



Memorandum

Re. Rail car transport of Liquefied Natural Gas (LNG)

The Special Permit DOT-SP 20534

The Pipeline and Hazardous Materials Safety Administration (PHMSA) issued a Special Permit to Energy Transport Solutions LLC (“ETS”), a subsidiary of New Fortress Energy, in 2019 for the transportation of refrigerated methane, also known as liquefied natural gas (LNG), in DOT-113C120W tank cars,¹ with a goal of exporting LNG for sale overseas.²

This permit authorizes the first and only use in the nation of DOT 113C120W tank cars to transport LNG, which have never been tested to carry this cargo on railways. The rail cars were designed 50 years ago and not intended for the transportation of LNG, but for other cryogenic materials. They are being repurposed to transport LNG in this Special Permit.

The origin of the LNG would be from a proposed LNG liquefaction plant in Wyalusing Township, Bradford County, PA. The Special Permit has expired but ETS has applied for a renewal.³ The LNG would be transported by rail tank car approximately 200 miles overland to the Gibbstown Logistics Center, a deepwater port terminal in Gibbstown, Gloucester County, NJ on the Delaware River. A Dock (Dock 2) is planned to be built for the export of LNG from the facility; the project has received many of the needed approvals but some are outstanding and important federal decisions are pending that will define the future of the project. If approved, approximately 5 million gallons of LNG would be exported every day from Gibbstown overseas in enormous LNG tanker ships, using up to two 100-car trains (called “unit trains”) and/or trucks to deliver the LNG. The LNG would be transloaded from rail cars and trucks directly into the waiting tanker ships, 24 hours per day, 365 days per year. See an interactive map of the routes here: <https://www.delawariverkeeper.org/taxonomy/term/1174> Static Maps: <https://www.delawariverkeeper.org/sites/default/files/LNG%20Gibbstown%20Transport%20Routes%20Static%20Maps.pdf>

The Federal LNG by Rail 2020 Rulemaking that lifted the Ban on LNG transport by rail car nationwide

Subsequent to the issuance of the Special Permit, PHMSA issued RIN 2137–AF40, Hazardous Materials: Liquefied Natural Gas by Rail, 49 CFR Parts 172, 173, 174, 179, and 180, [Docket No. PHMSA–2018–0025 (HM–264)]⁴, a rule authorizing the bulk transportation of LNG by rail tank car

¹ Special Permit DOT-SP 20534. <https://www.phmsa.dot.gov/safe-transportation-energy-products/dot-20534-pdf>

² <https://www.inquirer.com/business/lng-port-delaware-river-repauno-drbc-gibbstown-approved-20201209.html>

³ <https://www.delawariverkeeper.org/sites/default/files/ETS%20Special%20Permit%20Renewal%20Application%20%282021-11-29%29.pdf>

⁴ **Federal Register** / Vol. 85, No. 143 / Friday, July 24, 2020 / Rules and Regulations, p. 44994

for carriers nationwide. In that rule, PHMSA included specifications based on public comments received by the agency concerning safety. One was the requirement for enhancements to the outer tank, which was indicated by a new specification suffix "9" (DOT-113C120W9).⁵ As stated in the rule:

"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."⁶

However, Special Permit DOT-SP 20534 does not have the condition that was imposed in the federal rule requiring the enhancement of the outer tank in the design of the DOT-113C120W9 rail tank cars. The Special Permit that authorizes the use of the old design rail tank cars is obviously allowing substandard rail tank cars to be utilized – cars that were considered and rejected by PHMSA in the subsequent federal rulemaking.

The Federal Proposed Rulemaking to Suspend the 2020 Rule

Despite the addition of a thicker 9/16th inch steel jacket and some newly imposed operational controls, the federal government has proposed to suspend the rule that authorized rail tank cars for LNG transport so that further safety testing can be done and ongoing environmental assessments can be concluded.⁷ An LNG Task Force was formed by the federal government to study the risks associated with the transport of LNG by Rail as approved under the 2020 amendments. The LNG Task Force ultimately identified and undertook 15 tasks to synthesize ongoing research and outreach activities. The Transportation Safety Board is employing the Task Force in Phase 1 of the LNG rail transport study. A2 Report will follow.

A Phase 1 Report from the Transportation Safety Board has been issued identifying several safety issues including: "incomplete status of tasks pertaining to full-scale impact testing, portable tank pool fire testing, worst-case scenario analysis, and quantitative risk assessment."⁸ Also needed is better understanding of "the potential risks to public and worker safety arising from releases during loading, unloading, and transloading of LNG tank cars, as well as in overcoming limited emergency planning and response training and resources."⁹ Further recommendations from the Transportation Safety Board include that PHMSA and the Federal Railroad Administration (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 scenarios— such as using a train speed of 50 miles per- 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."¹⁰

⁵ *Id.*

⁶ *Id.*, p. 44996

⁷ PHMSA's Proposed Rulemaking to Adopt Suspension of Hazardous Materials Regulations Amendments Authorizing Transportation of Liquefied Natural Gas by Rail, Docket No. PHMSA-2021-0058 (HM-264A).

<https://www.govinfo.gov/content/pkg/FR-2021-11-08/pdf/2021-23132.pdf>

⁸ 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> at 5-6. As quoted in Federal Register at <https://www.govinfo.gov/content/pkg/FR-2021-11-08/pdf/2021-23132.pdf> p. 61734

⁹ Federal Register at <https://www.govinfo.gov/content/pkg/FR-2021-11-08/pdf/2021-23132.pdf> p. 61734

¹⁰ *Id.*

As stated by PHMSA in the proposed suspension rule, “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.”¹¹

As stated by Earthjustice, in comments submitted in support of the proposed suspension rulemaking, on behalf of Delaware Riverkeeper Network and five other organizations that appealed the 2020 federal rulemaking: “Even if such initial studies had actually been completed and found compelling results that LNG bulk rail transport were less dangerous than all known scientific data on the hazards of storing and moving cryogenic hydrocarbon liquids would suggest, approval of the LNG by rail rule would still have been premature.”¹²

The Unique Dangers of LNG Transport – the potential use of Special Permit by ETS

The Special Permit to ETS for the transport of LNG in rail tank cars allows rail tank cars that have not been proven safe for the transport of LNG, a hazardous, flammable, and potentially explosive cargo. Studies show that transporting LNG poses specific and unique hazards.¹³ An environmental impact statement was not prepared by the reviewing agency, the Pipeline and Hazardous Materials Safety Administration under the National Environmental Policy Act, leading to a wholly inadequate environmental review.

Nonetheless, what we do know about the dangers is substantial and warrants the rejection of the renewal of the permit. Unfortunately, the fate of the permit is undecided at this time (as of December 1, 2021). PHMSA’s Environmental Assessment¹⁴ issued in 2019 agrees that response to a broken cryogenic tank car is very difficult for first responders and fire companies and risks catastrophe due to the great potential for explosions and large fires. The response is essentially to evacuate the area since a methane gas-fueled fire cannot be extinguished. Certainly, the huge volume of a gas cloud (600-620 times greater than the volume of the liquid) released from a breached LNG tank as well as the instance where a tank car is engulfed in fire compounds the potential for catastrophe in populated areas and for communities that are along the transportation route. The result is not only fire but can also result in a bomb-like explosion that is similar to a thermogenic event - literally a bomb.

New information has shown that LNG can cause a catastrophic BLEVE or Boiling Liquid Expanding Vapor Explosion if the vessel is exposed to high temperatures or a fire. The expansion of the liquid LNG in a vessel causes the pressurized liquid to boil, and the gas takes up more room than the liquid, stressing the container as pressure builds. Relief valves are only designed to release pressure slowly to keep equilibrium in the pressurized container. Exposed to high heat, the valve will fail to keep up and the metal will weaken, cracks will result in the container, causing LNG to be released with an explosion. The result is a BLEVE, a catastrophic failure of the container. There are many incidents over the years of BLEVE catastrophes, some as recent as 2019, but the fact that a BLEVE can occur with LNG has only recently been established.

¹¹ *Id at p. 61735.*

¹² Comments Supporting Proposed Rulemaking for Suspension of JMR Amendments Authorizing Transportation of Liquefied Natural Gas by Rail, Docket No. PHMSA-2021-0058 (HM-264A), p. 2.

¹³ https://nap.nationalacademies.org/cart/download.cgi?record_id=26221 Chapter 1.

¹⁴ <https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/safe-transportation-energy-products/72911/environmental-assessment.pdf>

When the gas or vapor cloud in the container is released, because it is flammable it is likely to ignite after the BLEVE, typically causing a fireball that burns fast, hot and wide. A fuel air explosion can also occur, known as a “vapor cloud explosion”. A vapor cloud explosion is the mechanism used in a thermobaric weapon that uses air to generate a high-temperature explosion, producing a long duration blast wave. These weapons are also termed a fuel-air bomb. This is the threat that LNG storage and transport brings to the Gibbstown region and to every traffic route used to carry the LNG to the Delaware River and on the river during export.

If the vapor cloud does not ignite, a ground-hugging vapor cloud can move far distances,¹⁵ and exposure to the vapor can cause extreme freeze burns. If in an enclosed space, it asphyxiates, causing death¹⁶.

On dry land such as a terminal where LNG is stored or is contained in tankers on trucks or rail cars, a BLEVE where there is no liquid in the local environment to absorb the heat, can rupture even faster than a vessel on water. Truck transport regulations are being closely examined due to an increase in accidents involving truck transport of LNG. While it used to be assumed that truck transport had a low potential for explosion or fire, an accident in Spain changed that. In 2002, an LNG truck in Spain flipped over, burned, then exploded into a 500-foot fireball that killed the driver and burned two others. ‘The severity of this kind of explosion is something people haven’t usually considered applicable to LNG trucks,’ says Jerry Havens, former director of the Chemical Hazards Research Center at the University of Arkansas. ‘But what happened in Spain changes that picture. It shows you’ve got the potential for a massive explosion’.

In the accident in Spain, a BLEVE occurred, which resulted in death to the driver and burns to two people approximately 650 feet away, and threw large flaming debris, including the truck’s diesel engine, for 853 feet. A similar LNG truck accident with a catastrophic fire occurred in Spain in 2011, killing the driver. It was pointed out by an analyst in Savannah Georgia during debate over LNG truck transport that a pool fire and and/or explosion involving an LNG truck may have a low probability, but it has a high consequence with instant injuries or death for those within several hundred feet. The chances, according to the analyst, of an LNG truck accident are 200 to 1. This is a great risk for populated areas and truck routes through urban centers. The potential impacts of the transit of trucks to the site and the parking, movements, unloading and exit of the trucks must be fully examined for risk of accidents and resulting damage to people and the environment.

In the event of a release of LNG, the LNG must gas off naturally, as the container cannot be capped or interacted with, the area must be immediately evacuated and secured, ignition sources must be eliminated, and water cannot be used, as the release is cryogenic. Water can plug the valves of the container with ice and any cold air release can freeze skin in seconds and can even turn air to liquid or solid form, removing oxygen, an obvious disaster for anyone in the area.

For a history of accidents involving the transport of LNG, see the “History of LNG Accidents” available at <https://www.timrileylaw.com/LNG.htm>

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¹⁵ “Immediate ignition with liquid still on the ground could cause the spill to develop into a pool fire and present a radiant heat hazard. If there is no ignition source, the LNG will vaporize rapidly forming a cold gas cloud that is initially heavier than air, mixes with ambient air, spreads and is carried downwind.” P. 10 “Methane in vapor state can be an asphyxiant when it displaces oxygen in a confined space.” P. 11. SP 20534 Special Permit to transport LNG by rail in DOT-113C120W rail tank cars. Final Environmental Assessment. Docket No. PHMSA-2019-0100. December 5, 2019. P. 10.

¹⁶ SP 20534 Special Permit to transport LNG by rail in DOT-113C120W rail tank cars. Final Environmental Assessment. Docket No. PHMSA-2019-0100. December 5, 2019. P, 11.