Order 13990

Section 2(a) of Executive Order 13990 requires the review of agency regulations and other actions promulgated or adopted between January 20, 2017, and January 20, 2021, that are candidates for suspension, modification, or rescission because of inconsistency with Administration policies to improve public health, protect the environment, prioritize environmental justice, and reduce GHG emissions. The White House identified the LNG by Rail final rule in a nonexclusive list ²¹ of agency actions that would be reviewed in accordance with Executive Order 13990. Additionally, section 7 of Executive Order 13990 revokes Executive Order 13868, along with several other executive orders and executive actions, and directs agencies to promptly take steps, consistent with applicable law, to rescind any rules or regulations that had been issued "implementing or enforcing" those executive orders and executive actions.

On May 5, 2021, DOT issued a notice soliciting comment on potential

candidates for review under Executive Order 13990 from among existing rules and other DOT actions.²² DOT received one comment pertaining to the LNG by Rail final rule. In that comment, the Transportation Trades Department of the American Federation of Labor and Congress of Industrial Organizations (AFL–CIO) called for re-examination of the LNG by Rail final rule because it believes that rulemaking "neglected to include meaningful safety measures to adequately address the inherent risks to this type of operation."²³

III. Basis for Suspension

A. Development of a More Complete Understanding of the Risks and Benefits Associated With Rail Tank Car Transportation of LNG

The LNG by Rail rulemaking considered incorporating within the HMR regulatory requirements to protect the public, property, and the environment from unreasonable risks from transportation of LNG in rail tank cars. As such, PHMSA-in consultation with FRA-determined that existing HMR requirements including the modified DOT-113 tank car and new operational requirements prescribed in the LNG by Rail final rule, along with expected compliance with widelyaccepted, voluntary industry standards such as AAR Circular OT-55 for shipments of LNG in rail tank cars, would reduce risk to safety, property, and the environment to acceptable levels in light of the potential benefits of that rulemaking.²⁴ That decision reflected consideration of LNG's hazardous properties and the safety record of the DOT-113 tank car.25

However, PHMSA acknowledged in the LNG by Rail final rule that additional further data and knowledge (for example regarding potential benefits as well as safety and environmental risks) could make appropriate further mitigations for shipping LNG by rail tank car.²⁶ The LNG by Rail final rule, RIA, and FEA were candid about uncertainty in the future market demand for transportation of LNG by rail tank car, potential direct and

²³ Docket No. DOT–OST–2021–0036–0025. ²⁴ See, e.g., 85 FR 45003 (discussing reduction in risks from tank car enhancements, mandatory operational controls, and voluntary industry practices) and 45024 (discussing potential economic and other benefits from the LNG by Rail final rule).

¹⁶ In that legislation, Congress earmarked funds for the NASEM study for the express purpose of "inform[ing] rulemaking." NASEM maintains a website dedicated to the TRB committee's work that contains the TRB committee's charter, work product, meeting agendas, and other supporting material. *See* NASEM, "Safe Transportation of Liquefied Natural Gas by Railroad Tank Car," *https://www.nationalacademies.org/our-work/safetransportation-of-liquefied-natural-gas-by-railroadtank-car* (last visited Jun. 16, 2021).

¹⁸ *Id.* at 5–6.

¹⁹ Id.

²⁰ Id. at 13.

²¹U.S. White House, "Fact Sheet: List of Agency Actions for Review," *https://www.whitehouse.gov/ briefing-room/statements-releases/2021/01/20/factsheet-list-of-agency-actions-for-review/* (last visited Jun. 16, 2021).

²² 85 FR 23876.

²⁵ 85 FR 44998.

²⁶ See, e.g., 85 FR 44995 ("PHMSA recognizes that there is ongoing and potential future research related to the transportation of LNG by all modes. The Agency will continue to use this research to inform potential future regulatory activity, as appropriate.").

indirect GHG emissions associated with authorizing LNG by rail tank car, and the adequacy of emergency planning and response resources.²⁷ PHMSA sought to mitigate potential risks that were affected by those uncertainties by adopting certain requirements in the LNG by Rail final rule suggested by comments in the rulemaking docket.28 PHMSA also stated that it may adjust the HMR's regulatory framework governing rail tank car transportation of LNG as more information became available from its oversight activities.²⁹ In fact, PHMSA had already begun work within the LNG Task Force on a comprehensive set of tasks directed toward refining PHMSA's knowledge of the risks of rail tank car transportation of LNG when it issued the LNG by Rail final rule. PHMSA also expected that it would have the benefit of the TRB committee's study on LNG by rail that Congress had directed for the express purpose of informing pertinent PHMSA rulemakings. Lastly, PHMSA understood it would have time to amend the HMR to integrate insights from those research activities, as it could take time to build a fleet of dedicated DOT-113C120W9 tank cars, as stated in the RIA.³⁰

Uncertainty regarding the potential benefits and safety and environmental risks of rail transportation of LNG under the HMR has persisted longer than PHMSA anticipated when it issued the LNG by Rail final rule, and has in fact increased as a result of the release of the TRB Phase I Report on June 15, 2021. Uncertainty has persisted longer than expected because the COVID-19 public health emergency has delayed the completion of research efforts to confirm and enhance PHMSA and FRA's knowledge of public safety and environmental risks attendant in rail tank car transportation of LNG. As explained in the TRB Phase I Report, several of the tasks that had been scheduled for completion by early 2021 will not be completed before late 2021 or 2022. Delivery of the TRB Phase I Report was expected March 31, 2021, but the report was issued June 15, 2021.

Uncertainty also has increased because, while the TRB committee generally commended PHMSA and FRA's efforts under the LNG Task Force. the TRB committee identified a number of information gaps in its and the LNG Task Force's work that PHMSA was not aware of when it issued the LNG by Rail final rule. The gaps concern testing and the evaluation of public safety and environmental risks (e.g., relating to full-scale impact testing, pool fire testing, worst-case analysis, and quantitative risk assessment)—including testing on which PHMSA had relied in the LNG by Rail final rule.³¹ The data gaps identified by the TRB committee might have been resolved by this point in time, but they currently remain unresolved because of the disruptions caused by the COVID-19 public health emergency. Further, the committee identified opportunities to improve the work of the LNG Task Force in understanding the risks to the public, workers, and the environment from rail tank car transportation of LNG, which potentially could further reduce uncertainties in the future and put PHMSA in a better position to evaluate risks as it moves forward with its companion rulemaking. The TRB committee also emphasized the need for a robust understanding of the potential risks to public and worker safety arising from releases during loading, unloading, and transloading of LNG tank cars, and improved emergency planning and response training and resources, further underscoring the importance of PHMSA taking additional time to ensure it fully understands and considers uncertainties.

The COVID-19 public health emergency and other developments have also exacerbated uncertainties in near- and long-term market demand for rail transportation of LNG bounding the potential benefits and risks to public safety and the environment from the LNG by Rail final rule. The FEA supporting the LNG by Rail final rule acknowledged the complexity of the economics driving whether demand for natural gas transport outside the pipeline network as LNG would be met through the transportation in tank cars under the LNG by Rail final rule or by alternatives (one or more of highway transportation of LNG via MC-338 insulated cargo tanks, rail transportation of LNG pursuant to SP, or rail transportation of LNG via portable tank pursuant to FRA approval).³² The COVID-19 public health emergency has complicated that calculus further by causing economic disruption

throughout the natural gas industry, impacting LNG infrastructure investment directly.³³ Additionally, since the LNG by Rail final rule became effective, LNG markets have seen a number of announcements portending potentially fundamental supply and demand changes in international LNG markets.³⁴ Consequently, PHMSA believes there is more uncertainty now than when the LNG by Rail final rule was issued regarding whether, when, and where rail tank car transport of LNG-and by extension, any potential benefits and public safety/ environmental risks-will materialize.

PHMSA believes the increased uncertainty regarding the potential benefits and safety and environmental consequences of rail transportation of LNG pursuant to the LNG by Rail final rule warrants temporary suspension while PHMSA evaluates (under RIN 2137-AF54) whether and under what circumstances the HMR should allow rail transportation of LNG. As explained above, research activity that PHMSA had expected would corroborate its understanding of the safety and environmental risks attendant in rail transportation of LNG has been delayed, while TRB's peer review of testing cited in the LNG by Rail final rule has raised additional questions.³⁵ Uncertainties in

³⁴ See, e.g., DiSavinio, Reuters, "For LNG Developers, Another Year of Cancelled Projects" (May 18, 2021), https://www.reuters.com/business/ energy/lng-developers-another-year-canceledprojects-2021-05-18/; Shiryaevskaya, Stapczynski & Ratcliffe, Bloomberg, "King of LNG Undercuts Rivals to Keep Dominating World Market" (May 19, 2021), https://www.bloomberg.com/news/articles/ 2021-05-19/king-of-lng-undercuts-rivals-in-bid-todominate-global-market; Stapczynski. Bloomberg, "Global LNG Market Faces Shakeup from Japan's Green Shift" (Jul. 26, 2021), https:// www.bloomberg.com/news/articles/2021-07-26/ japan-s-green-ambitions-threaten-the-lng-market-ithelped-create.

³⁵ PHMSA also notes that, even as there is less certainty regarding the potential benefits associated with the LNG by Rail final rule, there is greater scientific certainty that one of those potential benefits would entail significant environmental consequences. Specifically, the LNG by Rail final rule touted the potential for increased natural gas (methane) production as a potential benefit of that rulemaking. See, e.g., 85 FR 44995. However, more recent science has underscored the urgency of limiting such additional production for avoiding the worst consequences from anthropogenic climate change from indirect emissions associated with production and transportation activity. See, e.g., Sixth Assessment Report—Working Group I: Physical Science Basis" at TS-68, 6-11, 6-73 (Aug. 2021), https://www.ipcc.ch/report/ar6/wg1/ #FullReport (last visited Aug. 19, 2021) (explaining the urgency of reducing GHG emissions-in Continued

²⁷ 85 FR 45016 (describing market demand uncertainties) and 45019–21 (describing ongoing efforts to improve emergency planning and emergency response training and resources); Docket No. PHMSA–2018–0025–0478 at 35 (discussing uncertainties regarding GHG emissions impacts of that rulemaking).

^{28 85} FR 44996.

²⁹85 FR 44995.

³⁰ Docket No. PHMSA–2018–0025-0479 at 19.

³¹ See 85 FR 45006 (full-scale impact testing), 45012 (pool fire testing), and 45013 (quantitative risk assessment).

³² Docket No. PHMSA–2018–0025–0478 at 11, 26–29.

³³ See, e.g., Kravtosova & DiSavinio, Reuters, "LNG Investments Vanish in 2020 as Coronavirus Slashes Oil and Gas Prices," (Sep. 9, 2020), https:// www.reuters.com/article/us-Ing-exports-investmentanalysis/lng-investments-vanish-in-2020-ascoronavirus-slashes-oil-and-gas-pricesidUSKBN2602PY.

the underlying economic dynamics driving the potential benefits and public safety and environmental risks considered in the LNG by Rail final rule have increased (*e.g.*, the quantity of LNG that will move by rail, the routes involved, and whether new transportation capacity would induce more natural gas extraction). PHMSA believes these increased uncertainties cast doubt on the continued validity of the balance between potential benefits and public safety and environmental risks underpinning the LNG by Rail final rule.

A temporary suspension, however, will give PHMSA and FRA the opportunity to complete a comprehensive evaluation of the benefits and risks of rail tank car transportation of LNG in the companion rulemaking before any LNG moves by rail under the HMR. Although—as explained below—PHMSA and FRA understand that rail tank car transportation of LNG is neither occurring nor expected to occur in the near future, temporary suspension of the LNG by Rail final rule ensures avoidance of potential risks to public and worker safety and the environment from such transportation while that parallel rulemaking proceeds. Suspension would also ensure HMR authorization of rail transportation of LNG reflects the "best science" available,³⁶ including additional information obtained from the ongoing and delayed research efforts of the LNG Task Force, the forthcoming TRB Phase II Report expected in mid-2022, and continuing developments in scientific understanding of the near-term risks of climate change from enhanced natural gas transportation investments. Suspension would allow consideration of additional public comment, particularly on issues such as public and worker safety, environmental risks, and environmental justice, as well as on any additional testing or other information generated by PHMSA, FRA, and the TRB.

Therefore, PHMSA proposes to add a new special provision 439 prohibiting

LNG transportation in rail tank cars until issuance of a final rule concluding the rulemaking proceeding under RIN 2137–AF54, or June 30, 2024, whichever is earlier.

B. No Material Adverse Impact on Reliance Interests

PHMSA does not expect temporary suspension of transporting LNG by rail tank car will have a material adverse impact on serious reliance interests. Despite issuance of the LNG by Rail final rule in July 2020, LNG has not been transported in rail tank cars, and PHMSA is unaware of any planned movements in the near future. The development of the necessary infrastructure—in particular, construction of DOT-113C120W9 tank cars—to transport LNG by rail under the HMR demands significant financial investment, long-term commitment, and considerable planning. The DOT-113C120W9 tank car was introduced for LNG transport and would be impractical for use with other hazardous materials because another, more feasible specification (*i.e.*, DOT-113C120W) is already available for other Class 2 cryogenic flammable liquids that are authorized to be transported by rail. Therefore, a dedicated LNG tank car fleet would need to be built, and there may be construction delays because of limited capacity in the rail car manufacturing industry. At this time, PHMSA is unaware of any orders having been placed for manufacture of new DOT-113C120W9 tank cars.

Nor are PHMSA and FRA aware of near-term plans to transport LNG in existing DOT-113 rail tank cards under DOT-SP 20534. ETS, the holder of DOT-SP 20534, is a subsidiary of New Fortress Energy Inc. (NFE) according to documents filed with the U.S. Securities and Exchange Commission (SEC). NFE develops and operates energy infrastructure, including LNG terminals, power generation facilities, and natural gas logistics infrastructure, and provides supply and logistics services to customers both domestically and internationally. NFE noted in its Q2-2021 Form 10–Q: Quarterly Report filed in August with the SEC that it has not yet issued a final notice to proceed to its engineering, procurement, and construction contractors for its liquefaction facility in Wyalusing, PAan origination-point for the route authorized by PHMSA in DOT-SP 20534.³⁷ Further, noting the volatility of the current LNG market, NFE admits "there can be no assurances that [it] will complete the Pennsylvania Facility or be able to supply [its] Facilities with LNG produced at [its] own Liquefaction Facilities." PHMSA also understands that NFE's Wyalusing, PA, facility is the subject of a pending, contested petition for Declaratory Order filed with the Federal Energy Regulatory Commission (FERC) that may determine whether that facility requires a FERC certificate before operating as an LNG export terminal.³⁸

Nevertheless, while PHMSA does not expect the transport of LNG by rail tank car in the near future for the reasons discussed above, shippers may continue to seek authorization to transport LNG by rail in rail tank cars pursuant to a DOT SP issued by PHMSA or in portable tanks subject to an approval by FRA. PHMSA's SP procedures thoroughly explain the information applicants must include in their application and PHMSA's process, which includes public docketing, an opportunity for public comment, and an explanation for why an application is granted or denied.³⁹ The procedures also include an opportunity for reconsideration and an appeal process, after which a decision is the final administrative action.⁴⁰ FRA's approval process has similar procedures. Indeed, FRA recently received a petition from Alaska Railroad Corporation to extend an FRA approval to ship LNG by rail in portable tanks. In response to the requested extension, FRA published a notice of conditional approval and initiated a 60-day comment period ending on August 23, 2021, to ensure that FRA had opportunity to consider any additional views or information that stakeholders provided.⁴¹ As PHMSA is unaware of any potential near-term movement of LNG by rail tank cars and any potential shippers could avail themselves of the SP (for the potential transportation of LNG by rail tank car) or FRA approval processes (for the potential transportation of LNG by portable tank on rail cars), PHMSA expects the proposed suspension of LNG by rail transportation to have a minimal economic impact. For more

- ³⁹49 CFR part 107, subpart B.
- ⁴⁰ 49 CFR part 107, subpart B.

particular, short-term contributors such as methane); Intl. Energy Agency, "Net Zero by 2050: A Roadmap for the Global Energy Sector" at 99 (May 2021) (noting the urgency of avoiding new natural gas production fields in order to meet netzero policy goals).

³⁶ See "Presidential Memorandum on Restoring Trust in Government Through Scientific Integrity and Evidence-Based Policymaking" (Jan. 27, 2021), https://www.whitehouse.gov/briefing-room/ presidential-actions/2021/01/27/memorandum-onrestoring-trust-in-government-through-scientificintegrity-and-evidence-based-policymaking/ (requiring Federal agencies to make "evidencebased decisions" informed by the "best available science and data" in their regulatory activity).

³⁷ New Fortress Energy Inc. 10–Q Quarterly Report for Quarter Ending June 30, 2021, (Aug. 6, 2021), *https://sec.report/Document/0001140361-21-027401/*. PHMSA also notes that ETS is required by

 $[\]P$ 12 of DOT–SP 20534 to provide periodic reports on the status of efforts to manufacture and deliver tank cars intended for use pursuant to that SP.

³⁸ See FERC Docket No. CP20–524 (in re Petition for Declaratory Order of Bradford County Real Estate Partners LLC). Should FERC declare that an export facility certificate is needed, it could take an additional two years (or longer) to obtain that certificate from FERC.

⁴¹ FRA, "Notice of Conditional Approval," 86 FR 33472 (Jun. 24, 2021).

information, see discussion of the cost analysis in accordance with Executive Order 12866 ("Regulatory Planning and Review").⁴²

However, PHMSA solicits comment from stakeholders on potential economic, public safety, and environmental benefits and adverse impacts of the proposed rulemaking. PHMSA also solicits comments on the length of its proposed suspension period and whether PHMSA should modify its proposed expiration date. PHMSA notes that it selected the proposed date (June 30, 2024) for expiration of the temporary suspension to give PHMSA adequate time to incorporate the results of the forthcoming TRB Phase II Report expected in mid-2022—within its companion rulemaking under RIN 2137-AF54.

IV. Regulatory Analyses and Notices

A. Statutory/Legal Authority

This NPRM is published under the authority of the Federal Hazardous Materials Transportation Act (HMTA; 49 U.S.C. 5101–5127). Section 5103(b) of the HMTA authorizes the Secretary of Transportation to "prescribe regulations for the safe transportation, including security, of hazardous materials in intrastate, interstate, and foreign commerce." The Secretary has delegated the authority granted in the HMTA to the PHMSA Administrator at 49 CFR 1.97(b).

B. Executive Order 12866 and DOT Regulatory Policies and Procedures

Executive Order 12866 (''Regulatory Planning and Review'')⁴³ requires that "agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating." Agencies should consider quantifiable measures and qualitative measures of costs and benefits that are difficult to quantify. Further, Executive Order 12866 requires that "agencies should select those [regulatory] approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach." Similarly, DOT Order 2100.6A ("Rulemaking and Guidance Procedures'') requires that regulations issued by PHMSA and other DOT **Operating Administrations should** consider an assessment of the potential benefits, costs, and other important impacts of the proposed action and

⁴² 58 FR 51735 (Oct. 4, 1993). ⁴³ Ibid. should quantify (to the extent practicable) the benefits, costs, and any significant distributional impacts, including any environmental impacts.

Executive Order 12866 and DOT Order 2100.6A require that PHMSA submit "significant regulatory actions" to the Office of Management and Budget (OMB) for review. This rulemaking is considered a significant regulatory action under section 3(f)(4) of Executive Order 12866 because the temporary suspension of the LNG by Rail final rule could raise novel legal or policy issues. This NPRM has, therefore, been reviewed by OMB.

As discussed at greater length above, PHMSA does not expect that the proposed temporary suspension of the amendments adopted in the LNG by Rail final rule will have material, adverse impacts. Should the proposed rule be adopted such that HMR authorization to move LNG by rail tank car is temporarily suspended, no LNG could move under the HMR in a rail tank car until PHMSA completes its companion rulemaking under RIN 2137–AF54, or June 30, 2024, whichever is earlier. Notwithstanding the considerable uncertainties regarding the market demand for rail tank car transportation of LNG, PHMSA expects little or no LNG transportation by rail tank car would have moved during the proposed suspension period for the reasons explained above; therefore, PHMSA expects little or no direct economic impact of a temporary suspension. Indeed, PHMSA's temporary suspension may in fact reduce economic burden by discouraging a shipper from ordering rail tank cars compliant with the LNG by Rail final rule when the companion rulemaking (under RIN 2137–AF54) may adopt different requirements. Additionally, should any potential shippers need to transport LNG by rail tank car during the suspension period, they could avail themselves of the PHMSA SP or FRA approval processes for such transport. Further, as explained below, temporary suspension guarantees avoidance of potential adverse public safety and environmental impacts (including, but not limited to, contribution of direct and indirect GHG emissions) that could have arisen from rail tank car transportation of LNG under the HMR. Lastly, PHMSA notes that the limited duration of its proposed suspension would also mitigate any adverse economic, public safety, or environmental impacts that could arise.

PHMSA acknowledges that, in the (unlikely) event demand for rail tank car transportation under the LNG by Rail final rule would materialize during the suspension period in the absence of this rule, the proposed temporary suspension could result in procedural or compliance costs, lost business opportunities, and safety and environmental risks. Obtaining and complying with the conditions imposed within PHMSA-issued DOT SPs and FRA approvals authorizing rail transportation of LNG would incur costs due to regulatory uncertainty, as well as delay and compliance burdens. Each of those consequences would entail higher procedural or compliance costs, which could in turn result in lost business opportunities, or at minimum, diminish the business benefits of rail transportation of LNG.44 Further, the DOT SP and FRA approval alternatives would entail unique public safety and environmental risks, which are a function of the conditions imposed by each of PHMSA and FRA in each authorization.

Alternatively, the unavailability of HMR authorization for rail tank car transportation of LNG could prompt shipping LNG by highway via MC-338 insulated cargo tanks. This alternative may involve higher costs than rail transportation, as each MC-338 cargo tank (which has approximately half the capacity of a DOT-113 tank car) would have to be shipped individually, likely forfeiting the economies of scale from rail transportation via tank car (under the LNG by Rail final rule or a DOT SP) or ISO tank (under an FRA approval). For this reason, PHMSA does not expect shippers to opt for LNG transportation via MC-338 cargo tank as a substitute for rail tank car transportation pursuant to the LNG by Rail final rule. To the extent that transportation via MC-338 cargo tank does occur, it would entail different environmental risks (including, but not limited to, greater risk of accidents and more direct GHG emissions than rail transportation of the same volume of LNG) than the transportation of LNG by rail tank car.45

Therefore, PHMSA expects that, in the event that the proposed suspension of the LNG by Rail final rule has any adverse economic impact, it would consist largely of lost business opportunities as a result of higher procedural or compliance costs and lower economies of scale from

⁴⁴ See, e.g., Docket No. PHMSA–2018–0025– 00478 at 5, 30 (noting that the grantee of DOT–SP 20534 has indicated that it was unlikely to employ ISO tanks for rail transportation of LNG because of the high costs of that approach) and 35 (noting the potential for LNG by Rail final rule to create new business opportunities).

⁴⁵ Id. at 33–34, 56 (discussing higher direct GHG emissions from highway transportation) and 37–38 (discussing higher risk of crashes from highway transportation).

alternatives to rail transportation under the LNG by Rail final rule. Any such adverse economic impacts are expected to be unlikely and time-limited. Further, any lost business opportunities could be offset by avoided safety and environmental risks if the suspension reduces the transportation of LNG (*i.e.*, if it prevents transportation or production of LNG that would otherwise occur).

Because temporary suspension of the LNG by Rail final rule entails limited risk of adverse economic impact even as it guarantees avoidance of potential public safety and environmental impacts (including significant environmental risks such as indirect GHG emission contributions to climate change), PHMSA submits the proposed HMR amendments herein. PHMSA solicits comment from stakeholders on potential impacts of the proposed rulemaking.

C. Executive Order 13132

PHMSA analyzed this rulemaking in accordance with the principles and criteria contained in Executive Order 13132 ("Federalism")⁴⁶ and its implementing Presidential Memorandum ("Preemption").47 Executive Order 13132 requires agencies to assure meaningful and timely input by State and local officials in the development of regulatory policies that may have "substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government.'

This rulemaking may preempt State, local, and Native American Tribe requirements, but does not propose any regulation that has substantial direct effects on the States, the relationship between the national government and the States, or the distribution of power and responsibilities among the various levels of government.

The Federal hazmat law contains an express preemption provision at 49 U.S.C. 5125(b) that preempts State, local, and Tribal requirements on certain covered subjects, unless the nonfederal requirements are "substantively the same" as the Federal requirements, including the following:

(1) The designation, description, and classification of hazardous material;

(2) the packing, repacking, handling, labeling, marking, and placarding of hazardous material;

(3) the preparation, execution, and use of shipping documents related to

46 64 FR 43255 (Aug. 10, 1999).

hazardous material and requirements related to the number, contents, and placement of those documents;

(4) the written notification, recording, and reporting of the unintentional release in transportation of hazardous material; and

(5) the design, manufacture, fabrication, inspection, marking, maintenance, recondition, repair, or testing of a packaging or container represented, marked, certified, or sold as qualified for use in transporting hazardous material in commerce.

This rule addresses subject items (2) and (5) above, which are covered subjects, and therefore, non-federal requirements that fail to meet the "substantively the same" standard are vulnerable to preemption under the Federal hazmat law. Moreover, PHMSA will continue to make preemption determinations applicable to specific non-federal requirements on a case-bycase basis, using the obstacle, dual compliance, and covered subjects tests provided in Federal hazmat law.

This rule also incorporates certain FRA requirements under the former Federal Railroad Safety Act of 1970, as repealed, revised, reenacted, and recodified (FRSA; 49 U.S.C. 20106), and the former Safety Appliance Acts, as repealed, revised, reenacted, and recodified (SAA; 49 U.S.C. 20301-20302, 20306) that may potentially preempt certain State requirements. Such FRSA and SAA requirements would apply to certain operators and offerors of LNG by Rail tank cars, including operational requirements for distributed power or two-way end-oftrain (EOT) power braking systems.

D. Executive Order 13175

PHMSA analyzed this rulemaking in accordance with the principles and criteria contained in Executive Order 13175 and DOT Order 5301.1 ("Department of Transportation Policies, Programs, and Procedures Affecting American Indians, Alaska Natives, and Tribes"). Executive Order 13175 and DOT Order 5301.1 require DOT Operating Administrations to assure meaningful and timely input from Native American Tribal government representatives in the development of rules that significantly or uniquely affect tribal communities by imposing "substantial direct compliance costs" or "substantial direct effects" on such communities or the relationship and distribution of power between the Federal government and Native American Tribes.

In addition to the petitions filed by the environmental groups and State attorneys general mentioned above, the Puyallup Tribe also challenged the LNG by Rail final rule and alleged violations of the Tribal consultation protocols under the National Historic Preservation Act and Executive Order 13175 and disparate impacts on the Tribe in violation of Executive Order 12898 and Title VI of the Civil Rights Act of 1964.

PHMSA assessed the impact of this rulemaking and expects that it will not significantly or uniquely affect Tribal communities or Native American Tribal governments. This rulemaking does not impose substantial compliance costs on Native American Tribal governments, nor does it mandate Tribal action. Insofar as PHMSA expects the rulemaking would not adversely affect the safe transportation of hazardous materials generally, PHMSA does not expect it would entail disproportionately high adverse risks for Tribal communities. PHMSA submits that the proposed rulemaking could in fact reduce risks to Tribal communities, as it could avoid the release of hazardous materials by railroad in the vicinity of Tribal communities. For these reasons, PHMSA does not expect the funding and consultation requirements of Executive Order 13175 and DOT Order 5301.1 to apply. However, PHMSA solicits comment from Native American Tribal governments and communities on potential impacts of the proposed rulemaking.

E. Regulatory Flexibility Act and Executive Order 13272

The Regulatory Flexibility Act (5 U.S.C. 601 et seq.) requires agencies to consider whether a rulemaking would have a "significant economic impact on a substantial number of small entities" to include small businesses, not-forprofit organizations that are independently owned and operated and are not dominant in their fields, and governmental jurisdictions with populations under 50,000. The **Regulatory Flexibility Act directs** agencies to establish exceptions and differing compliance standards for small businesses, where possible to do so and still meet the objectives of applicable regulatory statutes. Executive Order 13272 ("Proper Consideration of Small Entities in Agency Rulemaking")⁴⁸ requires agencies to establish procedures and policies to promote compliance with the Regulatory Flexibility Act and to "thoroughly review draft rules to assess and take appropriate account of the potential impact" of the rules on small businesses, governmental jurisdictions,

^{47 74} FR 24693 (May 22, 2009).

^{48 67} FR 53461 (Aug. 16, 2002).

and small organizations. The DOT posts its implementing guidance on a dedicated web page.⁴⁹

This rulemaking has been developed in accordance with Executive Order 13272 and DOT's procedures and policies to promote compliance with the Regulatory Flexibility Act to ensure that potential impacts of draft rules on small entities are properly considered. As explained above, PHMSA expects that the temporary suspension of the LNG by Rail final rule proposed herein will not have a significant economic impact generally, much less a significant economic impact on a substantial number of small entities. However, PHMSA solicits comments on the anticipated economic impacts to small entities.

F. Paperwork Reduction Act

Under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*), no

person is required to respond to any information collection unless it has been approved by OMB and displays a valid OMB control number. Pursuant to 44 U.S.C. 3506(c)(2)(B) and 5 CFR 1320.8(d), PHMSA must provide interested members of the public and affected agencies an opportunity to comment on information collection and recordkeeping requests.

PHMSA has analyzed this NPRM in accordance with the Paperwork Reduction Act. PHMSA currently accounts for security plan burdens under OMB Control Number 2137–0612, "Hazardous Materials Security Plans." In the LNG by Rail final rule, PHMSA required any rail carrier transporting a tank car quantity of UN1972 (Methane, refrigerated liquid (cryogenic liquid) or Natural gas, refrigerated liquid (cryogenic liquid)) to comply with the additional rail transportation safety and

security planning requirements. Following publication of the LNG by Rail final rule, PHMSA published both a 60-day ⁵⁰ and 30-day ⁵¹ notice and comment to provide an opportunity for public comment on the estimated increase in burden. PHMSA did not receive comments to either notice. Subsequently, PHMSA submitted the revision to OMB and received approval for the increased burden. As PHMSA proposes a temporary suspension of the authorization to ship LNG by rail tank car, as was codified in the LNG by Rail final rule, PHMSA estimates this rulemaking would result in a decrease in the burden associated with additional rail transportation safety and security planning requirements. The following reflects this estimated decrease in burden:

Decrease in primary route analysis	Change in number of railroads	Decrease in number of routes	Burden hours per route	Decrease in total burden hours	Salary cost per hour ⁵²	Decrease in total salary cost	Decrease in total burden cost
Class I Railroads Class II Railroads Class III Railroads	0 0 0	(2) (1) (1)	80 80 40	(160) (80) (40)	\$73.98 73.98 73.98	(\$11,837) (5,919) (2,959)	\$0 0 0
Total	0	(4)		(280)		(20,715)	0
Decrease in alternate route analysis	Change in number of railroads	Decrease in number of routes	Burden hours per route	Decrease in total burden hours	Salary cost per hour ⁵³	Decrease in total salary cost	Decrease in total burden cost
Class I Railroads Class II Railroads Class III Railroads	0 0 0	(2) (1) (1)	120 120 40	(240) (120) (40)	\$73.98 73.98 73.98	(\$17,756) (8,878) (2,959)	\$0 0 0
Total	0	(4)		(280)		(29,593)	0

Total AnnualDecrease in Number of Respondents: 0.

Total Annual Decrease in Number of Response: 8.

Total Annual Decrease in Burden Hours: 680.

Total Annual Decrease in Salary Costs: \$50,308.

Total Annual Decrease in Burden Costs: \$0.

PHMSA requests comments on the information collection and recordkeeping burden that would be reduced by the temporary suspension of the LNG by Rail final rule. Address written comments to the DOT Docket Operations Office as identified in the

⁴⁹DOT, "Rulemaking Requirements Related to Small Entities," *https://www.transportation.gov/ regulations/rulemaking-requirements-concerningsmall-entities* (last visited Jun. 17, 2021).

⁵⁰ 85 FR 46220 (Jul. 31, 2020).

ADDRESSES section of this rulemaking. Comments regarding information collection burdens must be received prior to the close of the comment period identified in the DATES section of this rulemaking. Requests for a copy of this information collection should be directed to Steven Andrews or Shelby Geller, (202) 366-8553, ohmspra@ dot.gov. Standards and Rulemaking Division (PHH–10), Pipeline and Hazardous Materials Safety Administration, 1200 New Jersey Avenue SE, Washington, DC 20590-0001. If these proposed HMR amendments are adopted in a final rule, PHMSA will submit the revised

information collection and recordkeeping requirements to OMB for approval.

G. Unfunded Mandates Reform Act of 1995

The Unfunded Mandates Reform Act of 1995 (UMRA; 2 U.S.C. 1501 *et seq.*) requires agencies to assess the effects of Federal regulatory actions on State, local, and Tribal governments, and the private sector. For any NPRM or final rule that includes a Federal mandate that may result in the expenditure by State, local, and Tribal governments, or by the private sector of \$100 million or more in 1996 dollars in any given year,

⁵¹85 FR 73128 (Nov. 16, 2020).

⁵² Occupation labor rates based on 2020 Occupational and Employment Statistics Survey (DES) for "Transportation, Storage, and Distribution Managers (11–3071)" in the Transportation and Warehousing industry. *See https://www.bls.gov/ oes/current/oes113071.htm*. The hourly mean wage for this occupation (\$50.53) is adjusted to reflect the

total costs of employee compensation based on the BLS Employer Costs for Employee Compensation Summary, which indicates that wages for civilian workers are 68.3 percent of total compensation (total wage = wage rate/wage % of total compensation).

the agency must prepare, amongst other things, a written statement that qualitatively and quantitatively assesses the costs and benefits of the Federal mandate.

This proposed rulemaking does not impose unfunded mandates under the UMRA. As explained above, it is not expected to result in costs of \$100 million or more in 1996 dollars on either State, local, or Tribal governments, in the aggregate, or to the private sector in any one year, and is the least burdensome alternative that achieves the objective of the rule.

H. Environmental Assessment

The National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 et seq.), requires that Federal agencies analyze proposed actions to determine whether the action will have a significant impact on the human environment. CEQ implementing regulations (40 CFR parts 1500-1508) require Federal agencies to conduct an environmental review considering (1) the need for the action, (2) alternatives to the action, (3) probable environmental impacts of the action and alternatives, and (4) the agencies and persons consulted during the consideration process. DOT Order 5610.1C ("Procedures for Considering Environmental Impacts'') establishes DOT procedures for evaluation of environmental impacts under NEPA and its implementing regulations.

(1) The Need for the Action

PHMSA has determined that the recommendations from the TRB committee, its ongoing research, and recent events stemming from the COVID-19 public health emergency predicate the need to re-evaluate the amendments authorized in the LNG by Rail final rule. Research activity that PHMSA had expected would enhance its understanding of the risks attendant in rail transportation of LNG has been delayed, and uncertainties have increased in whether there will be any potential benefits, and in the underlying economic dynamics bounding those risks (e.g., the quantity of LNG that will move by rail, and the routes involved). Therefore, PHMSA proposes to amend the HMR to suspend authorization of LNG transportation in a rail tank car pending further analysis and completion of a companion rulemaking that will consider changes to the conditions under which LNG could be moved by rail, to potentially include additional safety, environmental, and environmental justice protections. This action will provide PHMSA an opportunity to review recent actions

that could be obstacles to Administration policies promoting public health and safety, the environment, and climate change mitigation; and to evaluate the results of ongoing and delayed research efforts to ensure the safe transportation of LNG by rail tank car.

(2) Alternatives to the Action

In proposing this rulemaking, PHMSA is considering the following alternatives:

No Action Alternative

If PHMSA were to select the No Action Alternative, current regulations authorizing the transport of LNG in rail tank cars would remain in effect and no provisions would be amended or added. Therefore, the HMR would continue to authorize the transportation of LNG in DOT–113C120W9 tank cars with a 9/16inch outer tank composed of TC–128B normalized steel. The following operational controls and safety measures would also remain in effect:

• Each tank car must be operated in accordance with § 173.319, which includes:

 $^{\odot}\,$ Testing of relief valves every 5 years

 $^{\odot}\,$ annual replacement of rupture discs

• thermal integrity tests following an average daily pressure rise during any shipment exceeding 3 psig per day

• other requirements specific to liquids in cryogenic tank cars.

• 49 CFR part 179, subpart F contains detailed design, construction, and operational requirements for DOT– 113C120W tank cars with the specification suffix "9" to be used in rail transportation of LNG.

• Trains transporting 20 or more tank cars of LNG in a block, or 35 such tank cars throughout the train, must be equipped and operated with a two-way EOT device, pursuant to the requirements in 49 CFR part 232, subpart E, or a distributed-power (DP) locomotive as defined in 49 CFR 229.5.

• The offeror must remotely monitor each tank car while in transportation for pressure and location.

• The offeror must notify the carrier if the tank pressure rise exceeds 3 psig over any 24-hour period.

• Trains transporting any quantity of LNG must comply with the route planning requirements in § 172.820, which requires rail carriers transporting LNG by rail tank car to conduct an annual route analysis considering, at a minimum, 27 risk factors listed in appendix D to part 172.

• Each LNG tank car must have:

 $^{\odot}\,$ A reclosing pressure relief device with a start-to-discharge pressure of 75 psig;

 a non-reclosing pressure relief device set to discharge at the tank test pressure;

• a maximum permitted filling density (percent by weight) of 37.3 percent;

 $^{\odot}\,$ a design service temperature of $-\,162\,^{\circ}C$ ($-\,260\,^{\circ}F);$

 $^{\odot}\,$ a maximum pressure when offered for transportation not to exceed 15 psig;

○ a minimum steel thickness, after forming, on the outer tank shell and tank heads of 9/16 inch, which is thicker than the requirement for other DOT-113C120W tank cars; and

 $^{\circ}$ an outer tank shell constructed of AAR TC–128, Grade B normalized steel plate as specified in § 179.100–7(a), which has a higher tensile strength of 81,000 psi which makes it stronger than that used for the existing DOT–113 outer shell.

The FEA, which—except for the finding of no significant impact therein-is adopted by reference into this NPRM, examined how the above requirements were imposed to reduce risks to human safety and the environment from the transportation of LNG in rail tank cars and incidents occurring as a result of this transportation.⁵⁴ The No Action Alternative would allow the shipment of LNG in rail tank cars, and PHMSA could continue to consider whether additional mitigations are necessary based on the expert recommendations from the TRB Phase I Report and results from ongoing and delayed research efforts.

Proposed Action Alternative

This alternative is the current proposal as it appears in this NPRM, proposing to add a new special provision to the HMR that would suspend the transportation of LNG in rail tank cars while PHMSA undergoes a comprehensive review to ensure the safe transportation of LNG by rail in accordance with ongoing research and incorporation of recommendations from the TRB, as well as the best available economic analysis and climate science. Rail transport of LNG would be permitted only on an *ad hoc* basis as authorized by the conditions of a PHMSA special permit (49 CFR 107.105) or in a portable tank secured to a rail car pursuant to the conditions of an FRA approval (49 CFR 174.63). The proposed amendments included in this alternative are more fully discussed in

⁵⁴ See Docket No. PHMSA-2018-0025-0478.

the preamble and regulatory text sections of this NPRM.

(3) Probable Environmental Impacts of the Action and Alternatives

No Action Alternative

If PHMSA were to select the No Action Alternative, current regulations would remain in place without suspension. As described in the FEA, the No Action Alternative could pose risks to public safety and the environment because the authorization under the HMR to offer shipments of LNG by rail tank car would remain in place. LNG poses potential hazards as a cryogenic liquefied flammable gas, including cryogenic temperature exposure, fire, and asphyxiation hazards. Transportation of any hazardous material introduces risk to safety and the environment, and each additional tank car theoretically increases the overall risk of an incident occurring and the quantity that could be released in the event of a derailment. While this is true for all hazardous materials transportation, PHMSA seeks to better understand the risks inherent to LNG transportation in the DOT-113C120W9, especially given the LNG by Rail final rule authorized large quantities to be transported at some point in the future. The 2020 FEA explained that transporting LNG in rail tank cars is expected to be safer than transporting LNG by truck on highways-however, it is possible that allowing LNG to be transported in rail tank cars would increase the amount of LNG transported, and therefore a direct comparison of the risks by rail and highway may be misleading. PHMSA will also consider, based on existing rail infrastructure locations and anticipated routes, whether transportation of LNG in rail tank cars could pose disproportionate harm or risk to communities of color or low-income communities. As described in the preamble to this proposed rule, various market and other uncertainties exist regarding specific routes that may be used for the transport of LNG by rail tank car.

No release of LNG vapor to the environment is allowed during the normal transportation of LNG in tank cars whether by roadway or railway. However, methane is odorless, and LNG contains no odorant, making detection of a release resulting from an incident difficult without a detection device. Releases of LNG due to venting or to accidents, without immediate ignition, involving either an MC–338 cargo tank, a portable tank, or a DOT–113C120W9 rail tank car have the potential to create flammable vapor clouds of natural gas because recently gasified LNG does not dissipate in the atmosphere as quickly as ambient-temperature natural gas. Large releases of LNG due to the breach of the inner tank of these transport vessels could result in a pool fire, vapor fire, and explosion hazards if methane vapors become confined. These flammability hazards pose a risk of higher potential impacts than localized cryogenic hazards.

Some commenters to the LNG by Rail final rule argued that the authorization of LNG by rail would further incentivize the production of natural gas, which is a fossil fuel. Methane has much greater heat trapping potential in the atmosphere than carbon dioxide in the short term. Thus, methane is considered a potent GHG, and comprises a significant portion of the United States' GHG emissions. While methane leaks are highly unlikely during transportation in the DOT-113C120W9 due to tank car design, increased natural gas production could lead to indirect environmental impacts of increased methane emissions released during production, loading and unloading, or at other times during its life cycle. In considering whether the authorization could further incentivize the production of natural gas, PHMSA will consider the scope of existing natural gas production and transportation via natural gas pipeline and other modes of transportation.

The FEA for the LNG by Rail final rule discussed potential environmental benefits that could be associated with the authorization to transport LNG by rail tank car. First, PHMSA discussed that the authorization could allow for the delivery of natural gas to locations dependent on more polluting energy forms, such as coal, diesel, heating oil, or firewood.55 Use of natural gas in such areas, whether foreign or domestic, could allow for a reduction in polluting and climate-warming emissions. Additionally, the authorization to transport LNG by rail tank car could potentially replace some shipments of LNG by highway. As discussed in the FEA for the LNG by Rail rule, highway

transportation is less efficient in comparison to rail transportation when considering fuel use, combustion emissions, and climate change impacts. However, in order to supplement, reduce, or replace highway transportation, rail infrastructure would need to exist between the origin and destination locations or be developed. Finally, the FEA explored industry claims that the authorization could incentivize the capture, storage, and liquefaction of natural gas over venting and flaring of natural gas during oil production and other industrial activities, in areas where natural gas pipeline capacity is unavailable. Facilitating the productive end use of by-product methane could reduce the venting and flaring of natural gas, which causes methane and carbon dioxide emissions. Similar to other abovedescribed benefits, it is difficult to predict the extent to which industries would invest in the equipment, technology, and expertise necessary to pursue natural gas capture, storage, and liquefaction necessary to pursue LNG transportation by rail. A suspension of the authorization to transport LNG by rail could curtail these potential benefits in the near term.

Proposed Action Alternative

Under the Proposed Action Alternative, PHMSA would amend the HMR to suspend authorization of LNG transportation in rail tank cars pending further analysis and completion of a companion rulemaking or June 30, 2024, whichever is earlier. Therefore, the HMR would not authorize shippers to transport bulk quantities of LNG by rail tank car. Instead, LNG by rail would only be permitted pursuant to a DOT SP or in portable tanks subject to FRA approval. The Proposed Action Alternative would avoid the risks that transportation of LNG in rail tank cars, and particularly potential derailments of rail cars transporting LNG, could pose to public safety and the environment. PHMSA would be able to further consider whether the transportation of LNG could pose disproportionate harm or risk to communities of color and communities with low incomes, which have historically borne the brunt of deleterious Federal policy decisions. PHMSA would also be able to further consider whether shipping LNG in rail tank cars is consistent with public health and safety, environmental protection, and climate change mitigation; and to evaluate the results of ongoing and delayed research efforts and collaboration as part of an accompanying rulemaking under RIN 2137-AF54.

⁵⁵ See, e.g., EPA, Press Release, "State of Alaska and Fairbanks North Star Borough receive \$14.7 Million EPA grant to improve air quality," (Nov. 2020), https://www.epa.gov/newsreleases/statealaska-and-fairbanks-north-star-borough-receive-147-million-epa-grant-improve-air ("The Borough will use the grant funds to continue a woodstove changeout and conversion program focused on converting more wood burning appliances to cleaner burning liquid or gas-fueled heating appliances, which have a very low output of particulate pollution and higher fuel efficiency. Wood smoke contributes up to 60 to 80 percent of fine particle pollution levels measured in the Fairbanks North Star Borough.").

However, as noted in the FEA for the LNG by Rail final rule, the use of MC-338 cargo tanks and portable tanks for LNG could increase over time if rail transport in tank cars were not authorized. Thus, shippers could have to rely on less efficient transportation mechanisms in the interim, as highway transportation requires more vehicles to move the same amount of material as rail transportation—if this occurs, the potential environmental benefits that could result from the transportation of bulk quantities of LNG by rail car discussed above would not be realized in the short term. However, as explained above, PHMSA does not expect that significant quantities of LNG would be shipped in rail tank cars during the suspension period. Further, the loss of economies of scale associated with transport of LNG by rail tank car could inhibit switching to MC–338 cargo tanks.

(4) Agencies and Persons Consulted During the Consideration Process

PHMSA has coordinated with FRA, the Federal Aviation Administration, the Federal Motor Carrier Safety Administration, and the U.S. Coast Guard in the development of this proposed rule. The NPRM has also been made available to other Federal agencies within the interagency review process contemplated under Executive Order 12866. PHMSA solicits, and will consider, comments on the NPRM's potential impacts on safety and the environment submitted by members of the public, State and local governments, Tribal communities, and industry.

(5) Proposed Finding of No Significant Impact

The adoption of the Proposed Action Alternative's proposed suspension would prohibit the transportation of LNG in rail tank cars while PHMSA and FRA undertake a comprehensive analysis of safety and environmental issues associated with the transportation of LNG by rail. As such, PHMSA expects that the HMR amendments in the NPRM would have no significant impact on the human environment. PHMSA expects that the Proposed Action Alternative would allow PHMSA to review new information to evaluate the potential impact on safety, environmental justice, and GHG emissions. Further, based on PHMSA's analysis of these provisions described above and insofar as there has been no significant progress toward the movement of LNG by rail tank car, PHMSA proposes to find that codification and implementation of the proposed rule would not result in a

significant impact to the human environment.

PHMSA welcomes any views, data, or information related to environmental impacts that may result from NPRM's proposed requirements, the No Action Alternative, and other viable alternatives and their environmental impacts.

I. Executive Order 12898

Executive Orders 12898 ("Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations"),56 13985 ("Advancing Racial Equity and Support for Underserved Communities Through the Federal Government"),57 13990 ("Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis"),58 14008 ("Tackling the Climate Crisis at Home and Abroad"),⁵⁹ and DOT Order 5610.2C ("Department of Transportation Actions to Address Environmental Justice in Minority Populations and Low-Income Populations") require DOT agencies to achieve environmental justice as part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects, including interrelated social and economic effects of their programs, policies, and activities on minority populations, lowincome populations, and other underserved and disadvantaged communities.

PHMSA has evaluated this proposed rule under the above Executive Orders and DOT Order 5610.2C, and expects it would not cause disproportionately high and adverse human health and environmental effects on minority, lowincome, underserved, and other disadvantaged populations and communities. The rulemaking is facially neutral and national in scope; it is neither directed toward a particular population, region, or community, nor is it expected to adversely impact any particular population, region, or community. And insofar as PHMSA expects the rulemaking would not adversely affect the safe transportation of hazardous materials generally, PHMSA does not expect the proposed revisions would entail disproportionately high adverse risks for minority populations, low-income populations, or other underserved and disadvantaged communities.

The proposed rulemaking could reduce risks to minority populations, low-income populations, or other underserved and disadvantaged communities. Insofar as the proposed HMR amendments could avoid the release of hazardous materials, the proposed rule could reduce risks to populations and communities including any minority, low-income, underserved, and disadvantaged populations and communities—in the vicinity of railroad lines. However, as noted in the FEA for the LNG by Rail final rule, access to LNG may result in potential economic benefits for underserved communities because of the efficiencies of transporting LNG by rail, and thereby domestic production, distribution, and consumption of natural gas could increase. These potential economic benefits that could result from the transportation of bulk quantities of LNG by rail car would not be realized by underserved communities in the short term. In addition, to the extent that suspending shipment of LNG by rail tank car could increase demand for shipping LNG by truck on highways, the proposed HMR amendments could increase risks to environmental justice communities in the vicinity of those highways.

PHMSA solicits comment on potential impacts to minority, low-income, underserved, and other disadvantaged populations and communities of the proposed rulemaking.

J. Privacy Act

In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, including any personal information the commenter provides, to *http:// www.regulations.gov*, as described in the system of records notice (DOT/ALL– 14 FDMS), which can be reviewed at *http://www.dot.gov/privacy*. DOT's complete Privacy Act Statement in the **Federal Register** published on April 11, 2000,⁶⁰ or on DOT's website at *http:// www.dot.gov/privacy*.

K. Executive Order 13609 and International Trade Analysis

Executive Order 13609 ("Promoting International Regulatory Cooperation")⁶¹ requires that agencies must consider whether the impacts associated with significant variations between domestic and international regulatory approaches are unnecessary or may impair the ability of American business to export and compete

 $^{^{56}\,59}$ FR 7629 (Feb. 16, 1994).

^{57 86} FR 7009 (Jan. 25, 2021).

⁵⁸86 FR 7037 (Jan. 25, 2021).

⁵⁹86 FR 7619 (Feb. 1, 2021).

⁶⁰65 FR 19475 (Apr. 11, 2000).

^{61 77} FR 26413 (May 4, 2012).

internationally. In meeting shared challenges involving health, safety, labor, security, environmental, and other issues, international regulatory cooperation can identify approaches that are at least as protective as those that are or would be adopted in the absence of such cooperation. International regulatory cooperation can also reduce, eliminate, or prevent unnecessary differences in regulatory requirements.

Similarly, the Trade Agreements Act of 1979 (Pub. L. 96-39), as amended by the Uruguay Round Agreements Act (Pub. L. 103-465), prohibits Federal agencies from establishing any standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Pursuant to the Trade Agreements Act, the establishment of standards is not considered an unnecessary obstacle to the foreign commerce of the United States, so long as the standards have a legitimate domestic objective, such as providing for safety, and do not operate to exclude imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards.

PHMSA participates in the establishment of international standards in order to protect the safety of the American public. PHMSA has assessed the effects of this rulemaking to ensure that it does not cause unnecessary obstacles to foreign trade. While the proposal to suspend the transport of LNG by rail tank car has potential to impact the United States' export of bulk LNG internationally, there has been no significant reliance interest or progress toward the near-term movement of LNG by rail tank cars. As such, PHMSA expects the amendments herein to pose a minimal impact to international trade if adopted. Therefore, PHMSA proposes

to amend the HMR to suspend authorization of LNG transportation in a rail tank car pending further analysis to ensure potential future regulatory actions to allow bulk transport of LNG by rail promote public health and safety, the environment, and climate change mitigation. Accordingly, this rulemaking is consistent with Executive Order 13609 and PHMSA's obligations under the Trade Agreement Act, as amended.

L. Executive Order 13211

Executive Order 13211 ("Actions **Concerning Regulations That** Significantly Affect Energy Supply, Distribution, or Use")⁶² requires Federal agencies to prepare a Statement of Energy Effects for any "significant energy action." Executive Order 13211 defines a "significant energy action" as any action by an agency (normally published in the Federal Register) that promulgates, or is expected to lead to the promulgation of, a final rule or regulation that (1)(i) is a significant regulatory action under Executive Order 12866 or any successor order and (ii) is likely to have a significant adverse effect on the supply, distribution, or use of energy (including a shortfall in supply, price increases, and increased use of foreign supplies); or (2) is designated by the Administrator of the Office of Information and Regulatory Affairs (OIRA) as a significant energy action.

Although this proposed rule is a significant action under Executive Order 12866, PHMSA expects it to have an annual effect on the economy of less than \$100 million. Further, this action is not likely to have a significant adverse effect on the supply, distribution, or use of energy in the United States. While the proposal to suspend the transport of LNG by rail tank car has potential to impact the supply, distribution, or use of energy in the United States, PHMSA does not anticipate any near-term movement of LNG by rail tank cars. For additional discussion of the anticipated economic impact of this rulemaking, please see discussion of the cost analysis in accordance with Executive Order 12866 ("Regulatory Planning and Review").

List of Subjects in 49 CFR Part 172

Education, Hazardous materials transportation, Hazardous waste, Incorporation by reference, Labeling, Markings, Packaging and containers, Reporting and recordkeeping requirements.

In consideration of the foregoing, PHMSA proposes to amend 49 CFR part 172 as follows:

PART 172—HAZARDOUS MATERIALS TABLE, SPECIAL PROVISIONS, HAZARDOUS MATERIALS COMMUNICATIONS, EMERGENCY RESPONSE INFORMATION, TRAINING REQUIREMENTS, AND SECURITY PLANS

■ 1. The authority citation for part 172 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.81, 1.96 and 1.97.

■ 2. In § 172.101, amend the Hazardous Materials Table by revising the entry for "Methane, refrigerated liquid (cryogenic liquid) or Natural gas, refrigerated liquid (cryogenic liquid), with high methane content)" to read as follows:

§172.101 Purpose and use of hazardous materials table.

* * * *

^{62 66} FR 28355 (May 22, 2001).

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■ 3. In § 172.102, revise paragraph (c)(1) by adding special provision 439 in numerical order to read as follows:

§172.102 Special provisions.

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439 UN1972 is not authorized for transportation by rail tank car until issuance of either a final rule concluding the rulemaking action proceeding under RIN 2137-AF54, or June 30, 2024, whichever occurs first. For information and the status of RIN 2137-AF54, please refer to the Office of Management and Budget's Office of Information and Regulatory Affairs at www.reginfo.gov.

* * *

Issued in Washington, DC, on October 19, 2021, under authority delegated in 49 CFR 1.97.

William S. Schoonover,

Associate Administrator for Hazardous Materials Safety, Pipeline and Hazardous Materials Safety Administration.

[FR Doc. 2021-23132 Filed 11-5-21: 8:45 am] BILLING CODE 4910-60-P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS-R4-ES-2021-0053; FF09E21000 FXES1111090FEDR 223]

RIN 1018-BF38

Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Miami Tiger Beetle

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; extension of comment period, and announcement of public hearing.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), are extending the public comment period on our September 7, 2021, proposed rule to designate critical habitat for the Miami tiger beetle (Cicindelidia floridana) under the Endangered Species Act of 1973 (Act), as amended. We are taking this action to conduct a public hearing and to allow all interested parties additional time to comment. Comments previously submitted need not be resubmitted and will be fully considered in preparation of the final rule.

DATES: Comment submission: The comment period for the proposed rule published on September 7, 2021 (86 FR 49945), is extended. We will accept comments received or postmarked on or before December 23, 2021. Please note that comments submitted electronically using the Federal eRulemaking Portal (see ADDRESSES, below) must be received by 11:59 p.m. Eastern Time on the closing date, and comments submitted by U.S. mail must be postmarked by that date to ensure consideration.

Public hearing: On December 2, 2021, we will hold a public hearing from 6 to 7:30 p.m., Eastern Time, using the Zoom platform (for more information, see Public Hearing, below).

ADDRESSES: Availability of documents: You may obtain copies of the September 7, 2021, proposed rule and associated documents on the internet at *https://* www.regulations.gov under Docket No. FWS-R4-ES-2021-0053.

Comment submission: You may submit written comments by one of the following methods:

(1) *Electronically:* Go to the Federal eRulemaking Portal: https:// www.regulations.gov. In the Search box, enter the RIN or docket number, which are displayed in the initial headings of this document. For best results, do not copy and paste the RIN or docket number; instead, type the RIN or docket number into the Search box using hyphens. Then, click on the Search button. On the resulting page, in the Search panel on the left side of the screen, under the Document Type heading, click on the Proposed Rule box to locate this document. You may submit a comment by clicking on "Comment." Please ensure you have located the correct document before submitting your comments.

(2) By hard copy: Submit by U.S. mail to: Public Comments Processing, Attn: FWS-R4-ES-2021-0053, U.S. Fish and Wildlife Service, MS: PRB/3W, 5275 Leesburg Pike, Falls Church, VA 22041-3803.

We request that you send comments only by the methods described above. We will post all comments on https:// www.regulations.gov. This generally means that we will post any personal information you provide us (see Public Comments, below, for more information).

FOR FURTHER INFORMATION CONTACT:

Lourdes Mena, Division Manager, Florida Classification and Recovery, U.S. Fish and Wildlife Service, Florida Ecological Services Field Office, 7915 Baymeadows Way, Suite 200, Jacksonville, FL 32256–7517; telephone 904–731–3134. Persons who use a telecommunications device for the deaf

(TDD) may call the Federal Relay Service at 800-877-8339.

SUPPLEMENTARY INFORMATION:

Background

On September 7, 2021, we published a proposed rule (86 FR 49945) to designate critical habitat for the Miami tiger beetle under the Act. The proposed rule established a 60-day public comment period, ending November 8, 2021. During the comment period, we received a request for a public hearing. Therefore, we are announcing a public hearing and a 45-day extension of the September 7, 2021, proposed rule's comment period (see DATES, above) to allow the public an additional opportunity to provide comments on the proposed rule.

For a description of previous Federal actions concerning the Miami tiger beetle and information on the types of comments that would be helpful to us in promulgating this rulemaking action, please refer to the September 7, 2021, proposed rule (86 FR 49945).

Public Hearing

We are holding a public hearing to accept comments on the proposed rule on the date and at the time listed in DATES. We are holding the public hearing via the Zoom online video platform and via teleconference so that participants can attend remotely. For security purposes, registration is required. All participants must register in order to listen and view the hearing via Zoom, listen to the hearing by telephone, or provide oral public comments at the hearing by Zoom or telephone. For information on how to register, or if technical problems occur joining Zoom on the day of the hearing, visit https://www.fws.gov/southeast/ florida. Registrants will receive the Zoom link and the telephone number for the public hearing. If applicable, interested members of the public not familiar with the Zoom platform should view the Zoom video tutorials (https:// support.zoom.us/hc/en-us/articles/ 206618765-Zoom-video-tutorials) prior to the public hearing.

The public hearing will provide interested parties an opportunity to present verbal testimony (formal, oral comments) regarding the September 7, 2021, proposed rule to designate critical habitat for the Miami tiger beetle (86 FR 49945). The public hearing will not be an opportunity for dialogue with the Service, but rather a forum for accepting formal verbal testimony. In the event there is a large attendance, the time allotted for oral statements may be limited. Therefore, anyone wishing to make an oral statement at the public

high-cost areas for which it is requesting to offer the high-cost area benefit. If the Administrator finds the particularized economic hardship showing is satisfied in accordance with the Commission's rules and orders, and any guidance from the Wireline Competition Bureau and the Office of Economics and Analytics, then the Administrator will approve the request and notify the participating provider. Otherwise, the Administrator will deny the request and provide the participating provider a written explanation of the basis for the denial.

(1) The Administrator will review applications within a timeline to be determined by the Bureau.

(2) Providers may appeal the Administrator's determination as set forth in subpart I in this part of the Commission's rules.

(3) Providers may only submit claims for up to the \$30.00 standard benefit amount while an appeal of an Administrator's determination is underway. Following a successful appeal, providers approved to offer the high-cost area benefit may submit revised claims for eligible households in the approved high-cost areas as set forth in § 54.1808. The provider many submit revised claims for up to \$75.00 only from the start of the approval period indicated in the appeal determination letter.

(d) Annual renewal process. A participating provider that has been approved to provide the high-cost area benefit must request approval annually thereafter to continue to provide the enhanced benefit to eligible households in a subsequent year. The participating provider will need to demonstrate particularized economic hardship in the renewal submission, through the documentation specified by the Wireline Competition Bureau. The deadline for submitting the renewal request shall be determined by the Wireline Competition Bureau.

(e) Notice to eligible households. (1) Participating providers approved to offer the high-cost area benefit shall provide Affordable Connectivity Program subscribers written notice when the provider begins applying the high-cost area benefit to the subscriber's bill. The written notice must state:

(i) That the subscriber is receiving a high-cost area benefit and the difference between the standard benefit amount and the enhanced high-cost benefit being applied to the subscriber's supported service;

(ii) That the receipt of the high-cost area benefit is contingent on the provider's annual continued eligibility to offer the enhanced high-cost area benefit; (iii) That the provider is required to provide the subscriber advance notice if the provider is no longer deemed eligible to offer the high-cost area benefit; and

(iv) That the provider is required to provide the subscriber advance notice of any changes to the subscriber's supported service rate or service plan stemming from any loss of the provider's eligibility to offer the highcost area benefit.

(2) If a participating provider fails to timely submit the renewal submission by the deadline or no longer qualifies to offer the high-cost area benefit based on its annual resubmission, then the participating provider shall provide written notice to its Affordable Connectivity Program customers receiving the high-cost area benefit at least 30 days and at least 15 days before the expiration of its approval to offer the high-cost area benefit. Such subscriber notices shall include:

(i) A statement that the provider will no longer be offering the high-cost area benefit in the relevant high-cost area;

(ii) The effective date of the end of the high-cost area benefit;

(iii) A statement that upon the effective date of the loss of the high-cost area benefit, the Affordable Connectivity Program supported service purchased by the household will no longer be discounted at the higher subsidy amount; and

(iv) The amount the household will be expected to pay if it continues purchasing the service from the provider after the high-cost area benefit is no longer available.

(3) If a participating provider is no longer authorized to offer the high-cost area benefit, the provider may transition an eligible household to a lower-priced ACP service plan once the high-cost area benefit is no longer available, upon advance notice to the household and an opportunity for the household to opt out of the change and remain on its current service plan or select another service plan. Participating providers must include the advance transition notice in the required written notice about the end of the provider's approval to offer the high-cost area benefit. The advanced notice must:

(i) Provide details about the new plan and monthly price;

(ii) State that the subscriber may remain on its current plan or choose another plan;

(iii) Provide instructions on how the subscriber can opt out of the transition or change its service plan;

(iv) Provide the deadline for the subscriber to notify the provider that the

subscriber would like to remain on its current plan or choose another plan. [FR Doc. 2023–18621 Filed 8–31–23; 8:45 am] BILLING CODE 6712–01–P

DEPARTMENT OF TRANSPORTATION

Pipeline and Hazardous Materials Safety Administration

49 CFR Part 172

[Docket No. PHMSA-2021-0058 (HM-264A)]

RIN 2137-AF55

Hazardous Materials: Suspension of HMR Amendments Authorizing Transportation of Liquefied Natural Gas by Rail

AGENCY: Pipeline and Hazardous Materials Safety Administration (PHMSA), Department of Transportation (DOT).

ACTION: Final rule.

SUMMARY: PHMSA, in coordination with the Federal Railroad Administration (FRA), is amending the Hazardous Materials Regulations to suspend authorization of liquefied natural gas (LNG) transportation in rail tank cars pursuant to a final rule published on July 24, 2020, pending the earlier of either completion of a companion rulemaking evaluating potential modifications to requirements governing rail tank car transportation of LNG, or June 30, 2025.

DATES: This final rule is effective on October 31, 2023.

FOR FURTHER INFORMATION CONTACT:

Alexander Wolcott, Transportation Specialist, Standards and Rulemaking Division, Office of Hazardous Materials Safety, (202) 366–8553, 1200 New Jersey Avenue SE, Washington, DC 20590– 0001.

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I. Overview

PHMSA, in coordination with FRA, is suspending recent amendments to the Hazardous Materials Regulations (HMR; 49 CFR parts 171-180) authorizing transportation of "Methane, refrigerated liquid," commonly known as liquefied natural gas (LNG) in DOT-113C120W9 specification rail tank cars while it conducts a thorough evaluation of the HMR's regulatory framework for rail transportation of LNG in a companion rulemaking under Regulatory Identification Number (RIN) 2137-AF54, and determines whether any modifications are necessary. Transportation of LNG by rail tank car has not occurred since the July 24, 2020, publication of a final rule authorizing transportation of LNG in rail tank cars¹ and there is considerable uncertainty regarding whether any would occur in the time it takes for PHMSA to consider

potential modifications to existing, pertinent HMR requirements. However, this temporary suspension of the HMR provisions authorizing transportation of LNG in rail tank cars guarantees no such transportation will occur before its companion rulemaking has concluded or June 30, 2025, whichever is earlier, thereby: (1) avoiding potential risks to public health and safety or environmental consequences (to include direct and indirect greenhouse gas (GHG) emissions)² that are being evaluated in the companion rulemaking under RIN 2137-AF54; (2) allowing for the completion of ongoing testing and evaluation efforts undertaken in collaboration with FRA, as well as further consideration of the recommendations from external technical experts of the National Academy of Sciences, Engineering, and Medicine (NASEM); (3) assuring an opportunity for the potential development of any mitigation measures and operational controls for rail tank car transportation of LNG; (4) reducing the potential for economic burdens by ensuring that entities avoid ordering rail tank cars for transporting LNG compliant with current HMR requirements when the companion rulemaking may adopt alternative requirements; and (5) enabling potential opportunities for stakeholders and the public to be apprised of, and comment on, the results of ongoing testing and evaluation efforts.

Towards that end, PHMSA is adding a new special provision 439 that prohibits LNG transportation in rail tank cars until issuance of a final rule concluding the rulemaking proceeding under a companion rulemaking under RIN 2137–AF54, or June 30, 2025, whichever is earlier. Rail transport of LNG may still be permitted as authorized by the conditions of a PHMSA special permit (SP) under § 107.105, or in a portable International Organization for Standardization (ISO) tank secured to a rail car pursuant to the conditions of an FRA approval under §174.63. PHMSA is also adopting a modest extension (until June 30, 2025, at the latest) of the sunset for the temporary suspension period identified in its November 2021 notice of proposed rulemaking in this proceeding,³ consistent with comments received on the NPRM and information obtained after its publication evincing greater uncertainty regarding the near-term commercial viability and potential environmental and safety risks associated with rail tank car transportation of LNG as authorized by the July 2020 Final Rule.

II. Background

A. Historical Regulation of LNG by Rail

LNG is a natural gas that has been cooled and converted to a liquid form for easier and more efficient transportation. In the United States, pipelines have historically delivered most natural gas, although other modes of transportation—such as rail and highway—have accounted for a relatively minor portion of natural gas transportation, typically in the form of LNG. Before PHMSA published the July 2020 Final Rule, rail transportation of LNG would have been limited to UN portable tank shipments (commonly referred to as ISO tank shipments) under an FRA approval and shipments made under SPs issued by PHMSA. This approach reflected the unique safety risks presented by rail transportation of large volumes of LNG and the historically low demand to transport LNG by rail.

B. A New Regulatory Approach and Enabling Research

Executive Order 13868 ("Promoting Energy Infrastructure and Economic Growth'')⁴ was signed in April 2019 and required PHMSA to treat LNG the same as other cryogenic liquids, authorize LNG to be transported in approved rail tank cars, and to finalize that rulemaking within 13 months.⁵ In response, PHMSA published a notice of proposed rulemaking titled "Hazardous Materials: Liquefied Natural Gas by Rail"⁶ in which it proposed to authorize the transportation of LNG in existing DOT-113C120W specification tank cars. The initial comment period for the NPRM closed on December 23, 2019, and was subsequently extended until January 13, 2020, following PHMSA's issuance to Energy Transport Solutions, LLC (ETS) in early December 2019 of

¹ PHMSA final rule "Hazardous Materials: Liquefied Natural Gas by Rail," 85 FR 44994 (Jul. 24, 2020) (July 2020 Final Rule). References within to "this Final Rule" or "the Final Rule" without qualification by reference to "July 2020" are meant to refer to this notice rather than its July 2020 Final Rule.

² PHMSA distinguishes between "direct" and "indirect" GHG emissions herein consistent with Council on Environmental Quality (CEQ) guidance. *See* CEQ, "National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change," 88 FR 1196 (Jan. 9, 2023), which builds upon and updates CEQ's 2016 "Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews," 81 FR 51866 (Aug. 8, 2016).

³ PHMSA, "Notice of Proposed Rulemaking— Hazardous Materials: Suspension of HMR Amendments Authorizing Transportation of Liquefied Natural Gas by Rail" 86 FR 61731 (Nov. 8, 2021) (NPRM).

⁴84 FR 15495 (Apr. 15, 2019).

⁵ The Secretary has delegated such rulemaking duties to the PHMSA Administrator. *See* 49 CFR 1.97.

⁶⁸⁴ FR 56977 (Oct. 24, 2019).

DOT–SP 20534 for the transportation of LNG by rail tank car.⁷

DOT-SP 20534 allowed the transportation of LNG in existing DOT-113 tank cars from Wyalusing, PA, to Gibbstown, NJ, with no intermediate stops. This SP contained safety controls including a requirement to conduct remote sensing for detecting and reporting internal pressure, location, leakage, and (prior to the initial shipment of a tank car under the SP) a requirement to provide training to emergency response agencies that could be affected on the route. DOT-SP 20534 expired by its terms on November 30, 2021, after ETS had not filed an application for renewal until November 29, 2021. After careful consideration, PHMSA denied ETS' application for renewal on March 31, 2023.8

In January 2020, PHMSA established a joint LNG Task Force with FRA to undertake testing and evaluation activity on the transportation of LNG that could inform potential future regulatory actions, as appropriate. In order to identify tasks within that effort, the LNG Task Force utilized a risk-based framework focused on knowing the risk, predicting the risk, reducing the risk, and preparing for the risk. Using that framework, the LNG Task Force identified and undertook 15 tasks to synthesize ongoing research and outreach activities. Those tasks included empirical review of international LNG transportation, safety and security route risk assessments, a re-evaluation of the costs and benefits of electronically controlled pneumatic (ECP) brakes, and the validation of emergency responders' opinions and needs. Although the LNG Task Force initially projected completion of its tasks by late 2021, much of its work was interrupted or delayed because of the coronavirus disease 2019 (COVID-19) public health emergency and because of subsequent modification of the scope of its activities. The ongoing efforts of the LNG Task Force are discussed further below.

In parallel with its work under the LNG Task Force, and pursuant to a

mandate in the "Further Consolidated Appropriations Act, 2020" (Pub. L. 116-94), PHMSA and FRA partnered with NASEM to conduct a study on the transportation of LNG in rail tank cars through a committee of the Transportation Research Board (TRB).⁹ The TRB commenced work in mid-July 2020. Roughly contemporaneous with the TRB beginning its work, PHMSA published the July 2020 Final Rule authorizing the shipment of LNG in new DOT-113C120W9 specification rail tank cars with enhanced outer tank requirements, subject to all applicable requirements and certain new operational controls. The July 2020 Final Rule became effective on August 24, 2020 and was swiftly followed by several petitions for judicial review. Specifically, six environmental groups, a coalition of attorneys general for 14 States and the District of Columbia, and the Puyallup Tribe of Indians filed separate petitions for review challenging the July 2020 Final Rule. All the petitioners asked the court to vacate the July 2020 Final Rule, alleging violations of the Hazardous Materials Transportation Act (HMTA; 49 U.S.C. 510 2012;5127), the Administrative Procedure Act (APA; 5 U.S.C. 553 et seq.), and the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 et seq.). The Puyallup Tribe also alleged violations of the Tribal consultation protocols under the National Historic Preservation Act (54 U.S.C. 300101 et seq.) and Executive Order 13175 ("Consultation and Coordination with Indian Tribal Governments"),¹⁰ as well as disparate impacts on the Tribe in violation of Executive Order 12898 ("Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations")¹¹ and Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d et seq.). The petitions were subsequently consolidated within a single proceeding in the U.S. Court of Appeals for the District of Columbia Circuit¹² with the court granting PHMSA's motion to place the petitions in abeyance while PHMSA reviewed the July 2020 Final Rule.

¹¹ 59 FR 7629 (Feb. 16, 1994).

 12 Under docket no. 20–1317 (consolidated with docket nos. 20–1318, 20–1431, & 21–1009).

PHMSA submitted the latest status report in that proceeding in early June 2023. The Court lifted the abeyance on July 18, 2023.¹³

C. Another Hard Look Incorporating NASEM Recommendations and Ongoing Research Efforts

Immediately after taking office, the **Biden-Harris Administration issued** Executive Order 13990 ("Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis'')¹⁴ on January 20, 2021. Executive Order 13990 required the review of agency regulations and other actions promulgated or adopted between January 20, 2017, and January 20, 2021, that are candidates for suspension, modification, or rescission because of inconsistency with Biden-Harris Administration policies to improve public health, protect the environment, prioritize environmental justice, and reduce GHG emissions. The Biden-Harris Administration identified the July 2020 Final Rule in a nonexclusive list ¹⁵ of agency actions that would be reviewed in accordance with Executive Order 13990. Additionally, section 7 of Executive Order 13990 revoked Executive Order 13868, along with several other executive orders and executive actions, and directed agencies to promptly take steps, consistent with applicable law, to rescind any rules or regulations that had been issued "implementing or enforcing" those executive orders and executive actions.

In response to Executive Order 13990, DOT published a notice on May 5, 2021, soliciting comment on potential candidates for review under Executive Order 13990 from among existing rules and other DOT actions.¹⁶ DOT received one comment pertaining to the July 2020 Final Rule from the Transportation Trades Department of the American Federation of Labor and Congress of Industrial Organizations (AFL–CIO). The commenter requested a reexamination of the July 2020 Final Rule as it believed that rulemaking "neglected to include meaningful safety measures to adequately address the

16 85 FR 23876 (May 5, 2021).

⁷ 84 FR 70492 (Dec. 23, 2019) (DOT–SP 20534). ⁸ 88 FR 24844, 2846 (Apr. 24, 2023). PHMSA formally informed ETS of the denial of its renewal application by email on March 31, 2023, noting that (1) ETS's renewal application had made no attempt to address the concerns raised in the NPRM in this proceeding, (2) nearly three and a half years after issuance of DOT–SP 20534, ETS had yet to provide evidence that it had procured either new DOT– 113C120W9 tank cars or existing DOT–113C120W tank cars, and (3) the origin and destination facilities specified in DOT–SP 20534 had not been built and would need additional authorizations before construction could begin. ETS did not seek judicial review of the denial.

⁹ In that legislation, Congress earmarked funds for the NASEM study for the express purpose of "inform[ing] rulemaking." NASEM maintains a website dedicated to the TRB committee's work that contains the TRB committee's charter, work product, meeting agendas, and other supporting material. See NASEM, "Safe Transportation of Liquefied Natural Gas by Railroad Tank Car," https://www.nationalacademies.org/our-work/safetransportation-of-liquefied-natural-gas-by-railroadtank-car (last visited May 15, 2023).

¹⁰ 65 FR 67249 (Nov. 9, 2000).

¹³ On May 17, 2023, Petitioners filed a Joint Motion to Lift Abeyance and requested the D.C. Circuit Court to direct the parties to submit a proposed briefing schedule. PHMSA, through the Department of Justice, filed a response opposing the motion to lift the abeyance on June 6, 2023. The Petitioners filed a reply on June 13, 2023.

^{14 86} FR 7037 (Jan. 25, 2021).

¹⁵ U.S. White House, "Fact Sheet: List of Agency Actions for Review," https://www.whitehouse.gov/ briefing-room/statements-releases/2021/01/20/factsheet-list-of-agency-actions-for-review/ (last visited May 16, 2023).

inherent risks to this type of operation."¹⁷

The TRB issued its Phase I Report on June 15, 2021,¹⁸ which reviewed the plans and progress of the LNG Task Force and evaluated the relevance, completeness, and quality of those efforts. The Phase I Report generally praised the LNG Task Force's "comprehensive as planned" program for making effective use of a "number of long standing and high-quality research and testing programs." However, the TRB noted that the COVID–19 public health emergency resulted in delays in initiation and completion of several tasks. The TRB also noted that the interdependency of many of those outstanding tasks complicated its and the LNG Task Force's work in developing a complete understanding of the risks associated with the transportation of LNG in rail tank cars. Specifically, it expressed concern on the incomplete status of tasks pertaining to full-scale impact testing, portable tank pool fire testing, worst-case scenario analysis, and quantitative risk assessment. The Phase I Report made several recommendations including proposing that PHMSA and FRA make changes to the planned portable fire tank testing, assess the potential for cryogenic damage cascading to adjacent tanks, enhance the modeling for worstcase scenarios, evaluate explosion hazards from a spill of LNG resulting in vapor dispersion in an environment with confined or congested spaces, and add loading and unloading operations to the risk assessment. PHMSA subsequently modified its LNG Task Force testing activity in response to the Phase I Report recommendations by, among other things, undertaking each of the following: enhanced impact testing directed toward evaluating post-weld, heat-treated seams from a DOT-113C120W9-specification tank car; enhanced worst-case scenario modeling; performing an enhanced quantitative risk assessment; modification of ISO tank pool fire testing protocols to better simulate release conditions; and enhanced train dynamic simulations to better capture effects from use of distributed power and buffer car placement within a train consist transporting LNG.

On November 8, 2021, PHMSA published the NPRM in this rulemaking proceeding. In that NPRM, PHMSA reviewed pertinent economic data, TRB's Phase I Report recommendations, and the status of ongoing work of the LNG Task Force en route to proposing a temporary suspension of the transportation of LNG by rail tank car until the earlier of either June 30, 2024, or the publication of a companion rulemaking under RIN 2137-AF54. PHMSA's proposal reflected its understanding that uncertainties acknowledged in the July 2020 Final Rule—*e.g.*, regarding the near-term commercial viability of rail tank car transportation of LNG, as well as potential safety and environmental benefits and risks of rail tank car transportation-had only increased since issuance, thereby "casti[ng] doubt on the continued validity of the balance between potential benefits and public safety and environmental risks underpinning the [July 2020 Final Rule]." 19 PHMSA therefore proposed a temporary suspension of the July 2020 Final Rule to allow time for PHMSA to review the results of the (thenforthcoming) TRB Phase II Report, complete ongoing LNG Task Force testing and evaluation activities, and (based on the results of those efforts) modify HMR requirements as appropriate within the companion rulemaking under RIN2137-AF54. The comment period closed on December 23, 2021. PHMSA received over 10,500 comments from private individuals, environmental groups, government officials, the rail industry, and other stakeholders. See Section III for further details.

The TRB issued its Phase II Report on September 9, 2022.²⁰ The Phase II Report involved a more comprehensive assessment than that undertaken in connection with the Phase I Report regarding topics relevant to the safe movement of LNG by rail tank car pursuant to both SPs and the HMR following issuance of the July 2020 Final Rule. Specifically, it examined bulk shipments of LNG by other modes of transportation (including vessel and highway) to identify the basic principles used in those modes for safety assurance. It also examined the effectiveness of regulatory requirements and industry practices (*e.g.*, pertaining to speed and routing, as well as other operational controls applicable to highhazard flammable trains) intended to assure the safe transportation of bulk rail shipments of other hazardous materials.

The Phase II Report also made recommendations on necessary nearand long-term actions to improve the understanding of the risks associated with transporting LNG by rail tank car, mitigate those risks, and prevent and prepare for potential incidents. The first recommendation suggested launching an LNG safety assurance initiative before LNG tank cars are put in service. The safety assurance initiative would actively monitor initial plans for and early patterns of LNG traffic activity, including the locations and routes of shipments, the number and configuration of tank cars in trains, and reports of incidents involving a tank car or train carrying LNG. The second and final recommendation suggested that PHMSA and FRA should review the DOT-113C120W9 tank car specification to ensure that it adequately accounts for the cryogenic and thermal properties of LNG that could contribute to a tank release in the event of a rail incident and potential cascading impacts therefrom. The TRB's elaboration on its second recommendation emphasized the value in assessing each of the following: the capacity of the pressure relief devices on the new DOT-113C120W9-specification tank cars to vent a sufficient amount of LNG when the tank car is engulfed in an LNG fire in derailment conditions, including a rollover event; the effects of adding more and different types of insulation in the annular space to ensure sufficient performance of the multilayer insulation system when the tank car is exposed to heat flux and direct flame impingement from an LNG fire; and the potential for the outer tank of the DOT-113C120W9 tank car to experience cryogenic brittle failure and loss of vacuum insulation when exposed to an LNG pool fire. PHMSA subsequently adjusted its LNG Task Force testing activity in response to the Phase II Report recommendations by modifying its ongoing worst-case analysis modeling and quantitative risk assessment efforts to address the DOT-113C120W9-specification design element concerns raised by the TRB. In light of the new information received from the TRB reports and PHMSA's completed research and ongoing tests, PHMSA suspends the regulations adopted in the July 2020 Final Rule to allow PHMSA sufficient time to complete its analysis to reconsider the determinations made in the July 2020 Final Rule.

The LNG Task Force has completed most of its testing and evaluation activities (as modified in response to the TRB Phases I and II Reports). Of those remaining activities, PHMSA expects to

¹⁷ Docket No. DOT–OST–2021–0036–0025. ¹⁸ NASEM, "Preparing for LNG by Rail Tank Car: A Review of a U.S. DOT Safety Research, Testing, and Analysis Initiative" (Jun. 2021) (Phase I Report). https://www.nan.edu/read//26221/chapter/

Report), *https://www.nap.edu/read/26221/chapter/* 1.

¹⁹86 FR at 61735–36.

²⁰NASEM, "Preparing for LNG by Rail Tank Car: A Readiness Review" (Sep. 2022) (Phase II Report), https://www.nap.edu/read/26719/chapter/1.

complete its enhanced quantitative risk analysis and worse case analysis modeling no later than Q3–2023. This analysis has taken longer than expected because it was modified first to address concerns in the TRB Phase I Report in June 2021 and then again in response to the TRB Phase II Report issued in September 2022. PHMSA is in the process of contracting for performance of each of the following remaining tasks: (1) enhanced impact testing directed toward evaluating post-weld, heattreated seams from a DOT-113C120W9specification tank car in response to the TRB Phase I Report; and (2) enhanced train dynamic simulations to better capture effects from use of distributed power and buffer car placement within a train consist transporting LNG in response to the TRB Phase I Report.

D. East Palestine, OH Derailment

On February 3, 2023, a mixed-consist freight train operated by Norfolk Southern Railway—comprised of two head-end locomotives, 149 railcars, and 1 distributed power locomotivederailed in East Palestine, Ohio. Thirtyeight railcars derailed, including 11 tank cars carrying combustible liquid and flammable gas hazardous materials, though none of the railcars were carrying LNG. The derailment resulted in a fire impacting the derailed tank cars and damaging 12 additional railcars that had not derailed. Included in the derailment and fire were five DOT-105 specification tank cars containing vinyl chloride—a hazardous material classified as a Division 2.1 flammable gas. These DOT-105 specification tank cars were not punctured in the derailment. PĤMSA is working with the National Transportation Safety Board to learn all it can from this incident and

determine whether the lessons learned should inform rail transportation of other hazardous commodities such as LNG.

III. Discussion of Comments to the NPRM and Adoption of a Temporary Suspension of the July 2020 Final Rule

The comment period for the NPRM in this proceeding closed on December 23, 2021. PHMSA received over 10,500 sets of comments to the rulemaking docket through and after the formal comment period; consistent with § 106.70, PHMSA considers late-filed comments to the extent possible. PHMSA considered all comments received in the development of this Final Rule. The comments submitted to this docket may be accessed via *http://*

www.regulations.gov. The following table categorizes the commenters. Please note that some commentors submitted multiple comments.

Commenter	Count	Description and examples of category
Non-Government Organizations	18	Environmental Groups; Emergency Response Organizations; Other.
Government Officials	8 10.126	Local; State; Federal; Tribal.
Industry Stakeholders	3	Trade Associations; Shippers.
Table of Con	nmenters	to the NPRM

Comments received could generally be summarized as advancing one or more of the following positions:

• Comments requesting an immediate, permanent ban of LNG by rail;

• Comments requesting the removal of the June 30, 2024, sunset date;

• Comments of general support for the NPRM;

• Comments alleging chilling of nearterm demand for LNG transportation by rail tank car pursuant to the July 2020 Final Rule;

• Comments alleging that LNG by rail improves safety;

• Comments alleging environmental benefits from LNG by rail;

• Comments alleging PHMSA is overstepping its authority by attempting to regulate oil and gas production;

• Comments alleging PHMSA did not meet its evidentiary burden under the APA for temporary suspension of the July 2020 Final Rule;

• Comments alleging that PHMSA's proposal will have miscellaneous adverse consequences for regulated entities, the U.S. economy, and national security; and

• Comments beyond the scope of this rulemaking.

Based on the comments received in response to the NPRM, the recommendations in the TRB Phases I and II Reports, the ongoing LNG Task Force testing and evaluation activities, and pertinent information regarding the near-term commercial prospects for rail tank car transportation of LNG, PHMSA has concluded that a temporary suspension of the July 2020 Final Rule's authorization for rail tank car transportation of LNG in new DOT-113C120W9-specification tank cars is appropriate. PHMSA finds that, consistent with the analysis in the NPRM, these resources indicate that the uncertainties described in the July 2020 Final Rule (e.g., regarding whether, when and how LNG by rail tank car transportation will occur, and the safety and environmental risks and benefits of such transportation) have only increased since its issuance, calling into question the balance between potential benefits and public safety and environmental risks PHMSA understood itself to be striking in that rulemaking. In contrast (and as explained at greater length below in this Section III responding to comments received on the NPRM) a temporary suspension will ensure each of the following: (1) avoidance of potential safety risks to

public and worker safety and the environment while PHMSA completes its companion rulemaking under RIN 2137-AF54; (2) HMR authorization of rail tank car transportation of LNG pursuant to that companion rulemaking reflects the best science by accounting for ongoing LNG Task Force testing and evaluation activities as informed by the TRB Phases I and II Report recommendations; (3) consideration of additional public comment from diverse stakeholders in that companion proceeding; and (4) minimizing the potential for economic burdens by ensuring that entities avoid ordering rail tank cars for LNG service compliant with the requirements of the July 2020 Final Rule when the companion rulemaking may alter those requirements.²¹ See 86 FR at 61732, 67135–36. As noted in the NPRM, stakeholders seeking to transport LNG by rail during the suspension period may seek (on an ad hoc basis) either SPs from PHMSA or approvals from FRA.

Lastly, the Final Rule extends the duration of the temporary suspension an

²¹ The temporary suspension provided for in this Final Rule applies only to rail transportation of LNG tank cars—it does not prohibit use of the new DOT-113C120W9 tank car in connection with other hazardous, cryogenic liquids.

additional year (until June 30, 2025, at the latest) beyond the sunset date (June 30, 2024) proposed in the NPRM. This extension-which is consistent with comments received from stakeholders ²² on the NPRM discussed in section III.B below—is warranted due to delays in completion of the LNG Task Force activity (discussed in section III.C below) that will inform the companion rulemaking under RIN 2137–AF54. Also, economic information discussed in section III.D below shows that the commercial prospects for rail tank car transportation pursuant to the July 2020 Final Rule have become even more uncertain than they were when the NPRM issued in November 2021.

A. Comments Requesting an Immediate, Permanent Ban of LNG by Rail

PHMSA received numerous comments requesting the immediate, permanent ban of all LNG by rail in lieu of the temporary suspension as proposed in the NPRM. Many of these comments were part of write-in campaigns comprising approximately 6,650 comments in an initial campaign during the formal comment period, and an additional 3,500 comments in a second campaign coordinated by the National Resource Defense Council (NRDC) after the East Palestine derailment in early 2023 (NRDC Coordinated Write-in Campaign Comments). Other comments were stand-alone comments submitted by non-governmental organizations (e.g., environmental advocacy organizations); Federal, State, and local government officials; and private citizens.

Many of these comments attributed the need for an immediate, permanent ban on the risk to public safety and the environment from LNG's material properties-specifically, pointing to its flammability, explosive potential, and GHG contributions—in the event of a release. Of particular concern for many commenters were the risks of a boiling liquid expanding vapor explosions (BLEVEs) or asphyxiation in the event of a release of LNG during an accident or incident. Some commenters elaborated on their safety concerns by highlighting the potential limitations (e.g., of personnel and equipment resources and training) of emergency response personnel to respond to an incident involving rail transportation of LNG in their jurisdictions. Other commenters alleged that the new DOT-113C120W9 tank car specification was inadequate or

untested for rail transportation of LNG and that a more robust safety history coupled with more robust, mandatory operational controls (such as limits on train length, tank car weight, and maximum allowable speed) than required in the July 2020 Final Rulewould be necessary to ensure safety. Other commenters cited safety and environmental justice concerns for those who live along rail lines that would carry LNG, stating that "bomb trains" would threaten the safety of those who live in these communities—many of which communities may be denselypopulated or historically disadvantaged. Other commenters called for an immediate ban of LNG transportation by rail given methane's status as a potent GHG and the Biden-Harris Administration's commitments to reducing GHG emissions. And commenters from the NRDC campaign called for a ban on LNG by rail in the "in the wake of the devastating train derailment in East Palestine, Ohio." 23 Lastly, some commenters contended that if the ". . . rule was already bad enough to reconsider, it should be repealed outright."²⁴

PHMSA Response

PHMSA acknowledges the concerns raised by these stakeholders and agrees that any risks related to the transportation of LNG by rail should be examined closely and properly mitigated to ensure safety for the public and the environment. Accordingly PHMSA is suspending LNG transportation by rail tank car pursuant to the July 2020 Final Rule until the conclusion of the companion rulemaking under RIN 2137-AF54 or June 30, 2025, whichever is earlier. This will provide PHMSA an opportunity to conduct a thorough evaluation of the HMR's regulatory framework for rail transportation of LNG based on the information received from the LNG Task Force testing and evaluation efforts, TRB Phases I and II Reports, and stakeholders' written comments. PHMSA also encourages those stakeholders to consider submitting comments in response to any future notice of proposed rulemaking issued by PHMSA in the companion rulemaking under RIN 2137-AF54.

B. Comments Requesting the Removal of the June 30, 2024, Sunset Date

PHMSA received comments requesting removal of the sunset date of

June 30, 2024, proposed in the NPRM so that the proposed suspension would be in effect until the companion rulemaking under RIN 2137-AF54 has concluded. Delaware Riverkeeper Network (DRN) commented that in the NPRM, PHMSA justified the sunset date by indicating that the TRB Phase II Report was expected in mid-2022 and that PHMSA needed time to incorporate those results and publish a rule. DRN argued that "this rationale begs the question-why not wait until PHMSA actually incorporates the results of the Phase II Report and concludes the rulemaking process?" They further stated that "the unpredictability of the COVID-19 pandemic indicates that timelines are not as predictable as they were pre-2019."²⁵

The International Association of Fire Fighters (IAFF) suggested an objectivebased approach whereby the suspension would only be lifted if certain criteria have been met. IAFF further urged ". the FRA to establish specific criteria to be attained prior to the lifting of the proposed suspension." ²⁶ Similarly, comments from the AFL-CIO and others supported suspending LNG by rail tank car until LNG Task Force testing and evaluation efforts are complete, stating they ". . . support PHMSA's suspension of the implementation of the rule until a time when the agencies have completed a more thorough safety review." 27 Other commenters proposed longer suspension periods than had been proposed in the NPRM.

PHMSA Response

PHMSA in the NPRM specifically sought comments on the proposed suspension date, including the sunset date, and whether PHMSA should modify the proposed expiration of the suspension period.²⁸ PHMSA appreciates and acknowledges the points made by commenters and, consistent with the discussion in the introduction to section III above, is extending the sunset date for the suspension period an additional year such that rail tank car transportation of LNG pursuant to the July 2020 Final Rule will be suspended until the earlier of either (1) a final rule concluding the companion rulemaking under RIN 2137-AF54, or (2) June 30, 2025. This one-year extension beyond the sunset date (June 30, 2024) proposed in the NPRM will give PHMSA adequate time to complete LNG Task Force testing and evaluation activities (and delays in

²² PHMSA received no comments that specifically requested the June 2024 sunset date for the suspension; commenters either sought no suspension or a permanent suspension.

²³ NRDC Coordinated Write-in Campaign Comments.

 $^{^{\}rm 24}\,\rm Beyond$ Extreme Energy with 198 methods Comment at 1.

²⁵ DRN Comment at 2.

²⁶ IAFF Comment at 2.

²⁷ TDD Comment at 1.

²⁸ 86 FR at 61737.

receipt of the TRB Phases I and II Reports) that had been delayed because of the COVID–19 public health emergency and additional scoping and contracting issues, and thereafter integrate those results into each of a notice of proposed rulemaking and final rulemaking in the companion rulemaking under RIN 2137–AF54.

C. Comments of General Support for the NPRM

PHMSA received numerous comments in support of the NPRM's proposed suspension, including comments from Governor Jay Inslee of Washington State; the Attorneys General of Maryland, New York, Connecticut, Delaware, Illinois, Massachusetts, Michigan, Minnesota, New Jersey, Oregon, Pennsylvania, Rhode Island, Vermont, Washington, and the District of Columbia; and the Puyallup Tribe of Indians. Many commenters who supported the temporary suspension proposed in the NPRM also urged PHMSA to subsequently ban LNG in the companion rulemaking under RIN 2137-AF54. Commenters supporting the NPRM's proposed suspension of the July 2020 Final Rule generally articulated the same safety and environmental concerns as those calling for an immediate, permanent bans of rail tank car transportation of LNG discussed in section III.A above.

PHMSA Response

PHMSA acknowledges the thousands of comments submitted in support of the NPRM. Although some of those commenters also urged PHMSA to permanently ban rail tank car transportation of LNG in the companion rulemaking under RIN 2137-AF54, PHMSA submits that it will need to complete (and review the results of) the LNG Task Force testing and evaluation efforts before it will be in a position to speak to the contents of a forthcoming notice of proposed rulemaking in that companion rulemaking. PHMŠA encourages stakeholders to consider submitting comments in response to any future notice of proposed rulemaking issued by PHMSA in the companion rulemaking under RIN 2137–ÅF54.

D. Comments Alleging Chilling of Near-Term Demand for LNG Transportation by Rail Tank Car Pursuant to the July 2020 Final Rule

PHMSA received several comments ²⁹ on the NPRM's observations of increased uncertainty regarding whether

there will be near-term demand for rail tank car transportation of LNG pursuant to the July 2020 Final Rule. Specifically, CSX noted in its comments that it had several projects in development to transport LNG by rail in or before 2024, and that "[t]he continued investment in and pursuit of those projects, which require design, permitting, and construction with long lead times, would be impaired if the July 2020 Final Rule were suspended *indefinitely*, delaying them potentially for years and harming CSX's reliance interests and imposing costs and lost business opportunities on CSX and its partners" (emphasis added). CSX subsequently met with PHMSA on February 17, 2022, and elaborated on their written comments by noting that those projects had been shelved and that the issuance of the NPRM was the occasion for those decisions. The Attorney General for the State of Louisiana, Jeff Landry, joined by State Attorneys General from Alabama, Alaska, Arizona, Arkansas, Florida, Georgia, Idaho, Indiana, Kentucky, Mississippi, Missouri, Montana, Nebraska, New Hampshire, Ohio, South Carolina, South Dakota, Texas, Utah, Virginia, West Virginia, and Wyoming (Landry, et. al.) similarly contend that "the proposed rule itself *is* the cause of the regulatory uncertainty of which it complains" (emphasis in original) in that it "discourages companies from making any capital investment in LNG by rail, specifically the DOT-113C120W9 specification tank cars that the 2020 Rule authorized.'

PHMSA Response

PHMSA finds these comments unconvincing statements of the nearterm commercial viability of rail tank car transportation of LNG pursuant to the July 2020 Final Rule. The suspension proposed in the NPRM and adopted in this Final Rule is not "indefinite" as characterized by CSX; rather, it is time-limited to the earlier of a date certain (June 2025) or to the completion of the milestone of issuing a final rule in the companion rulemaking under RIN 2137–AF54. Even if the NPRM affected one or more of CSX's nascent projects exploring rail tank car transportation of LNG, CSX or other entities could have applied for, and may still apply for, an alternative regulatory vehicle (e.g., an SP under § 107.105,³⁰ or an FRA approval for rail

transportation via portable tank) to allow work to proceed on those projects during the suspension period. PHMSA is unaware of CSX, its collaborators in those projects, or any other entities having pursued alternatives. Indeed, in its written comments and again during its February 17, 2022, meeting with PHMSA, CSX personnel acknowledged that the choice of package (i.e., the particular DOT-specification rail tank car or ISO tank) employed in rail transportation of LNG is merely one decision within a multi-step, multi-year project development and execution chain involving, among other things, the construction of origin facilities and offloading facilities, and the acquisition of one or more enabling Federal and State permits. The projects CSX and others may have been pursuing were prolonged, highly contingent processes in which there are multiple potential bases for material delay or cessation of a project throughout the development cycle. That said, PHMSA understands the shelving of CSX's or any other entities' projects following the proposal of a time-limited, temporary suspension for which there could be alternative rail transportation methods evinces less an alleged "chilling" of investment than the significant uncertainty discussed in the NPRM regarding whether there would be any commercially viable projects for rail transportation of LNG in the near-term.

And PHMSA understands that a variety of forces have created-and will continue to create throughout the suspension period-headwinds for the near-term commercial viability of any project for rail transportation of LNG. The NPRM explained that the near-term commercial prospects for LNG by rail (which the July 2020 Final Rule had acknowledged were uncertain at its issuance) had grown even more uncertain due to near-term structural changes in international markets including (1) massive investment in greatly increased export capacity by competing providers such as Qatar, and (2) reduced demand for LNG customers seeking to reduce their GHG emissions.³¹ The comments submitted by CSX, other industry stakeholders, and Landry, et. al. did not attempt to rebut this evidence, or PHMSA's finding that the near-term commercial uncertainty for rail transportation of LNG had increased. Further, the structural headwinds for rail transportation of LNG are likely to accelerate in the near future, as the U.S. **Energy Information Administration** (EIA) predicts that the capacity of

²⁹ CSX Comments at 1; PHMSA, Doc. No. PHMSA–2021–0058–7064, "Summary of CSX Listening Session" (Feb. 17, 2022); Landry, et al. Comments at 1, 4.

³⁰ Applications for a Special Permit submitted under § 107.105 must demonstrate that such Special Permit will achieve at least an equivalent level of safety as to what is provided under the HMR, and in particular, should address any outstanding safety questions or concerns including those raised in this rulemaking.

³¹86 FR at 61735–36.

pipeline-supplied U.S. LNG export terminals are expected to increase significantly beginning around 2025 which some analysts note could depress the offtake prices for LNG in the international export market—which could divert demand for LNG exports that could have been serviced by LNG by rail.³² Further, the supply shocks of the conflict in Ukraine have highlighted both in the United States and abroad the volatility of natural gas prices and fragility of international LNG market supply, accelerating movement among historical consumers of natural gas toward renewable energy and reduced reliance on LNG exports.³³ Meanwhile, domestic consumption of natural gas in the United States is expected to fall in the next decade due to increasing electrification driven by consumer preferences and Federal and State policy initiatives to reduce GHG emissions.³⁴ Durably high commodity (e.g., steel) prices and interest rates 35 would also tend to discourage capital investment in the manufacture of a new fleet of DOT-113C120W9-specification tank cars for dedicated commercial LNG service

PHMSA finds this recent evidence, coupled with the evidence discussed in the NPRM, augurs uncertainty regarding the commercial prospects for rail transportation of LNG that will continue beyond the originally proposed suspension period and into the longer suspension period adopted in this final rule.³⁶ Following the conclusion of the (temporary) suspension period, stakeholders would be able to evaluate

³³ See Intl. Energy Agency (IEA), World Energy Outlook: 2022 at 3, 25–26 (Oct. 2022); The Economist "War and Subsidies Have Turbocharged the Green Transition" (Feb. 13, 2023); Inst. for Energy Economics and Financial Analysis, Global LNG Outlook: 2023–2027 at 4–5 (Feb. 15, 2023). ³⁴ See EIA, Annual Energy Outlook 2023 at 25

(Mar. 2023).

whether the commercial prospects for rail tank car transportation of LNG pursuant to the July 2020 Final Rule merit pursuing.

E. Comments Contending That the LNG by Rail Improves Safety

PHMSA received several comments arguing temporary suspension of the July 2020 Final Rule would forfeit safety benefits.³⁷ Some of those comments pointed to the physical properties (e.g., auto-ignition temperatures) of LNG they assert make its rail transportation inherently safer than transportation of natural gas in other physical states. Others contended that, absent the July 2020 Final Rule, industry would be forced to utilize other modes of transportation of natural gas-in particular, highway transportation via MC-338 cargo tanks—which would entail more frequent accidents and incidents than rail transportation. Some comments generally praised the DOT-113C120W9-specification tank car approved for use in transporting LNG in the July 2020 Final Rule because it was an improvement on the proven, existing DOT-113C120W-specification tank cars that PHMSA had approved for use in rail tank car transportation of LNG via SP. Lastly, RSI asserted that by discouraging investment in DOT-113C120W9 tank cars for LNG service. PHMSA was discouraging construction of those enhanced tank cars for use in transporting other cryogenic liquid hazardous materials.

PHMSA Response

PHMSA finds these contentions unconvincing. As presented, each of those arguments suggest that any potential benefits of rail tank car transportation of LNG will be lost if PHMSA suspends the July 2020 Final Rule as proposed in the NPRM. But that binary understanding confuses the temporary, time-limited suspension proposed in the NPRM and adopted in this final rule with a *permanent* or indefinite ban on rail tank car transportation of LNG. A temporary suspension would mean that any safety benefits would only be unavailable for the suspension period—*i.e.*, until the end of June 2025 (at the latest). See 86 FR at 61737–38. Further, any such potential, time-limited comparative advantage turns on whether any rail transportation of LNG pursuant to the July 2020 Final Rule would in fact have

occurred during the suspension period, but, as explained above, market conditions now and in the near future do not support demand to transport LNG in rail tank cars. That demand, which was uncertain at issuance of the July 2020 Final Rule has become only more uncertain since given the commercial headwinds facing the development of that market.³⁸ Further, any time-limited comparative advantage from leaving the July 2020 Final Rule undisturbed would also be mitigated by the availability of other regulatory vehicles (FRA approvals and PHMSA SPs) that entities can pursue during the suspension period.

Uncertainty regarding whether the July 2020 Final Rule's authorization of rail transportation in DOT-113C120W9specification tank cars ensures adequate protection of public safety has only increased since the time of issuance of each of the July 2020 Final Rule and the NPRM proposing its suspension. The July 2020 Final Rule itself acknowledged that its authorization of rail transportation of LNG in the new DOT-113C120W9 tank car did not turn only on the tank car itself; rather, a number of other factors (including, but not limited to, the material properties of LNG and natural gas, the quantity of LNG that will be moved by rail, the routes involved, the availability of emergency response planning resources, etc.) affected the risks involved in rail tank car transportation of LNG. See 86 FR at 61734.39 Subsequently, the TRB Phase I Report highlighted gaps (discussed in section II.C above) within the LNG Task Force testing efforts undertaken to improve confidence in

³⁹ PHMSA disagrees with Landry, et al. that PHMSA's authorization of rail transportation of LNG in existing, less robust DOT-113C120W tank cars pursuant to DOT-SP 20534 reveals PHMSA's concerns regarding safety of the DOT-113C120W9 tank car as pretextual. Landry, et al. Comments at 4. The conditions it imposed—a defined, limited duration, a single route, and various operational controls-facilitate understanding and bounding of safety and environmental risks notwithstanding transportation within a legacy DOT-113C120W tank car. In contrast, the July 2020 Final Rule's nationwide, perpetual authorization of rail tank car transportation of LNG in a new tank car specification could entail a fundamentally different risk profile than DOT-SP 20534 or any other special permits that PHMSA may issue authorizing (on an ad hoc basis) rail tank car transportation of LNG. In addition, no LNG was ever shipped under DOT-SP 20534, which has now expired and which PHMSA has declined to renew.

³² EIA, "U.S. LNG Export Capacity to Grow as Three Additional Projects Begin Construction," (Sept. 6, 2022), https://www.eia.gov/todayinenergy/ detail.php?id=53719 (last visited May 12, 2023). See also A. Shiryaevskaya et al., Bloomberg, "World Gas Supply Shifts from Shortage to Glut with Demand Muted" (Apr. 16, 2023); L. Hampton, Reuters, "Wave of New LNG Export Plants Threatens to Knock Gas Prices" (Mar. 14, 2023).

³⁵N. Ruggiero, *S&P Global Commodity Insights*, U.S. Steel Sentiments Hit New High for 2023 As Mills Increase Finished Prices'' (Mar. 13, 2023); R. Druzin, *Argus Media*, "U.S. Steel Price Driven Up by Multiple Factors" (Mar. 14, 2023); M. Derby, *Reuters*, "Premature for Fed to Call End to Rate Hikes with Inflation Still High, Williams Says (May 9, 2023).

³⁶ Amidst the limited domestic and international commercial prospects discussed here, it is hardly surprising that rail transportation of LNG has occurred by neither (1) existing DOT–113C120W tank cars pursuant to DOT–SP 20534 issued by PHMSA to ETS in 2019, nor (2) ISO tanks pursuant to an FRA approval issued to the Alaska Railroad Company in 2015.

³⁷ CSX Comments at 1; Landry, et al. Comments at 1, 4, 5; RSI Comments at 2, 4; "Comments of U.S. House of Representatives Committee on Transportation and Infrastructure—Republican Minority Members' at 2–3 (Dec. 22, 2021) (House T&I Minority Comments).

³⁸ The NPRM also explains there is also significant uncertainty regarding the commercial prospects of mode-switching (from rail tank car to MC-338 cargo tanks carried by truck) given that such mode-switching would sacrifice (potentially significant) economies of scale offered by rail tank car transportation of LNG. *See* 86 FR at 61737. This observation was not addressed by any of the comments submitted by the House T&I Minority, Landry, et al., RSI, or CSX.

the safety benefits of rail transportation of LNG. TRB's subsequent Phase II Report identified additional areas warranting additional research and evaluation to ensure the safety of rail transportation of LNG in the DOT-113C120W9-specification tank car. Although PHMSA has revised the LNG Task Force's testing and evaluation activities in response to the TRB Phases I and II Report recommendations, that work continues; and even after completing the activities PHMSA must evaluate the results and determine whether and how to make permanent modifications to the HMR governing rail transportation of LNG. Further, the comments submitted in response to the NPRM proposing suspension of the July 2020 Final Rule show a lack of consensus among stakeholders regarding whether some of the critical safety challenges known when PHMSA issued the July 2020 Final Rule have been addressed. For example, a comment submitted by IAFF on the NPRM noted that "the capabilities of fire fighters and emergency medical responders to safely and effectively respond to hazmat incidents involving LNG rail cars has not improved since our 2019 comments" notwithstanding any PHMSA and FRA outreach and engagement efforts in the interim.⁴⁰

Additionally, comments touting the inherent safety advantages of rail tank car transportation of liquefied natural gas miss the larger safety issue toward which much of the LNG Task Force testing evaluation activity is directed. Natural gas in liquid form, undisturbed within a DOT-113C120W9 tank car is a very stable material that will not combust unless it vaporizes which only happens if the material warms. Further, any vapor present in the outage of the tank car will be of a concentration that is too high to combust. Rather, the principal safety concern-highlighted by PHMSA in the July 2020 Final Rule, in the NPRM and comments thereon, and in TRB's evaluation of safety risks associated with rail transportation of LNG—pertains to consequences should either there be a release of LNG to atmosphere, or a tank car be exposed to harsh conditions during an incident or accident. LNG releases can expose personnel and materials to extreme cold (as low as -120 °C or -260 °F) and can be an asphyxiant within a confined space. When released to the atmosphere (as a result of a puncture of the inner

and outer tanks during an accident or incident), liquid methane will convert to a gas that has a relatively low autoignition point (about 540 °C or 1000 °F) in addition to being highly combustible when exposed to an ignition source such as fire or electrical sparking. When methane ignites, it burns at very high temperatures (about 1330 °C, or 2426 °F), potentially resulting in exposure of personnel and materials—including (potentially) undisturbed DOT– 113C120W9 tank cars adjacent to an LNG pool fire to significant radiant heat hazards. Although PHMSA had undertaken (via the LNG Task Force) a robust testing regime to develop a fulsome understanding of those potential, significant hazards of LNG when transported by rail tank car in parallel with the development and issuance of the July 2020 Final Rule, the subject matter expert recommendations within each of the TRB's Phases I and II Reports underscore the value in obtaining that understanding from completing enhanced testing and evaluation activities before LNG begins moving in DOT-113C120W9 rail tank cars pursuant to the July 2020 Final Rule. A temporary suspension gives the LNG Task Force and PHMSA an opportunity to complete that critical work.

PHMSA also disagrees that suspension of the July 2020 Final Rule would discourage investment in enhanced, DOT-113C120W9specification tank cars for use in rail transportation of any cryogenic liquid hazardous materials—not just LNG. PHMSA acknowledges that the HMR (at 49 CFR part 179 Subpart F) contemplates use of DOT-113C120W9specification tank cars for transportation of other materials authorized for transportation in the DOT-113 series tank cars in that DOT-113C120W9 tank cars will also meet and exceed the minimum DOT-113C120W standard. However, factors influencing whether to invest in new DOT-113C120W9specification tank cars for use in transporting those other cryogenic liquids are very different from the factors driving decision making on investing in those tank cars for LNG service. For example, those other cryogenic liquid hazardous materials would likely be destined for more mature domestic and international markets than the (currently) speculative domestic and international market for LNG transported by rail tank car. Perhaps for this reason, PHMSA is aware of at least one entity having submitted an order for construction of new DOT-113C120W9-specification

tank cars for cryogenic ethylene service—even as, over three years after the July 2020 Final Rule issued, PHMSA is unaware of a single order from a commercial entity for a new DOT– 113C120W9 specification tank car for LNG service.⁴¹

For the reasons discussed above and in section III.D, PHMSA concludes that uncertainty on critical issues regarding the safety profile of rail tank car transportation of LNG pursuant to the July 2020 Final Rule has increased since its issuance—and will persist through the suspension period adopted in this final rule until PHMSA and FRA have had an opportunity to complete and review the results of the LNG Task Force's testing and evaluation activities and implement any necessary regulatory amendments in the companion rulemaking under RIN2137–AF54.

F. Comments Alleging Environmental Benefits From LNG by Rail

PHMSA received several comments arguing temporary suspension of the July 2020 Final Rule would forfeit important environmental benefits. Comments describe several mechanisms for such environmental benefits including potential reduction in flaring from oil and gas production activities and reduced GHG emissions compared to highway transportation of the same volume of LNG in MC–338 cargo tanks.⁴²

PHMSA Response

For largely the same reasons discussed in section III.E above, PHMSA finds these arguments unconvincing. The statements in those comments regarding the environmental benefits of the July 2020 Final Rule were offered without any evidentiary support and little analysis, frustrating evaluation against the comments submitted in response to the NPRM attributing potential environmental harms (including those pertaining to commodity releases and lifecycle and indirect GHG emissions) to rail tank car

⁴⁰ IAFF, Doc. No. PHMSA–2021–0058–6442, "Comments Regarding Suspension of Hazardous Materials Regulations Amendments Authorizing Transportation of Liquefied Natural Gas (LNG) by Rail" at 1–2 (Dec. 23, 2021).

⁴¹ In addition, DOT–113C120W9-specification tank cars constructed for cryogenic ethylene (or other cryogenic liquid) service could not be converted for LNG service easily or immediately: each tank car would have to be cleaned and purged; the physical configuration of critical, installed components of each tank car (*e.g.*, pressure relief valve piping, valves, and other service equipment) would have to be changed; and the re-configured tank car would have to obtain a design certification from the American Association of Railroads Tank Car Committee. Mechanically converting one car separate from the approval process for the Tank Car Committee—could take several months to over a year.

⁴² House T&I Minority Comments at 2–3; Landry, et al. Comments at 5–7; CSX Comments at 1–2; RSI Comments at 2, 5.

transportation of LNG. As explained in the NPRM, both environmental benefits and risks of rail tank car transportation of LNG are a function of whether, when, and where viable market opportunities for such transportation develops. The July 2020 Final Rule acknowledged considerable uncertainty regarding those questions—and as explained in the section III.D above, the commercial prospects for rail tank car transportation of LNG are more speculative now than in July 2020 or even when the NPRM in this proceeding issued in November 2021.

These considerations are particularly relevant to the mechanisms for environmental benefits identified in those comments charactering the environmental benefits of the July 2020 Final Rule. Whether a market will emerge during the suspension period (or for that matter, may ever emerge) for capture of methane that would be otherwise be flared from oil and gas production operations and transported by rail tank car is not a straightforward proposition. In addition to the nontrivial capital investment for rail tank cars, such an approach would require, among other things, liquefaction equipment at the production site and gasification equipment at the destination and enabling Federal or state regulatory authorizations-and each of those elements may need to be procured sooner at break-even or lower cost than alternatives such as capture and transportation via pipeline or MC-338 cargo tank carried by truck (or, by extension, by rail tank car via FRA approval or PHMSA SP). And even if such a market opportunity would have arisen, meaningful evaluation of the GHG emissions benefits would inevitably involve myriad assumptions (e.g., accident/incident rates for rail and highway transportation; lifecycle emissions from construction and operation of the tank cars and related equipment; potential indirect effects such as emissions associated with upstream production induced by newlyavailable takeaway capacity) that increase uncertainty regarding GHG impacts. Similarly, modal shifting between highway transportation of LNG via MC–338 cargo tank and rail tank car may not be as easy or as desirable as those comments assume. As discussed above in section III.D, highway transportation sacrifices economies of scale that is among the principal advantages of rail tank car transportation of LNG.

For the reasons discussed above, PHMSA concludes that uncertainty regarding the potential environmental benefits and harms from rail tank car transportation of LNG pursuant to the July 2020 Final Rule will continue throughout the suspension period adopted in this Final Rule. This persistent uncertainty on a critical potential benefit identified for the July 2020 Final Rule militates in favor of its temporary suspension as the LNG Task Force completes its testing and evaluation activity and PHMSA implements any necessary regulatory amendments in the companion rulemaking under RIN 2137–AF54.

G. Comments Alleging PHMSA Is Overstepping Its Authority by Attempting To Regulate Oil and Gas Production

PHMSA received comments alleging that PHMSA's proposed suspension of the July 2020 Final Rule overstepped its statutory authority under the HMTA by attempting to discourage oil and gas production activity.⁴³

PHMSA Response

Those arguments mischaracterize PHMSA's intentions and misapprehend pertinent law.44 Indeed, PHMSA nowhere in either the NPRM or in this Final Rule identifies decreasing oil and gas production activity as an explicit goal of its suspension of the July 2020 Final Rule. Instead, Landry, et al. divines that intention from a reference to "[induced] natural gas extraction" within a list of several considerations in the NPRM that are probative to the safety and environmental risks attendant to rail tank car transportation of LNG.45 But PHMSA's acknowledgement in the NPRM of the common-sense proposition that new oil and gas production activity-and any attendant environmental benefits as well as risks (including release to atmosphere of methane lost during extraction and transportation) associated with those activities-could be a reasonably foreseeable consequence of authorizing new takeaway capacity is consistent with its obligations under NEPA. See 86 FR 61735-36 & n. 35. It is also consistent with the reasoning supporting the July 2020 Final Rule,

which (along with its supporting documentation) explicitly identified potential indirect effects on each of upstream production activity and downstream fuel switching from coal as justifications for that rulemaking.⁴⁶

Nor, moreover, would any indirect effect on production activity from PHMSA's exercise of its authority under the HMTA to regulate interstate rail transportation of hazardous material implicate, as suggested by Landry, et al., the "major questions" concerns articulated in Utility Air Regulatory Group v. EPA (573 U.S. 302 (2014)), and in West Virginia v. EPA (597 U.S. (2022)). Neither case disturbed the longstanding tolerance of minor, incidental, or accidental effects when an agency takes actions within the core of its statutory responsibilities. And here, PHMSA is doing just that: imposing a temporary suspension of a recent (July 2020) exercise of its authority under the HMTA to prescribe regulations governing interstate transportation by rail of hazardous materials to temporarily restore the status quo ex ante preceding the July 2020 Final Rule. Lastly, given that (as explained in section III.D above) there is considerable uncertainty regarding the commercial viability of rail tank car transportation of LNG, the limited-duration suspension adopted in this Final Rule hardly resembles the fact sets before the Supreme Court in either of the above decisions in which EPA was said to have "discover[ed] . . . an unheralded power to regulate 'a significant portion of the American economy.'

H. Comments Alleging PHMSA Did Not Meet Its Evidentiary Burden Under the APA for Temporary Suspension of the July 2020 Final Rule

PHMSA also received comments claiming that the NPRM did not make the required showing under the APA for suspension of currently-effective regulations.⁴⁷ Landry, et al. in particular characterizes controlling precedent as establishing a uniquely high burden for temporary suspension of existing regulations. PHMSA must, in their view, provide "a detailed justification of new facts that contradict facts underlying

. . . prior policy", as well as "a more 'reasoned explanation' to justify suspension of a regulation" than merely the "inauguration of a new President." PHMSA must also demonstrate an

⁴³ Landry, et al. Comments at 1, 4.
⁴⁴ This argument is also in tension with exhortations elsewhere in the Landry, et al. comments for PHMSA to consider policy issues (pertaining to U.S national security and consumers' home heating bills) that are arguably more "attenuated" and less "tethered" to PHMSA's authority under the HMTA. See Landry, et al. Comments at 1, 7–10. Indeed, Landry, et al. also urges PHMSA to consider the indirect relationship between the rulemaking and production activity by claiming that rail tank car transportation could yield reductions in flaring from oil and gas production activities. Id. at 7.

 $^{^{45}}$ Landry, et al. Comments at 4 (citing 86 FR at 61736).

⁴⁶ See 85 FR at 44995. See also Final Regulatory Impact Assessment, Doc. No. PHMSA–2018–0025– 0479, at 4, 32–33 & n. 48; Final Environmental Assessment, Doc. No. PHMSA–2018–0025–0478 at 35–36, 52.

⁴⁷ House T&I Minority Comments at 2 & n.8; Landry, et al. Comments at 3–4.

"awareness that it is changing position." Landry, et al. ultimately concluded that PHMSA "had not provided any . . . explanations" demonstrating compliance with those purported requirements.

PHMSA Response

These criticisms misapprehend controlling precedent. Indeed, PHMSA does not understand the cited decisions to stand for the proposition suggested in those comments that "reasoned decision-making" in the context of suspension of currently effective regulations necessarily entails a heightened evidentiary burden. Rather, the Supreme Court explicitly stated that the evidentiary burden for agency action is not heightened when that action is a change. F.C.C. v. Fox Studios, 556 U.S. at 502, 514-15 (2009). And although agencies suspending currently effective regulations must acknowledge a change in their position, address any tensions between conflicting factual findings, and confront any serious reliance interests on the old policy, those common-sense expectations do not constitute a different, uniquely higher evidentiary standard for suspending a currently-effective regulation; rather, those are the sort of issues an agency may need to address (as applicable) when adopting any change in its regulations. See Motor Veh. Mfrs. Ass'n v. State Farm Ins., 463 U.S. 29, 51-52 (1983).

Nor did Landry, et al.'s comments provide any analysis explaining how PHMSA had run afoul of judicial guardrails for suspending currentlyeffective regulations. They simply asserted that PHMSA had failed to "explain[]" its compliance with pertinent APA requirements. But the NPRM acknowledged that it proposed a change in position from the July 2020 Final Rule: it stated in multiple places that rail tank car transportation of LNG authorized by the July 2020 Final Rule would be temporarily suspended. See, e.g., 86 FR at 61731–32. Further, PHMSA described at length its rationale and the evidence relied on in making that change. Specifically, information (including the TRB Phase 1 Report, COVID-related delays in the execution of LNG Task Force testing and evaluation efforts that had been expected to corroborate the conclusions in the July 2020 Final Rule, and potential fundamental shifts in the domestic and international market dynamics) that had emerged following issuance of the July 2020 LNG Final Rule cast doubt on the validity of PHMSA's understanding of the potential benefits and risks on which that

rulemaking's policy decisions rested. See 86 FR at 61735-36. And (as explained in section III.D above) because uncertainty on these considerations has only increased since the NPRM's issuance in November 2021, PHMSA has now decided to impose that suspension with a marginally longer (but still time-limited) duration. Lastly, this decision does not rest, as Landry, et al. suggests, on specious reasoning that "no policy is better than the old policy solely because a new policy might be put in place . . ."; rather, temporary suspension ensures that no rail car transportation of LNG pursuant to the July 2020 Final Rule will occur during the time needed for PHMSA to develop confidence regarding its potential risks and benefits within the companion rulemaking under RIN 2137–AF54.

I. Comments Alleging That PHMSA's Proposal Will Have Miscellaneous Adverse Consequences for Regulated Entities, the U.S. Economy, and National Security

PHMSA also received a handful of comments warning of miscellaneous adverse effects from the NPRM's proposed suspension of the July 2020 Final Rule.⁴⁸ Certain members of the U.S. House Transportation and Infrastructure Committee and Landry, et al. caution suspension of the July 2020 Final Rule could increase household energy expenses and compromise U.S. energy independence and geopolitical influence. Meanwhile RSI warns that the NPRM's invocation of economic uncertainty and "hypothetical concerns" as considerations when tailoring HMR requirements could portend shifting regulatory requirements for the transportation of other hazardous materials. RSI also contends that a more appropriate tool for addressing PHMSA's concerns with the July 2020 Final Rule would be to exercise its authority under § 107.339 to obtain emergency orders from a U.S. District Court to address "imminent hazards."

PHMSA Response

PHMSA finds these comments unconvincing. The claim that temporary suspension of the July 2020 Final Rule could affect U.S. household energy prices or the geopolitical balance of power strains credulity given that no DOT-113C120W9 tank cars intended for commercial LNG service have been sold and the commercial viability of such rail tank car transportation is increasingly uncertain. Additionally, RSI's concern that PHMSA could invoke changing

market dynamics to modify longstanding HMR requirements for other hazardous materials is misplaced. Unlike other hazardous materials, the rail tank car transportation of LNG is not a mature market—in fact, as discussed elsewhere in this Final Rule, no such market has emerged in over three years since the July 2020 Final Rule issued and a market may not emerge at all. Nor does PHMSA's decision to temporarily suspend the July 2020 Final Rule hardly address merely "hypothetical concerns"; rather, (as discussed in sections III.E and F above) the potential safety and environmental hazards associated with LNG could be significant, and it is PHMSA's responsibility under the HMTA to evaluate and adjust the HMR to ensure its transportation by rail tank car is conducted in a manner that protects public safety and the environment. Additionally, PHMSA's decision in this Final Rule to adjust pertinent HMR requirements on a time-limited basis and before any rail tank car transportation of LNG commences (or is likely to commence), minimizes the risk of stranded investments or lost business opportunities for regulated entities should PHMSA's ongoing evaluation of the safety and environmental risks and benefits merit imposing additional or conflicting safety requirements in the companion rulemaking under RIN 2137-AF54.

In addition, the final rule addresses any potential public safety and environmental risks from rail tank car transportation of LNG via a generic, nationwide, time-limited suspension following notice-and-comment rulemaking is a more appropriate approach than utilizing the emergency order authority recommended by RSI. The July 2020 Final Rule was a legislative rule that itself was the product of notice-and-comment rulemaking, and the APA establishes a presumption that a subsequent legislative rule providing for its modification (to include its temporary suspension) should similarly involve notice-and comment rulemaking. See 5 U.S.C. 553. In addition, PHMSA's emergency order authority may be difficult to assert on a time-limited, precautionary, nationwide basis like the temporary suspension adopted in this Final Rule. Each of PHMSA's § 107.339 emergency order authority and the Secretary's authority to address imminent hazards under 49 U.S.C. 5122(b) are seldom exercised. A finding of "imminent harm" may make it more difficult for any controls addressing that harm to be removed later based on

⁴⁸ House T&I Minority Comments at 1, 3; Landry, et al. Comments at 7–8; RSI Comments at 3.

PHMSA's evaluation of whether and how to amend pertinent HMR requirements in a companion rulemaking under RIN 2137–AF54.

J. Comments Beyond the Scope of This Rulemaking

PHMSA received miscellaneous comments beyond the scope of this rulemaking. These comments pertained to concerns regarding PHMSA's process in developing, and reasoning in adopting, the July 2020 Final Rule; concerns with the adequacy of conditions imposed by PHMSA within DOT-SP 20534 issued to ETS in 2019; a requested ban on fracking (the process of hydraulic fracturing to extract oil or gas) and all fossil fuels; and additional miscellaneous comments unrelated to this rulemaking or rail tank car transportation of LNG. A number of commentors requested repeal of any existing regulatory approvals or regulatory provisions—whether by FRA or PHMSA—authorizing rail transportation of LNG.

PHMSA Response

Although PHMSA appreciates the concerns raised by the commenters that the NPRM's proposal to suspend the transportation of LNG by rail tank car authorized by the July 2020 Final Rule did not go far enough to protect public safety and the environment, PHMSA declines to adopt their far-reaching recommendations in this proceeding. However, PHMSA encourages those stakeholders to consider submitting comments in response to any future notice of proposed rulemaking in PHMSA's companion rulemaking under RIN 2137–AF54, as well as to engage other Federal and State regulatory authorities with jurisdictional responsibilities for the issues they asked PHMSA to address.

IV. Regulatory Analyses and Notices

A. Statutory/Legal Authority

Statutory authority for this final rule is provided by the HMTA. Section 5103(b) of the HMTA authorizes the Secretary of Transportation to "prescribe regulations for the safe transportation, including security, of hazardous materials in intrastate, interstate, and foreign commerce." The Secretary has delegated the authority granted in the HMTA to the PHMSA Administrator at § 1.97(b).

B. Executive Orders 12866 and 14094, and DOT Regulatory Policies and Procedures

Executive Order 12866 ("Regulatory Planning and Review''),49 as amended by Executive Order 14094 ("Modernizing Regulatory Review"),50 requires that agencies "should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating." Agencies should consider quantifiable measures and qualitative measures of costs and benefits that are difficult to quantify. Further, Executive Order 12866 requires that "agencies should select those [regulatory] approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach." Similarly, DOT Order 2100.6A ("Rulemaking and Guidance Procedures") requires that regulations issued by PHMSA and other DOT **Operating Administrations should** consider an assessment of the potential benefits, costs, and other important impacts of the proposed action and should quantify (to the extent practicable) the benefits, costs, and any significant distributional impacts, including any environmental impacts.

Executive Order 12866 and DOT Order 2100.6A require that PHMSA submit "significant regulatory actions" to the Office of Management and Budget (OMB) for review. Executive Order 14094 amended Executive Order 12866, which defines significant regulatory actions. This rulemaking is considered a significant regulatory action under section 3(f) of Executive Order 12866 as amended by Executive Order 14094. This final rule has, therefore, been reviewed by OMB.

PHMSA concludes that the temporary suspension of transporting LNG by rail tank car is not expected to have an economic impact because LNG transport by rail tank car is not expected to occur during the suspension period. As explained in section III.D above, since issuance of the July 2020 Final Rule, the commercial prospects for rail tank car transportation of LNG have become increasingly unlikely. LNG has not been transported in any rail tank cars (whether pursuant to the July 2020 Final Rule, SP issued by PHMSA, or FRA approval), and PHMSA is unaware of any planned movements in the near future. Indeed, the development of the necessary infrastructure—including

construction of DOT-113C120W9 tank cars, loading and unloading facilities, vessel handling facilities if sea transport is required, liquification facilities, and regasification facilities—to transport LNG by rail as authorized by the July 2020 Final Rule demands significant financial investment, long-term commitment, and considerable planning associated with constructing a new LNG tank car fleet (which construction may itself be subject to delays because of limited capacity in the rail car manufacturing industry). PHMSA is unaware of any orders having been placed for the manufacture of new DOT-113C120W9 tank cars for commercial LNG service. This absence of commercial demand occurred despite the highest prices for domestic U.S. natural gas markets and LNG export markets in nearly a decade.⁵¹ Additionally, it appears LNG export prices have risen faster than the domestic price which has resulted in a substantial increase in US LNG exports over the last decade. However, the increase in export capacity does not appear to have translated into increased demand for tank cars, possibly due to the majority of the increase in liquefication capacity occurring at waterfront LNG facilities.52

PHMSA expects no economic impact due to the temporary suspension. Indeed, PHMSA's temporary suspension may in fact reduce economic burden by discouraging a shipper from ordering rail tank cars compliant with the July 2020 Final Rule when the companion rulemaking (under RIN 2137–AF54) may adopt different requirements. Additionally, should any potential shippers need to transport LNG by rail tank car during the suspension period, they could avail themselves of the PHMSA SP or FRA approval processes for such transport.⁵³ Further, temporary

⁵² For approved and under construction U.S. LNG projects see EIA, "U.S. LNG export capacity to grow as three additional projects begin construction", *https://www.eia.gov/todayinenergy/ detail.php?id=53719* (last accessed June 28, 2023).

⁵³ As noted earlier in this final rule, PHMSA previously denied an application for renewal of a special permit, in part, on the basis that the application for renewal did not discuss any of the concerns raised in the NPRM in this proceeding. PHMSA will consider all applications for a special permit that meet the requirements set forth in 49 Continued

⁴⁹58 FR 51735 (Oct. 4, 1993).

⁵⁰ 88 FR 21879 (April 11, 2023).

⁵¹ See EIA, "Price of U.S. Liquefied Natural Gas Exports", https://www.eia.gov/dnav/ng/hist/ n9133us3m.htm (last accessed May 24, 2023); EIA, "Average Cost of Wholesale U.S. Natural Gas in 2022 Highest Since 2008", https://www.eia.gov/ todayinenergy/detail.php?id=55119#:-:text= In%202022%2C%20the%20wholesale %20U.S.,on%20data%20from %20Refinitiv%20Eikon (last accessed May 24,

^{2023).}

suspension guarantees avoidance of potential adverse public safety and environmental impacts (including, but not limited to, contribution of direct and indirect GHG emissions) that could have arisen from rail tank car transportation of LNG under the HMR. Lastly, the limited duration of the suspension will also mitigate any potential adverse economic, public safety, or environmental impacts that could arise in the unlikely event that demand for rail tank car transportation under the July 2020 Final Rule would have materialized during the suspension period in the absence of this final rule.

In addition to the PHMSA SP and FRA approval alternatives, shippers could transport LNG by highway via MC–338 insulated cargo tanks. All of these alternatives for LNG shippers would involve higher costs than rail transportation, but they are available in the unlikely case that market conditions evolve to warrant LNG transportation prior to June 30, 2025, or the completion of the companion rulemaking.⁵⁴

C. Executive Order 13132

PHMSA analyzed this rulemaking in accordance with the principles and criteria contained in Executive Order 13132 ("Federalism")⁵⁵ and its implementing Presidential Memorandum ("Preemption").56 Executive Order 13132 requires agencies to assure meaningful and timely input by State and local officials in the development of regulatory policies that may have "substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government."

This rulemaking may preempt State, local, and Native American Tribe requirements, but does not contain any regulation that has substantial direct effects on the States, the relationship between the national government and the States, or the distribution of power and responsibilities among the various levels of government.

The HMTA contains an express preemption provision at 49 U.S.C.5125(b) that preempts State, local, and Tribal requirements on certain covered subjects, unless the non-Federal requirements are "substantively the same" as the Federal requirements, including the following:

(1) the designation, description, and classification of hazardous material;

(2) the packing, repacking, handling, labeling, marking, and placarding of hazardous material;

(3) the preparation, execution, and use of shipping documents related to hazardous material and requirements related to the number, contents, and placement of those documents;

(4) the written notification, recording, and reporting of the unintentional release in transportation of hazardous material; and

(5) the design, manufacture, fabrication, inspection, marking, maintenance, recondition, repair, or testing of a packaging or container represented, marked, certified, or sold as qualified for use in transporting hazardous material in commerce.

This final rule addresses subject items (2) and (5) above, which are covered subjects, and therefore, non-Federal requirements that fail to meet the "substantively the same" standard are vulnerable to preemption under the Federal hazmat law. Moreover, PHMSA will continue to make preemption determinations applicable to specific non-Federal requirements on a case-bycase basis, using the obstacle, dual compliance, and covered subjects tests provided in Federal hazmat law.

D. Executive Order 13175

PHMSA analyzed this rulemaking in accordance with the principles and criteria contained in Executive Order 13175 and DOT Order 5301.1 ("Department of Transportation Policies, Programs, and Procedures Affecting American Indians, Alaska Natives, and Tribes"). Executive Order 13175 and DOT Order 5301.1 require DOT Operating Administrations to assure meaningful and timely input from Native American Tribal government representatives in the development of rules that significantly or uniquely affect Tribal communities by imposing "substantial direct compliance costs" or "substantial direct effects" on such communities or the relationship and distribution of power between the Federal government and Tribes.

In addition to the petitions filed by the environmental groups and State attorneys general mentioned above, the Puyallup Tribe also challenged the July 2020 Final Rule and alleged violations of the Tribal consultation protocols under the National Historic Preservation Act and Executive Order 13175 and disparate impacts on the Tribe in violation of Executive Order 12898 and Title VI of the Civil Rights Act of 1964.

PHMSA assessed the impact of this final rule and concluded that it will not significantly or uniquely affect Tribal communities or Tribal governments. This rulemaking does not impose substantial compliance costs on Tribal governments or communities, nor does it mandate Tribal action. Insofar as PHMSA expects the final rule will not adversely affect the safe transportation of hazardous materials generally, PHMSA does not expect it will entail disproportionately high adverse risks for Tribal communities. This final rule could in fact reduce risks to Tribal communities, as it could avoid the release of hazardous materials (in particular, LNG) by railroad in the vicinity of Tribal communities. For these reasons, PHMSA has concluded that the funding and consultation requirements of Executive Order 13175 and DOT Order 5301.1 do not apply.

E. Regulatory Flexibility Act and Executive Order 13272

The Regulatory Flexibility Act (5 U.S.C. 601 et seq.) requires agencies to consider whether a rulemaking would have a "significant economic impact on a substantial number of small entities" to include small businesses, not-forprofit organizations that are independently owned and operated and are not dominant in their fields, and governmental jurisdictions with populations under 50,000. The Regulatory Flexibility Act directs agencies to establish exceptions and differing compliance standards for small businesses, where possible to do so and still meet the objectives of applicable regulatory statutes. Executive Order 13272 ("Proper Consideration of Small Entities in Agency Rulemaking")⁵⁷ requires agencies to establish procedures and policies to promote compliance with the Regulatory Flexibility Act and to "thoroughly review draft rules to assess and take appropriate account of the potential impact" of the rules on small businesses, governmental jurisdictions, and small organizations. The DOT posts its implementing guidance on a dedicated web page.58

This rulemaking has been developed in accordance with Executive Order 13272 and DOT's procedures and policies to promote compliance with the Regulatory Flexibility Act and ensure that potential impacts of draft rules on

CFR 107, Subpart B and notes that each special permit application is considered on its own merits.

⁵⁴ Id. at 33–34, 56 (discussing higher direct GHG emissions from highway transportation) and 37–38 (discussing higher risk of crashes from highway transportation).

⁵⁵ 64 FR 43255 (Aug. 10, 1999).

^{56 74} FR 24693 (May 22, 2009).

^{57 67} FR 53461 (Aug. 16, 2002).

⁵⁸DOT, "Rulemaking Requirements Related to Small Entities," *https://www.transportation.gov/ regulations/rulemaking-requirements-concerningsmall-entities* (last visited Jun. 17, 2021).

small entities are properly considered. Consistent with the analysis above, PHMSA certifies that the temporary suspension of the July 2020 Final Rule will not have a significant economic impact on a substantial number of small entities.

F. Paperwork Reduction Act

Under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*), no person is required to respond to any information collection unless it has been approved by OMB and displays a valid OMB control number. Pursuant to 44 U.S.C. 3506(c)(2)(B) and 5 CFR 1320.8(d), PHMSA must provide interested members of the public and affected agencies an opportunity to comment on information collection and recordkeeping requests.

PHMSA has analyzed this rulemaking in accordance with the Paperwork

Reduction Act. PHMSA currently accounts for security plan burdens under OMB Control Number 2137-0612. "Hazardous Materials Security Plans." In the July 2020 Final Rule, PHMSA required any rail carrier transporting a tank car quantity of UN1972 (Methane, refrigerated liquid (cryogenic liquid) or Natural gas, refrigerated liquid (cryogenic liquid)) to comply with the additional rail transportation safety and security planning requirements. Following publication of the July 2020 Final Rule, PHMSA published both a 60-day 59 and 30-day 60 notice and comment period to provide an opportunity for public comment on the estimated increase in burden. PHMSA did not receive comments to either notice. Subsequently, PHMSA submitted the revision to OMB and received approval for the increased

burden. As PHMSA implements a temporary suspension of the authorization to ship LNG by rail tank car pursuant to July 2020 Final Rule, PHMSA estimates this rulemaking would result in a decrease in the burden associated with additional rail transportation safety and security planning requirements imposed by the July 2020 Final Rule. Because this final rule contains revisions to an information collection approved under OMB control number 2137-0612 that are subject to review by OMB under the PRA Act, PHMSA has submitted the revised information collection to OMB and will publish a subsequent Federal **Register** notice to advise the public when OMB has approved the revisions. The following reflects this estimated decrease in burden:

Decrease in primary route analysis	Change in	Decrease in	Burden	Decrease in	Salary	Decrease in	Decrease in
	number of	number of	hours per	total burden	cost per	total salary	total burden
	railroads	routes	route	hours	hour ⁶¹	cost	cost
Class I Railroads	0	(2)	80	(160)	\$75.88	(\$12,141)	\$0
Class II Railroads	0	(1)	80	(80)	75.88	(6,071)	0
Class III Railroads	0	(1)	40	(40)	75.88	(3,035)	0
Total	0	(4)		(280)		(21,248)	0
Decrease in alternate route analysis	Change in	Decrease in	Burden	Decrease in	Salary	Decrease in	Decrease in
	number of	number of	hours per	total burden	cost per	total salary	total burden
	railroads	routes	route	hours	hour ⁶²	cost	cost
Class I Railroads	0	(2)	120	(240)	\$75.88	(\$18,212)	\$0
Class II Railroads	0	(1)	120	(120)	75.88	(9,106)	0
Class III Railroads	0	(1)	40	(40)	75.88	(3,035)	0
Total	0	(4)		(400)		(30,354)	0

Total Annual Decrease in Number of Respondents: 0.

Total Annual Decrease in Number of Response: 8.

Total Annual Decrease in Burden Hours: 680.

Total Annual Decrease in Salary Costs: \$51,598.

Total Annual Decrease in Burden Costs: \$0.

G. Unfunded Mandates Reform Act of 1995

The Unfunded Mandates Reform Act of 1995 (UMRA; 2 U.S.C. 1501 *et seq.*) requires agencies to assess the effects of Federal regulatory actions on State, local, and Tribal governments, and the private sector. For any notice of proposed rulemaking or final rule that includes a Federal mandate that may result in the expenditure by State, local, and Tribal governments, or by the private sector of \$100 million or more in 1996 dollars in any given year, the agency must prepare, amongst other things, a written statement that qualitatively and quantitatively assesses the costs and benefits of the Federal mandate.

This rulemaking does not impose unfunded mandates under the UMRA. As explained above, it is not expected to result in costs of \$100 million or more in 1996 dollars on either State, local, or Tribal governments, in the aggregate, or to the private sector in any one year, and is the least burdensome alternative that achieves the objective of the rule.

H. Environmental Assessment

The National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321 et seq.),63 requires federal agencies to consider the environmental impacts of their actions in the decisionmaking process. NEPA requires Federal agencies to assess the environmental effects of proposed Federal actions prior to making decisions and involve the public in the decision-making process. Agencies must prepare an environmental assessment (EA) for an action for which a categorical exclusion is not applicable and is either unlikely to have significant effects or when significance of the action is unknown. In accordance with these requirements, an EA must briefly discuss: (1) the need for the action; (2) the alternatives considered; (3) the environmental impacts of the action and alternatives; and (4) a listing of the agencies and persons consulted. If, after reviewing the EA and public comments if

⁵⁹85 FR 46220 (Jul. 31, 2020).

^{60 85} FR 73128 (Nov. 16, 2020).

⁶¹ Occupation labor rates based on 2022 Occupational and Employment Statistics Survey (OES) for "Transportation, Storage, and Distribution Managers (11–3071)" in the Transportation and

Warehousing industry. See https://www.bls.gov/ oes/current/oes113071.htm. The hourly mean wage for this occupation (\$52.36) is adjusted to reflect the total costs of employee compensation based on the BLS Employer Costs for Employee Compensation Summary, which indicates that wages for civilian

workers are 69.0 percent of total compensation (total wage = wage rate/wage % of total compensation).

⁶² Ibid.

⁶³ See also 40 CFR parts 1501 to 1508.

applicable, in response to a draft EA (DEA), an agency determines that a proposed action will not have a significant impact on the human or natural environment, it can conclude the NEPA analysis with a finding of no significant impact (FONSI).

(1) The Need for the Action

PHMSA has determined that the recommendations from the TRB, its ongoing research, and recent events stemming from the COVID–19 public health emergency predicate the need to re-evaluate the amendments authorized in the July 2020 Final Rule. Research activity that PHMSA had expected would enhance its understanding of the risks attendant in rail transportation of LNG has been delayed, and uncertainties have increased in whether there will be any potential benefits, and in the underlying economic dynamics bounding those risks (*e.g.*, the quantity of LNG that will move by rail, and the routes involved). Therefore, PHMSA is amending the HMR to suspend authorization of LNG transportation in a rail tank car pending further analysis and completion of a companion rulemaking that will consider changes to the conditions under which LNG could be moved by rail, to potentially include additional safety, environmental, and environmental justice protections. This action will provide PHMSA an opportunity to review recent actions that could be obstacles to Administration policies promoting public health and safety, the environment, and climate change mitigation; and to evaluate the results of ongoing and delayed research efforts to ensure the safe transportation of LNG by rail tank car.

(2) Alternatives to the Action

In this rulemaking, PHMSA considered the following alternatives:

No Action Alternative

If PHMSA were to select the No Action Alternative, current regulations authorizing the transport of LNG in rail tank cars would remain in effect and no provisions would be amended or added. Therefore, the HMR would continue to authorize the transportation of LNG in DOT–113C120W9 tank cars with a 9/16inch outer tank composed of TC–128B normalized steel. The following operational controls and safety measures would also remain in effect:

• Each tank car must be operated in accordance with § 173.319, which includes:

testing of relief valves every 5 years
 annual replacement of rupture
 discs

 thermal integrity tests following an average daily pressure rise during any shipment exceeding 3 psig per day

 other requirements specific to liquids in cryogenic tank cars.

• 49 CFR part 179, subpart F contains detailed design, construction, and operational requirements for DOT– 113C120W tank cars with the specification suffix "9" to be used in rail transportation of LNG.

• Trains transporting 20 or more tank cars of LNG in a block, or 35 such tank cars throughout the train, must be equipped and operated with a two-way EOT device, pursuant to the requirements in 49 CFR part 232, subpart E, or a distributed-power (DP) locomotive as defined in 49 CFR 229.5.

• The offeror must remotely monitor each tank car while in transportation for pressure and location.

• The offeror must notify the carrier if the tank pressure rise exceeds 3 psig over any 24-hour period.

• Trains transporting any quantity of LNG must comply with the route planning requirements in § 172.820, which requires rail carriers transporting LNG by rail tank car to conduct an annual route analysis considering, at a minimum, 27 risk factors listed in appendix D to part 172.

• Each LNG tank car must have:

 a reclosing pressure relief device with a start-to-discharge pressure of 75 psig;

 $^{\odot}\,$ a non-reclosing pressure relief device set to discharge at the tank test pressure;

• a maximum permitted filling density (percent by weight) of 37.3 percent;

 $^{\circ}\,$ a design service temperature of $-\,162$ °C ($-\,260$ °F);

 $^{\odot}\,$ a maximum pressure when offered for transportation not to exceed 15 psig;

• a minimum steel thickness, after forming, on the outer tank shell and tank heads of 9/16 inch, which is thicker than the requirement for other DOT-113C120W tank cars; and

○ an outer tank shell constructed of AAR TC-128, Grade B normalized steel plate as specified in § 179.100-7(a), which has a higher tensile strength of 81,000 psi which makes it stronger than that used for the existing DOT-113 outer shell.

The final environmental analysis (FEA), which—except for the finding of no significant impact therein—is incorporated by reference into this final rule, examined how the above requirements were imposed to reduce risks to human safety and the environment from the transportation of LNG in rail tank cars and incidents occurring as a result of this transportation.⁶⁴ The No Action Alternative would allow the shipment of LNG in rail tank cars, and PHMSA could continue to consider whether additional mitigations are necessary based on the expert recommendations from the TRB Phase I and Phase II Reports and results from ongoing, delayed testing and evaluation activity by the LNG Task Force.

Selected Action Alternative

This Selected Action Alternative as it appears in this final rule, adding a new special provision to the HMR that would suspend the transportation of LNG in rail tank cars while PHMSA undergoes a comprehensive review to ensure the safe transportation of LNG by rail in accordance with ongoing research and incorporation of recommendations from the TRB, as well as the best available economic analysis and science. Rail transport of LNG would be permitted only as authorized by the conditions of a PHMSA special permit (49 CFR 107.105) that would apply only to the railroad(s) operating under such a permit or in a portable tank secured to a rail car pursuant to the conditions of an FRA approval (49 CFR 174.63). The amendments included in this alternative are more fully discussed in the preamble and regulatory text sections of this final rule.

(3) Probable Environmental Impacts of the Action and Alternatives

No Action Alternative

If PHMSA selected the No Action Alternative, current regulations would remain in place without suspension. As described in the FEA, the No Action Alternative could pose risks to public safety and the environment because the authorization under the HMR to offer shipments of LNG by rail tank car would remain in place. LNG poses potential hazards as a cryogenic liquefied flammable gas, including cryogenic temperature exposure, fire, and asphyxiation hazards. Transportation of any hazardous material introduces risk to safety and the environment, and each additional tank car increases the overall risk of an incident occurring and the quantity that could be released in the event of a derailment. While this is true for all hazardous materials transportation, PHMSA seeks to better understand the risks inherent to LNG transportation in the DOT-113C120W9, especially given that the July 2020 Final Rule authorized large quantities to be transported in rail cars. The July 2020 Final Rule FEA

⁶⁴ See Docket No. PHMSA-2018-0025-0478.

explained that transporting LNG in rail tank cars is expected to be safer than transporting LNG by truck on highways—however, it is possible that allowing LNG to be transported in rail tank cars would increase the amount of LNG transported, and therefore a direct comparison of the risks by rail and highway may be misleading. PHMSA will also consider, based on existing rail infrastructure locations and anticipated routes, whether transportation of LNG in rail tank cars could pose disproportionate harm or risk to communities of color or low-income communities. As described in the preamble to this final rule, various market and other uncertainties exist regarding specific routes that may be used for the transport of LNG by rail tank car.

No release of LNG vapor to the environment is allowed during the normal transportation of LNG in tank cars whether by roadway or railway. However, methane is odorless, and LNG contains no odorant, making detection of a release resulting from an incident difficult without a detection device. Releases of LNG due to venting or to accidents/incidents, without immediate ignition, involving either an MC-338 cargo tank, a portable tank, or a DOT-113C120W9 rail tank car have the potential to create flammable vapor clouds of natural gas because recently gasified LNG does not dissipate in the atmosphere as quickly as ambienttemperature natural gas. Large releases of LNG due to the breach of the inner tank of these transport vessels could result in a pool fire, vapor fire, and explosion hazards if methane vapors become confined. These flammability hazards pose a risk of higher potential impacts than localized cryogenic hazards.

Some commenters on the July 2020 Final Rule argued that the authorization of LNG by rail would further incentivize the production of natural gas, which is a fossil fuel. Methane has much greater heat trapping potential in the atmosphere than carbon dioxide in the short term. Thus, methane is considered a potent GHG, and comprises a significant portion of the United States' GHG emissions. While methane leaks are highly unlikely during transportation in the DOT-113C120W9 due to tank car design, increased natural gas production could lead to indirect environmental impacts of increased methane emissions released during production, loading and unloading, or at other times during its life cycle. In considering whether the authorization could further incentivize the production of natural gas, PHMSA will consider the

scope of existing natural gas production and transportation via natural gas pipeline and other modes of transportation.

The FEA for the July 2020 Final Rule discussed potential environmental benefits that could be associated with the authorization to transport LNG by rail tank car. First, PHMSA discussed that the authorization could allow for the delivery of natural gas to locations dependent on more polluting energy forms, such as coal, diesel, heating oil, or firewood.⁶⁵ Use of natural gas in such areas, whether foreign or domestic, could allow for a reduction in polluting and climate-warming emissions. Additionally, the authorization to transport LNG by rail tank car could potentially replace some shipments of LNG by highway. As discussed in the FEA for the July 2020 Final Rule, highway transportation is less efficient in comparison to rail transportation when considering fuel use, combustion emissions, and climate change impacts. However, in order to supplement, reduce, or replace highway transportation, rail infrastructure would need to exist between the origin and destination locations or be developed. Finally, the FEA explored industry claims that the authorization could incentivize the capture, storage, and liquefaction of natural gas over venting and flaring of natural gas during oil production and other industrial activities, in areas where natural gas pipeline capacity is unavailable. Facilitating the productive end use of by-product methane could reduce the venting and flaring of natural gas, which causes methane and carbon dioxide emissions. Similar to other abovedescribed benefits, it is difficult to predict the extent to which industries would invest in the equipment, technology, and expertise necessary to pursue natural gas capture, storage, and liquefaction necessary to pursue LNG transportation by rail. A suspension of the authorization to transport LNG by rail could curtail these potential benefits in the near term.

Selected Action Alternative

Under this Selected Action Alternative, PHMSA will amend the HMR to suspend authorization of LNG transportation in rail tank cars pending further analysis and completion of a companion rulemaking or June 30, 2025, whichever is earlier. Therefore, the HMR will not authorize shippers to transport bulk quantities of LNG by rail tank car. Instead, LNG by rail will only be permitted pursuant to a DOT SP or in portable tanks subject to FRA approval. The Selected Action Alternative will avoid the risks that transportation of LNG in rail tank cars, and particularly potential derailments of rail cars transporting LNG, could pose to public safety and the environment. PHMSA will be able to further consider whether the transportation of LNG could pose disproportionately high or adverse effects on minority and low income communities, which have historically borne the brunt of deleterious Federal policy decisions. PHMSA will also be able to further consider whether shipping LNG in rail tank cars is consistent with public health and safety, environmental protection, including climate change mitigation; and to evaluate the results of ongoing and delayed research efforts and collaboration as part of an accompanying rulemaking under RIN 2137-ÅF54.

However, as noted above and in the FEA for the July 2020 Final Rule, the authorization to transport LNG in DOT-113C120W9 specification tank cars could have yielded some environmental benefits or improvements, which will not be realized during the suspension period. The scope of potential environmental effects of suspending the July 2020 Final Rule depend on whether use of MC-338 for transportation of LNG increases as a result of the suspension of the DOT-113C120W9 or whether environmental benefits of the authorization have been realized that would not occur during the suspension. PHMSA is unaware of any order from a commercial entity for a new DOT-113C120W9-specification tank car for LNG service. Thus, no increased use of MC-338 tank cars for LNG service is expected as a result of this suspension.

In the unlikely event that the use of MC–338 cargo tank cars for LNG transportation increases due to the inability to transport LNG in rail tank cars, a few environmental effects could result. First, highway transportation of LNG requires more diesel engine vehicles and would result in more emissions, including volatile organic compounds, carbon dioxide, nitrogen

⁶⁵ See, e.g., EPA, Press Release, "State of Alaska and Fairbanks North Star Borough receive \$14.7 Million EPA grant to improve air quality," (Nov. 2020), https://www.epa.gov/newsreleases/statealaska-and-fairbanks-north-star-borough-receive-147-million-epa-grant-improve-air ("The Borough will use the grant funds to continue a woodstove changeout and conversion program focused on converting more wood burning appliances to cleaner burning liquid or gas-fueled heating appliances, which have a very low output of particulate pollution and higher fuel efficiency. Wood smoke contributes up to 60 to 80 percent of fine particle pollution levels measured in the Fairbanks North Star Borough.").

oxides, sulfur oxides, and particulate matter of 10 microns or less. Next, increased highway congestion also increases the potential for a highway incident involving LNG, depending on the extent of the increase. In the event highway transportation increases as a result of this rule, these environmental effects would be speculative and minor, and PHMSA finds that they are warranted during the suspension period while PHMSA undertakes a full analysis of risks inherent in transporting LNG in rail tank cars.

The July 2020 Final Rule FEA noted that the transportation of LNG could allow natural gas to reach markets that lack this access and could potentially reduce and replace the burning of more polluting and carbon-intensive sources of energy such as coal, wood, and diesel. As noted above, the July 2020 Final Rule has not resulted in these replacements or emissions reductions, such that the suspension would not reverse any such benefits. The July 2020 Final Rule FEA also explained that authorization to transport LNG in rail tank cars had the potential to reduce the wasteful and carbon-intensive practice of natural gas flaring because it could provide a market for by-product natural gas in areas where natural gas pipeline transportation is not available. The July 2020 Final Rule has not resulted in this benefit, and there is no indication that this benefit would have occurred anytime in the foreseeable future in the event that it remained available. Thus, PHMSA does not anticipate negative environmental effects from the suspension of the July 2020 Final Rule.

(4) Agencies and Persons Consulted During the Consideration Process

PHMSA has coordinated with FRA, the Federal Aviation Administration, the Federal Motor Carrier Safety Administration, and the U.S. Coast Guard in the development of this rule. The final rule has also been made available to other Federal agencies within the interagency review process contemplated under Executive Order 12866.

(5) Environmental Justice

Executive Order 12898 ("Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations"),⁶⁶ directs Federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse effects of Federal actions on the health or environment of minority and lowincome populations to the greatest extent practicable and permitted by law. DOT Order 5610.2C ("U.S. Department of Transportation Actions to Address Environmental Justice in Minority Populations and Low-Income Populations") establishes departmental procedures for effectuating Executive Order 12898 promoting the principles of environmental justice through full consideration of environmental justice principles throughout planning and decision-making processes in the development of programs, policies, and activities—including PHMSA rulemaking.

PHMSA has evaluated this final rule under DOT Order 5610.2C and Executive Order 12898 and has determined it will not cause disproportionately high and adverse human health and environmental effects on minority and low-income populations. The final rule is national in scope; it is neither directed toward a particular population, region, or community, nor is it expected to result in any adverse environmental or health impact to any particular population, region, or community.

This final rule could reduce risks to minority populations, low-income populations, or other underserved and disadvantaged communities. Insofar as these HMR amendments could avoid the release of hazardous materials, the final rule could reduce risks to populations and communities-including any minority, low-income, underserved, and disadvantaged populations and communities—in the vicinity of railroad lines. However, as noted in the FEA for the July 2020 Final Rule, access to LNG may result in potential economic benefits for underserved communities because of the efficiencies of transporting LNG by rail, and thereby domestic production, distribution, and consumption of natural gas could increase. These potential economic benefits that could result from the transportation of bulk quantities of LNG by rail car would not be realized by underserved communities in the short term. In addition, to the extent that suspending shipment of LNG by rail tank car could increase demand for shipping LNG by truck on highways, these HMR amendments could increase risks to environmental justice communities in the vicinity of those highways.

Further, this rule advances the policy goals of the most recent environmental justice Executive Order 14096— *Revitalizing Our Nation's Commitment* to Environmental Justice for All,⁶⁷ which deepens the Administration's whole-of-government approach to environmental justice to better protect communities from pollution and other environmental justice concerns.

(6) Finding of No Significant Impact

The adoption of the Selected Action Alternative's suspension will prohibit the transportation of LNG in rail tank cars while PHMSA and FRA undertake a comprehensive analysis of safety and environmental issues associated with the transportation of LNG by rail. As such, the HMR amendments in this final rule will have no significant impact on the human environment. The Selected Action Alternative will allow PHMSA to review new information to evaluate the potential impact on safety, environmental justice, and GHG emissions. Further, based on PHMSA's analysis of these provisions described above and insofar as there has been no significant progress toward the movement of LNG by rail tank car, PHMSA finds that codification and implementation of this rule will not result in a significant impact to the human environment.

I. Privacy Act

In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, including any personal information the commenter provides, to *http:// www.regulations.gov*, as described in the system of records notice (DOT/ALL– 14 FDMS), which can be reviewed on DOT's website at *http://www.dot.gov/ privacy* or DOT's complete Privacy Act Statement in the **Federal Register** published on April 11, 2000.⁶⁸

J. Executive Order 13609 and International Trade Analysis

Executive Order 13609 ("Promoting International Regulatory Cooperation")⁶⁹ requires that agencies must consider whether the impacts associated with significant variations between domestic and international regulatory approaches are unnecessary or may impair the ability of American business to export and compete internationally. In meeting shared challenges involving health, safety, labor, security, environmental, and other issues, international regulatory cooperation can identify approaches that are at least as protective as those

^{66 59} FR 7629 (Feb. 11, 1994).

⁶⁷ 88 FR 25251 (Apr. 21, 2023). Executive Order 14096 supplemented the efforts of Executive Order 12898.

⁶⁸65 FR 19475 (Apr. 11, 2000).

^{69 77} FR 26413 (May 4, 2012).

that are or would be adopted in the absence of such cooperation. International regulatory cooperation can also reduce, eliminate, or prevent unnecessary differences in regulatory requirements.

Similarly, the Trade Agreements Act of 1979 (Pub. L. 96–39), as amended by the Uruguay Round Agreements Act (Pub. L. 103-465), prohibits Federal agencies from establishing any standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Pursuant to the Trade Agreements Act, the establishment of standards is not considered an unnecessary obstacle to the foreign commerce of the United States, so long as the standards have a legitimate domestic objective, such as providing for safety, and do not operate to exclude imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards.

PHMSA participates in the establishment of international standards in order to protect the safety of the American public. PHMSA has assessed the effects of this rulemaking to ensure that it does not cause unnecessarv obstacles to foreign trade. While the suspension the transport of LNG by rail tank car has potential to impact the United States' export of bulk LNG internationally, there has been no significant reliance interest or progress toward the near-term movement of LNG by rail tank cars. As such, PHMSA expects the amendments herein to pose a minimal impact to international trade if adopted. Therefore, PHMSA is amending the HMR to suspend authorization of LNG transportation in a rail tank car pending further analysis to ensure potential future regulatory actions to allow bulk transport of LNG by rail promote public health and safety, the environment, and climate change mitigation. Accordingly, this rulemaking is consistent with Executive Order 13609 and PHMSA's obligations

under the Trade Agreement Act, as amended.

K. Executive Order 13211

Executive Order 13211 ("Actions **Concerning Regulations That** Significantly Affect Energy Supply, Distribution, or Use") 70 requires Federal agencies to prepare a Statement of Energy Effects for any "significant energy action." Executive Order 13211 defines a "significant energy action" as any action by an agency (normally published in the Federal Register) that promulgates, or is expected to lead to the promulgation of, a final rule or regulation that (1)(i) is a significant regulatory action under Executive Order 12866 or any successor order and (ii) is likely to have a significant adverse effect on the supply, distribution, or use of energy (including a shortfall in supply, price increases, and increased use of foreign supplies); or (2) is designated by the Administrator of the Office of Information and Regulatory Affairs (OIRA) as a significant action.

Although this rule is a significant action under Executive Order 12866, PHMSA expects it to have an annual effect on the economy of less than \$200 million. Further, this action is not likely to have a significant adverse effect on the supply, distribution, or use of energy in the United States. While the amendment to suspend the transport of LNG by rail tank car has potential to impact the supply, distribution, or use of energy in the United States, PHMSA does not anticipate any near-term movement of LNG by rail tank cars. For additional discussion of the anticipated economic impact of this rulemaking, please see section IV.B above.

L. Cybersecurity and Executive Order 14028

Executive Order 14028 ("Improving the Nation's Cybersecurity")⁷¹ directed the Federal government to improve its efforts to identify, deter, and respond to "persistent and increasingly sophisticated malicious cyber campaigns." Consistent with Executive Order 14028, the Transportation Security Administration (TSA) in October 2022 issued a Security Directive to reduce the risk that cybersecurity threats pose to critical railroad operations and facilities through implementation of layered cybersecurity measures that provide defense-indepth.⁷² PHMSA has considered the effects of the final rule and determined that its regulatory amendments will not materially affect the cybersecurity risk profile for rail transportation of hazardous materials.

List of Subjects in 49 CFR Part 172

Education, Hazardous materials transportation, Hazardous waste, Labeling, Markings, Packaging and containers, Reporting and recordkeeping requirements.

In consideration of the foregoing, PHMSA is amending 49 CFR chapter I as follows:

PART 172—HAZARDOUS MATERIALS TABLE, SPECIAL PROVISIONS, HAZARDOUS MATERIALS COMMUNICATIONS, EMERGENCY RESPONSE INFORMATION, TRAINING REQUIREMENTS, AND SECURITY PLANS

■ 1. The authority citation for part 172 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.81, 1.96 and 1.97.

■ 2. In § 172.101, amend the § 172.101 Hazardous Materials Table, by revising the entry for "Methane, refrigerated liquid (*cryogenic liquid*) or Natural gas, refrigerated liquid (*cryogenic liquid*), with high methane content)" to read as follows:

§172.101 Purpose and use of the hazardous materials table.

* * * *

⁷⁰ 66 FR 28355 (May 22, 2001).

⁷¹86 FR 26633 (May 17, 2021).

⁷² TSA, Security Directive No. 1580/82–2022–01, "Rail Cybersecurity Mitigation Actions and Testing" (Oct. 24, 2022).

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■ 3. In § 172.102, amend paragraph (c)(1) by adding special provision 439 in numerical order to read as follows:

§172.102 Special provisions.

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439 UN1972 is not authorized for transportation by rail tank car until either issuance of a final rule concluding the rulemaking action proceeding under RIN 2137–AF54, or June 30, 2025, whichever occurs first. For information and the status of RIN 2137–AF54, please refer to the Office of Management and Budget's Office of Information and Regulatory Affairs at *www.reginfo.gov.*

Issued in Washington, DC, on August 23, 2023, under authority delegated in 49 CFR 1.97.

Tristan H. Brown,

Deputy Administrator, Pipeline and Hazardous Materials Safety Administration. [FR Doc. 2023–18569 Filed 8–31–23; 8:45 am] BILLING CODE 4910–60–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 20

[Docket No. FWS-HQ-MB-2022-0090; FF09M32000-234-FXMB1231099BPP0]

RIN 1018-BF64

Migratory Bird Hunting; Migratory Game Bird Hunting Regulations on Certain Federal Indian Reservations and Ceded Lands

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: As part of the rulemaking process for the 2023-2024 season for migratory game bird hunting, the U.S. Fish and Wildlife Service (hereinafter, Service or we) has revised the process for establishing regulations for certain Tribes on Federal Indian reservations, off-reservation trust lands, and ceded lands. The Service recognizes Tribal treaty rights and the reserved hunting rights and management authority of Indian Tribes and seeks to strengthen Tribal sovereignty. We will no longer require that Tribes annually submit a proposal to the Service for our review and approval and no longer publish in the Federal Register the annual Tribal migratory bird hunting regulations. Instead, the regulations now include

elements of our current guidelines for establishing migratory game bird hunting regulations on Federal Indian reservations (including off-reservation trust lands) and ceded lands. Since 1985, Tribal migratory bird harvest has been small with negligible impact to bird population status, and we anticipate that Tribal hunting of migratory birds will continue to have similar negligible impacts to bird populations in the future. This rule will reduce administrative burdens on both the Tribes and the Service while continuing to sustain healthy migratory game bird populations for future generations.

DATES: This rule takes effect September 1, 2023.

ADDRESSES: You may inspect comments received on the migratory bird hunting regulations at *https:// www.regulations.gov* at Docket No. FWS-HQ-MB-2022-0090. You may obtain copies of referenced reports from the Division of Migratory Bird Management's website at *https:// www.fws.gov/program/migratory-birds* or at *https://www.regulations.gov* at Docket No. FWS-HQ-MB-2022-0090.

FOR FURTHER INFORMATION CONTACT: Jerome Ford, U.S. Fish and Wildlife Service, Department of the Interior, (703) 358–2606. Individuals in the United States who are deaf, deafblind, hard of hearing, or have a speech disability may dial 711 (TTY, TDD, or TeleBraille) to access telecommunications relay services. Individuals outside the United States should use the relay services offered within their country to make international calls to the point of contact in the United States. SUPPLEMENTARY INFORMATION:

SUPPLEMENTARY INFORM

Background

Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C. 703–712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any such bird, or any part, nest, or egg" of migratory game birds can take place and to adopt regulations for this purpose. These regulations must give due regard to the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds (16 U.S.C. 704(a)). The Secretary of the Interior has delegated to the Service the

lead Federal responsibility for managing and conserving migratory birds in the United States; however, migratory bird management is a cooperative effort of Federal, Tribal, and State governments. Federal regulations pertaining to migratory bird hunting are located in title 50 of the Code of Federal Regulations in part 20.

Acknowledging regional differences in hunting conditions, the Service has administratively divided the United States into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each State within the Flyway, as well as Provinces in Canada that share migratory bird populations with the Flyway. The Flyway Councils, established through the Association of Fish and Wildlife Agencies, assist in researching and providing migratory game bird management information for Federal, Tribal, State, and Provincial governments, as well as private conservation entities and the general public.

The Service annually develops migratory game bird hunting outside limits (hereinafter, Federal outside limits or Federal limits) for season dates, season lengths, shooting hours, bag and possession limits, and areas where migratory game bird hunting may occur. Hunting seasons selected by the States and Tribes within these Federal limits are set forth in regulations at 50 CFR part 20, subpart K. Because the Service is required to take abundance of migratory game birds and other factors into consideration, the Service undertakes several surveys throughout the year in conjunction with Service Regional Offices, the Canadian Wildlife Service, Tribes, and State and Provincial wildlife management agencies. For each annual regulatory cycle, Service biologists gather, analyze, and interpret biological survey data and provide this information through a series of published status reports and presentations to the Flyway Councils and other interested parties. The August 6, 2015, Federal Register at 80 FR 47388 provides a detailed overview of this process.

The Federal outside limits are necessary to allow harvest at levels compatible with migratory game bird population status and habitat conditions. To determine the appropriate outside limits for each species, we consider factors such as population size and trend, geographical distribution, annual breeding effort, condition of breeding and wintering

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