BROTHERHOOD OF LOCOMOTIVE ENGINEERS AND TRAINMEN

A DIVISION OF THE RAIL CONFERENCE
INTERNATIONAL BROTHERHOOD OF
TEAMSTERS

SAFETY TASK FORCE

INDEPENDENCE,
OHIO

BEFORE THE NATIONAL TRANSPORTATION SAFETY BOARD

NTSB Accident Number: DCA17MR007

Class: Major

March 10, 2017

Proposed findings, probable cause, and safety recommendations, in connection with the derailment and subsequent fire of Union Pacific Railway unit ethanol train, UEGKOT 09, on March 10, 2017 in Graettinger, Iowa.

Stephen J. Bruno, BLET-Safety Task Force, National Chairman
Steven D. Facklam, BLET-Safety Task Force, Party Spokesman

FINAL SUBMISSION

ACCIDENT SYNOPSIS

On Friday, March 10, 2017, at 12:50 a.m., Central Standard Time ("CST"),[1] eastbound Union Pacific Railroad ("UP") unit ethanol train, UEGKOT 09, derailed as it travelled over the Jack Creek bridge which is a timber constructed railroad bridge, milepost ("MP") 56.8 near Graettinger, Iowa.[2] Twenty (20) of the liquid ethanol tank cars derailed. Fourteen (14) tank cars released ethanol fueling a post-accident fire.

Train UEGKOT 09 was a High Hazard Flammable Unit Train ("HHFUT").[3] The accident occurred near Jack Creek, a tributary of the Des Moines River. An estimated 322,000 gallons of undenatured ethanol released in this accident. There were no reported injuries. Approximately 400-feet of railroad track and a 152-foot railroad bridge were destroyed in the accident. The accident resulted in an estimated $3.65 million in damages.[4] Weather at the time of the accident had winds from the northwest at seventeen (17) miles per hour ("MPH") gusting to thirty (30) MPH, visibility was ten (10) miles, and the temperature was 10° Fahrenheit.

Figure 1: Overhead view of the accident (photo courtesy of the NTSB).

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[1] All times in this Submission are reported in Central Standard Time.

[2] 49 C.F.R. § 237.5 defines *railroad bridge* as any structure with a deck, regardless of length, which supports one or more railroad tracks, or any other under grade structure with an individual span length of ten (10) feet or more located at such a depth that it is affected by live loads.

[3] A "high-hazard flammable unit train" (HHFUT) is a train comprised of 70 or more loaded tank cars containing Class 3 flammable liquids. A "unit" train is a train in which all cars, except the buffer cars, carries the same commodity and is shipped from the same origin to the same destination without being separated.

[4] This estimate does not include environmental remediation or the cost of clearing the accident.

Figure 1

Train Information:

UP Train UEGKOT 09 was an eastbound Union Pacific ethanol unit train, consisting of three (3) locomotives, two (2) buffer cars, and ninety-eight (98) loaded tank cars.[5] On the front of the train was lead locomotive UP 5666 and trailing locomotive UP 8376. The lead locomotive was

[5] *Buffer car* refers to a non-hazardous rail car used to separate hazardous materials from a possible ignition source (e.g.; locomotive or occupied caboose).

equipped with a remote-control system for the control of distributed power unit ("DPU") locomotive UP 8037, located on the rear of the train[6], which was controlled by the Locomotive Engineer. The lead two (2) locomotives were followed by one (1) buffer car, and then ninety-eight (98) loaded tank cars. Following the loaded tank cars was one (1) buffer car and the DPU locomotive (UP 8037). The ninety-eight (98) tank cars that contained liquid ethanol were of the United States Department of Transportation (D.O.T.) type 111 tank car design.

Regarding the continued use of Type 111 tank cars DOT states, "In published findings from the June 19, 2009, incident in Cherry Valley, Illinois, the NTSB indicated that the DOT Specification 111 tank car can almost always be expected to breach in the event of a train accident resulting in car-to-car impacts or pileups." The DOT continues that "FRA conducted research on longstanding safety concerns regarding the survivability of the DOT Specification 111 tank cars designed to current HMR standards and used for the transportation of ethanol and crude oil, focusing on issues such as puncture resistance and top fittings protection. The research indicated that special consideration is necessary for the transportation of ethanol and crude oil in DOT Specification 111 tank cars, especially in HHFTs."[7] On Friday, May 8, 2015, DOT published Final Rulemaking that requires the retrofitting and phasing out of DOT 111 tanks cars, to be completed by May, 1, 2023.[8]

[6] When used on the Union Pacific Railroad, Distributed Power Unit (DPU) refers to the remotely controlled locomotives, single or multiple, located at either intermediate points within a train, or at the rear of a train.

[7] *See* 80 Fed. Reg. 26654 (May 8, 2015), second paragraph.

[8] *Id.*

ACCIDENT NARRATIVE

On March 10, 2017, at 12:50 a.m., eastbound UP train UEGKOT 09 —was traveling at twenty-eight (28) MPH on the single Main Track of the UP's Estherville Subdivision. The train crew consisted of a Conductor and Locomotive Engineer. There is no signal system in place on the Estherville Subdivision. Train movements are authorized on this Subdivision by Track Warrant Control ("TWC") [9, 10]. The maximum authorized speed ("MAS") between MP 56 and MP 57 is thirty (30) MPH.

As UP Train No. UEGKOT 09 travelled eastbound over the Jack Creek bridge, it experienced an undesired emergency brake application ("UDE") followed by what the train crew described as a "lurch forward". Immediately after, the crew observed a "bright orange flash" outside of the locomotive cab. Both crew members observed a large fireball rising into the night sky. The Locomotive Engineer immediately notified the Union Pacific train dispatcher in Omaha, Nebraska via radio that the train had experienced an UDE, and that there were rail cars on fire.

As the Conductor walked back to assess the situation, he noted there were numerous cars in their train that had derailed. The Conductor found that the lead twenty (20) cars were still on the rails and attached to the two (2) lead locomotives, but had separated from the derailed and burning cars. Because the crew feared the lead twenty (20) cars might also catch fire, the train crew pulled these twenty (20) cars approximately one and one-half (1½) miles away from the burning wreckage.

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[9] Track Warrant Control (TWC) is a method of authorizing train movements by providing written authority for a train to move between two points on a track designated by the timetable.

[10] For copy of the Track Warrant, *see* Attachment A at the end of this Submission.

Subsequently the crew was asked by emergency responders, who had arrived on scene, to pull the rear fifty-two (52) unaffected cars back from the burning cars and did so using the DPU on the rear of the train. Each accompanied by a firefighter, the Locomotive Engineer went to the rear of the train and boarded the DPU, the Conductor went to the ninth (9^{th}) rail car from the derailed and burning rail cars. The train crew separated the non-affected rail cars westward, away from the burning, derailed rail cars.

Currently, there are no federal standards that mandate a minimum crew size on trains transporting hazardous materials. It is clear, in the immediate aftermath of this accident, that the actions of the Conductor and Locomotive Engineer in removing the remaining loaded ethanol tank cars away from the scene of the derailed and burning tank cars prevented a much more deadly and disastrous accident scene.

Location and Method of Operation:

The accident occurred near MP 56.8 near Graettinger, IA. MP 56.8 is located on UP's Estherville Subdivision. The Estherville Subdivision runs between Goldfield, IA and Superior, IA, for a distance of approximately seventy-nine (79) miles. This Subdivision is primarily single Main Track. This is not an AMTRAK route. Railroad operations on this Subdivision are controlled by TWC out of UP's train dispatching center located in Omaha, NE. Track speed is thirty (30) MPH approaching, and at, the accident location.

Operating Rules governing UP Train and Engine ("T & E") employees involved in the accident were the General Code of Operating Rules ("GCOR"), effective April 2015. Also governing train movements were:

- UP's Iowa Area Timetable No. 5, effective November 14, 2016;
- UP's Air Brake and Train Handling Rules, effective May 2, 2016;
- UP's Instructions for Handling Hazardous Materials, effective July 2, 2013; and
- UP's System Special Instructions, effective May 2, 2016.

Union Pacific Railway Form 8620 * PB-20800 Instructions for handling Hazardous Materials, Effective July 2, 2013

U.S. Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) regulations codified at 49 C.F.R. § 174.84 and § 174.85 regulate the industry regarding the placement of hazardous material cars in a train.[11] UP mandates the use of publication Form 8620 * PB-20800, titled *Instructions for Handling Hazardous Materials* for its transportation employees to reference when transporting hazardous materials in their trains. Specifically, page 42, under section titled 'Restrictions: Item No. 2,' addresses the requirement for the number of buffer cars required within the train make-up. It states: "Do not place a placarded car nearer than the sixth car from an engine (working or not working) or occupied caboose/business car. If the train does not have at least five buffer cars, the available buffer cars must be placed to protect the engine (working or not). If there is an occupied caboose/business car in the train, the available buffer cars must be divided equally to protect both the engine and caboose/business car. At least one buffer car is required."[12]

On several occasions BLET has requested that this rule be revised, in forums such as the Hazardous Materials Working Group of Federal Railroad Administration's ("FRA's") Railroad Safety Advisory Committee ("RSAC") and, most recently, in the BLET's submission to NTSB accident DCA15FR016 occurring September 19, 2015 on the BNSF Railway at Lesterville, South Dakota

[11] *See* Attachment B at the end of this Submission.

[12] *See* Attachment C at the end of this Submission.

of ethanol unit train G-MNXDPK7-17A. Situating locomotives further away from a potential fuel source reduces the likelihood the locomotive will provide an ignition source following a derailment, and also affords operating employees and first responders a safer distance from fires and explosions that may result.

Track Standards and Inspection Frequency

The Estherville Subdivision was classified by FRA Standards as a Class 3 track, which allows for a MAS of forty (40) MPH. UP inspects and maintains the Main Track on this portion of the Estherville Subdivision to FRA Track Safety Standards for Class 3 track, which allows for less stringent inspection frequencies as opposed to Class 2 and Class 1 trackage classification. UP has restricted their freight train movements to a maximum operating speed of 30 mph or lower on the Estherville Subdivision.

In the area of the derailment, the ninety (90) pound rail was manufactured by Inland Steel Company and Illinois Steel Company. The majority of the rail was manufactured between 1925 and 1930. One (1) rail section was manufactured in 1937 and another section was manufactured in 1957.

High Hazard Flammable Unit Train ("HHFUT"):

The UEGKOT 09 was designated a Key Train,[13] as well as a high hazard flammable unit train ("HHFUT"). In accordance with the May 8, 2015 PHMSA Final Rule titled, *Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains*, carriers that operate high hazard flammable trains (and high hazard flammable unit trains) must perform a routing analysis that considers, at a minimum, twenty-seven (27) safety and security factors and select a route based on its findings. Additional requirements such as speed restrictions and enhanced braking systems also apply. However, the Estherville Subdivision, does not meet the definition of a Key Route as defined in AAR Circular OT-55-O because it does not meet the yearly minimum levels in hazardous material car/tank car loads traversing the subdivision.[14] Key routes are subject to increased track and wayside bearing inspection.

The PHMSA Final Rule published on May 8, 2015 titled, *Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains*, states that U.S. ethanol production has increased considerably during the last ten (10) years[15] and has generated

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[13] Definition of "key train" is provided by Association of American Railroads ("AAR") publication OT-55-O, *Recommended Railroad Operating Practices for Transportation of Hazardous Materials*, January 27, 2015. "Key trains" have speed restrictions and other operating criteria. Definition: A "Key Train" is any train with: One tank car load of Poison or Toxic Inhalation Hazard1 (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).

[14] According to AAR Circular OT-55-O, a Key Route is 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 poison inhalation hazard (PIH) or toxic inhalation hazard (TIH), 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.

[15] *See* Attachment D at the end of this Submission.

similar growth in the transportation of ethanol by rail. The increase in shipments of large quantities of flammable liquids by rail has led to an increase in the number of train accidents, posing a significant safety and environmental concern to the general public.[16]

Shipping Paper Discrepancy (excerpts courtesy of the National Transportation Safety Board, Hazardous Material Factual Report):

The shipping description used on the hazardous materials shipping paper (train consist) that were in the train crew's possession was UN1987, Alcohols, N.O.S., Class 3, PG II. This describes denatured fuel ethanol and is not the proper shipping description for undenatured ethanol. Placards displayed on each rail car listed UN Identification Number 1170, signifying undenatured ethanol. Emergency response information (required by 49 C.F.R. § 172.602) appended to the train consist described the hazards of UN1987 denatured fuel ethanol, not UN1170 absolute or undenatured ethanol.

The shipper confirmed that the lading on the accident train was undenatured ethanol UN1170. A logistical difference between shipping the two products is that undenatured ethanol is taxed at a higher rate than denatured ethanol.

FRA obtained EDI 404 documentation indicating that on March 9, 2017, at 09:02, the Green Plains logistics coordinator entered information for the train identifying the lading as UN1987 denatured fuel ethanol. The documents show the logistics coordinator subsequently attempted to change the description to UN1170 undenatured ethanol on March 10 at 09:12, but that attempted correction

[16] *See* 80 Fed. Reg. 26722.

was not accepted by the EDI system because the railcars were already in transportation (and the accident had already occurred).

In a June 8, 2017 FRA inspection report, an agency hazardous materials inspector notified the Union Pacific Railroad that they r had violated 49 C.F.R. § 174.26(b) because the train crew accepted the tank cars into transportation after failing to inspect each of the ninety-eight (98) tank cars at ground level for inconsistencies between the placard (UN1170, Ethanol, 3, PG II) and the shipping papers (UN1987, Alcohols, n.o.s., 3, PG II). On June 9, 2017, the FRA hazardous materials inspector similarly notified Green Plains Logistics that it violated 49 C.F.R. § 172.202 for releasing into transportation ninety-eight (98) tank cars with the railroad shipping papers incorrectly describing the hazardous materials as UN1987 Alcohols, n.o.s., 3, PG II. According to the FRA reports, local emergency responders attempted to determine proper response measures using the erroneous train consist. The report states that emergency response actions were delayed when different tank car placard information prompted emergency responders to reformulate their plan for evacuation, mitigation, and responder safety. The reports state that the FRA hazardous materials inspector informed the Union Pacific Railroad and Green Plains Logistics the matter would be referred to the Office of Chief Counsel for enforcement action.

PROBABLE CAUSE

The Brotherhood of Locomotive Engineers and Trainmen ("BLET") finds that the probable cause of this accident was a broken rail on the single Main track on the Union Pacific Estherville Subdivision near Graettinger, Iowa resulting in the derailment of the unit ethanol train and subsequent release of product and fire.

CONTRIBUTING FACTORS

The Brotherhood of Locomotive Engineers and Trainmen ("BLET") finds that the continued use of non-retrofitted DOT 111 tank cars contributed to the severity, economic impact, and resulting fire after the initial derailment. Another contributing factor was the Union Pacific's use of ninety (90) pound, continuously welded rail[17] on the Estherville Subdivision that was being used to transport heavier loaded bulk commodity unit trains.

[17] Continuous welded rail (CWR) means rail that has been welded together into lengths exceeding 400 feet.

PROPOSED RECOMMENDATIONS

To Pipeline and Hazardous Materials Safety Administration ("PHMSA"):

1. Revisit HM-251 – Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains and issue new rule making immediately banning the use of un-retrofitted DOT 111 rail tank cars in the transportation of ethanol or crude oil instead of delaying until May 1, 2023, as the current regulation now allows.
2. Propose and issue new rule making that lowers the yearly minimum levels in hazardous material car/tank car loads that defines 'Key Routes'.

To Federal Railroad Administration ("FRA"):

1. Propose and issue new rule making mandating the use of two-person crews on all trains transporting hazardous materials.
2. The FRA promulgates a rule that conforms to the provisions of §20166 of the Rail Safety Improvement Act of 2008 that requires railroad carriers to provide emergency escape breathing apparatus.

To Union Pacific Railroad (UP):

1. Immediately cease transporting hazardous material trains (HHFT, HHFUT, and Key Trains) on ninety (90) pound rail.

CERTIFICATE OF SERVICE

I certify that on December 08, 2017 I have electronically served upon Mr. Michael Hiller ([redacted]), Investigator in Charge, National Transportation Safety Board, a complete and accurate copy of these proposed findings regarding the March 10, 2017, derailment and subsequent fire of Union Pacific Railroad train UEGKOT 09 in Graettinger, Iowa (NTSB Docket No. DCA-17-MR-007). An electronic copy of same was also forwarded to the individuals listed below in this certificate of service, as required by 49 C.F.R. § 845.27 (Proposed Findings).

National Transportation Safety Board c/o Mr. Michael Hiller
Investigator in Charge
DCA17MR007
490 L' Enfant Plaza, SW Washington, DC 20594
[redacted]

Mr. Steven Fender
Federal Railroad Administration, Region 6
Regional Administrator
[redacted]

Mr. Randy L. Eardensohn
Union Pacific Railroad
Gen Dir Oper Practices
[redacted]

Mr. Roy Morrison
Brotherhood of Maintenance of Way Employes Division
Director of Safety
[redacted]

Mr. Lawrence Mozena
SMART/UTU Transportation Safety Team
[redacted]

Sincerely yours,

[redacted]

Stephen J. Bruno
Brotherhood of Locomotive Engineers & Trainmen
National Secretary-Treasurer
National Chairman, Safety Task Force
7061 East Pleasant Valley Road
Independence, OH 44131

Attachment A

TRACK AUTHORITY FORM – TE&Y FORM 20705

(circle one)

Track Warrant Track & Time Track Permit

Number: 62-52 Date: 3-9-17

To: UP 5666 At: Estherville

1. ☐ Track warrant _____ is void
2. ☐ Not in effect until after the arrival of _____, _____, _____ at _____
3. ☐ Proceed from _____ to _____ on _____ track _____ Subdivision
4. ☐ Hold Main Track at last named point
5. ☐ Clear Main Track at last named point
6. ☐ Do not foul limits ahead of _____, _____, _____
7. ☒ Work between MP 0 and MP 78.4 on Main track Estherville Subdivision
8. ☐ Authority granted between CP _____ on _____ (track) Switch Yes / No
   and CP _____ on _____ (track) Switch Yes / No
   Joint _____ Blocked until _____ Extended to _____
9. ☐ Limits jointly occupied between _____ and _____
   (NOTE: Trains must move at restricted speed within joint authority limits)
10. ☐ Joint with _____ between _____ and _____
    Joint with _____ between _____ and _____
    Joint with _____ between _____ and _____
11. ☐ Do not exceed _____ mph between _____ and _____
    No flags displayed ___ Flags displayed at MP _____ for _____ trains
    Do not exceed _____ mph between _____ and _____
    No flags displayed ___ Flags displayed at MP _____ for _____ trains
    Do not exceed _____ mph between _____ and _____
    No flags displayed ___ Flags displayed at MP _____ for _____ trains
12. ☐ Comply with Procedure _____ at/between MP _____ and MP _____
    Comply with Procedure _____ at/between MP _____ and MP _____
    The ___ switch at _____ is lined for siding
    The ___ switch at _____ is lined for siding
    Leave the ___ switch at _____ lined for siding
    Leave the ___ switch at _____ lined for siding

1 Box(es) marked: 2, 3

OK at 1936 Dispatcher SCA Relayed to _____ Copied by Pressler

Clear of _____ at _____ Disp _____ by _____
Clear of _____ at _____ Disp _____ by _____
Clear of _____ at _____ Disp _____ by _____

Limits reported clear at _____ by _____

Attachment B

(3) Struck by any car moving under its own momentum.

(c) A placarded flatcar, or a flatcar carrying a placarded transport vehicle, freight container, or bulk packaging under this subchapter may not be cut off while in motion.

(d) No rail car moving under its own momentum may be permitted to strike any placarded flatcar or any flatcar carrying a placarded transport vehicle, freight container, or bulk packaging.

(e) No placarded flatcar or any flatcar carrying a placarded transport vehicle, freight container, or bulk packaging may be coupled into with more force than is necessary to complete the coupling.

(f) When transporting a rail car, transport vehicle, or freight container placarded for Division 1.1 or 1.2 (Class A explosive) materials in a terminal, yard, or on a side track or siding, the placarded rail car must be separated from the engine by at least one non-placarded rail car and must be placed in a location so that it will be safe from danger of fire. A rail car, transport vehicle, or freight container placarded for Division 1.1 or 1.2 (Class A explosive) materials may not be placed under a bridge or overhead crossing, or in or alongside a passenger shed or station, except during transfer operations.

[Amdt. 174–68, 55 FR 52680, Dec. 21, 1990, as amended at 56 FR 66281, Dec. 20, 1991; Amdt. 174–75, 58 FR 50237, Sept. 24, 1993; Amdt. 174–77, 59 FR 48549, Sept. 21, 1994; Amdt. 174–83, 61 FR 51339, Oct. 1, 1996]

§ 174.84 Position in train of loaded placarded rail cars, transport vehicles, freight containers or bulk packagings when accompanied by guards or technical escorts.

A rail car placarded in Division 1.1 or 1.2 (Class A explosive); Division 2.3 (Hazard Zone A; poisonous gas); or Division 6.1 (PG I, Hazard Zone A; poisonous liquid) in a moving or standing train must be next to and ahead of any car occupied by the guards or technical escorts accompanying the placarded rail car. However, if a rail car occupied by the guards or technical escorts has temperature control equipment in operation, it must be the fourth car behind any car requiring Division 1.1 or 1.2 (Class A explosive) placards.

[Amdt. 174–68, 55 FR 52680, Dec. 21, 1990, as amended at 56 FR 66281, Dec. 20, 1991]

§ 174.85 Position in train of placarded cars, transport vehicles, freight containers, and bulk packagings.

(a) Except as provided in paragraphs (b) and (c) of this section, the position in a train of each loaded placarded car, transport vehicle, freight container, and bulk packaging must conform to the provisions of this section.

(b) A car placarded "RADIOACTIVE" must comply with train positioning requirements of paragraph (d) of this section and must be separated from a locomotive, occupied caboose, or carload of undeveloped film by at least one non-placarded car.

(c) A tank car containing the residue of a hazardous material must be separated from a locomotive or occupied caboose by at least one rail car other than a placarded tank car.

(d) Position of rail cars in a train. In the following table:

POSITION IN TRAIN OF PLACARDED CARS TRANSPORTING HAZARDOUS MATERIALS

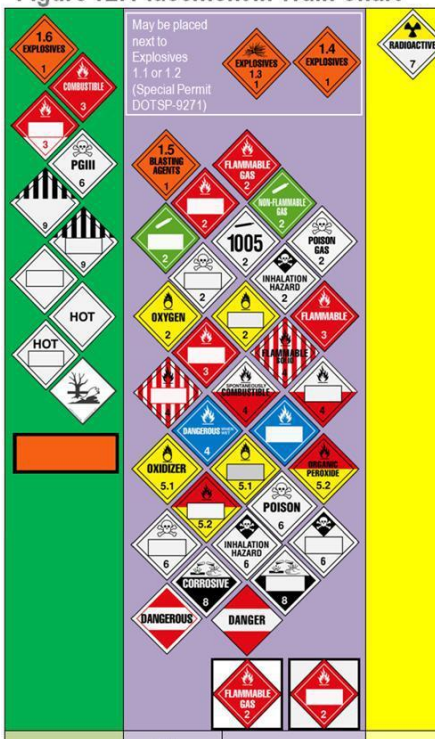
RESTRICTIONS	Placard Group 1	Placard Group 2		Placard Group 3		Placard Group 4
	Rail Car	Tank Car	Rail Car	Tank Car	Rail Car	Rail Car
1. When train length permits, placarded car may not be nearer than the sixth car from the engine or occupied caboose.	X	X		X		
2. When train length does not permit, placarded car must be placed near the middle of the train, but not nearer than the second car from an engine or occupied caboose.	X	X		X		
3. A placarded car may not be placed next to an open-top car when any of the lading in the open top car protrudes beyond the car ends, or if the lading shifted, would protrude beyond the car ends..	X	X		X		

Attachment C

Section VI

Train Placement

Figure 12: Placement in Train Chart



General Information

A. For train placement purposes, each platform or well of an intermodal rail car is counted as one car.

B. There are no train placement restrictions for end-of-train devices.

C. A buffer car for train placement purposes is a:
- non-placarded rail car;
- placarded/marked rail car from Column A (green);
- placarded rail car, other than a tank car, provided it complies with all applicable restrictions below; or
- placarded residue/empty tank car, provided it complies with Restrictions #3, #4, and #5 below.

D. Diamond-shaped placards without a square white background may have different restrictions than those with the square white background. For example, the INHALATION HAZARD (2) diamond shaped placard (without the square white background) is found in the purple column. The INHALATION HAZARD (2) placard **with** a square white background is found in the blue column.

Notes

1. If the placard on a rail car is displayed on a square white background -- EXPLOSIVES 1.1, EXPLOSIVES 1.2, INHALATION HAZARD (2), or INHALATION HAZARD (6), the car must be placed next to and ahead of any car occupied by guards or technical escorts accompanying the car.

   If the rail car occupied by guards or technical escorts is equipped with a lighted heater or stove, there must be at least three cars between the escort car and a rail car placarded EXPLOSIVES 1.1 or EXPLOSIVES 1.2.
2. The word "TOXIC" can be used in place of the word "POISON".
3. Residue/empty tank cars are identified on train consists/Train Lists and /RD Track Lists by the notation "RESIDUE: LAST CONTAINED". If in doubt, treat the car as a load.
4. For helper units and distributed power units, see Section VII, Item 3.

Any loaded or residue/ empty cars	Other loaded cars (not tank cars)	Tank cars		Any loaded cars	Loaded tank cars (For other than loaded tank cars, see above.)	Any loaded cars	
		Residue/ empty	Loaded				
A	B	C	D	E	F	G	Restrictions:
No Restrictions							1. Do not place a placarded car next to any loaded rail car displaying a placard found in the columns with color indicated by the squares. For example, a placard shown in Column D (purple) must not be placed next to any loaded rail car placarded in Columns E (yellow), F (blue), or G (red).
			X		X	X	2. Do not place a placarded car nearer than the sixth car from an engine (working or not working) or occupied caboose/business car. If the train does not have at least five buffer cars, the available buffer cars must be placed to protect the engine (working or not). If there is an occupied caboose/business car in the train, the available buffer cars must be divided equally to protect both the engine and caboose/business car. At least one buffer car is required.
		X	X	X	X	X	3. Do not place a placarded car next to an engine (working or not working) or occupied caboose/business car regardless of train length.
		TIH PIH	X		X	X	4. Do not place a placarded car, or a residue TIH/PIH tank car, next to a loaded flatcar **except** closed TOFC/COFC equipment, auto carriers, and other specially-equipped cars with tie-down devices for handling vehicles.
		TIH PIH	X		X	X	5. Do not place a placarded car, or a residue TIH/PIH tank car, next to a loaded bulkhead flatcar or open top car when any of the lading protrudes beyond the car ends or, if shifted, would protrude beyond the car ends. ***Note:*** Do not place a placarded car next to flatcars designed for wheel sets or traction motors or for flat cars with tote bins without bulkheads extending more than half the height of the tote bins.
			X		X	X	6. Do not place a placarded car next to any rail car, transport vehicle, or freight container with an open flame device or an internal combustion engine in operation. ***Note:*** Does not apply to cryogenic refrigerated equipment, but does apply to mechanical reefer equipment in protective service.

Attachment D

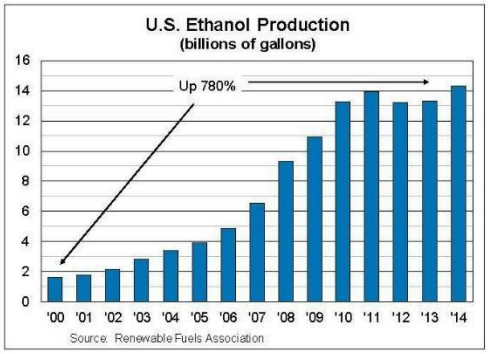
Railroads and Ethanol

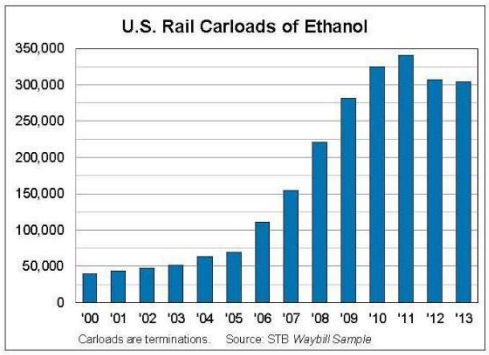
ASSOCIATION OF AMERICAN RAILROADS — JULY 2015

Summary

Ethanol is an important commodity for U.S. freight railroads. The more than **304,000 carloads of ethanol** railroads carried in 2013 accounted for **1.0 percent of total carloads** — up from just 0.3 percent in 2003. Railroads work closely with ethanol producers and consumers to help ensure America's ethanol transportation needs are met safely and efficiently.

- The U.S. ethanol industry has grown tremendously. In 2014, U.S. ethanol production was **14.3 billion gallons**, **more than ever before** and 780 percent higher than the 1.6 billion gallons produced in 2000.
- Ethanol production is concentrated in the Midwest (where most of the corn that goes into ethanol production is grown) but many of the major markets for ethanol are on the East Coast, California, and Texas. Thus, large amounts of ethanol are transported from production to consumption areas. Railroads are the mode of choice: **railroads account for 60 to 70 percent of ethanol transport**.
- In 2013 (the most recent year for which data are available), U.S. railroads terminated nearly 304,000 carloads of ethanol, up from fewer than 40,000 carloads in 2000. In 2013, ethanol accounted for 1.0 percent of total rail carloads, 1.4 percent of rail tonnage, and 2.1 percent of rail ton-miles.





- Each of the seven U.S. Class I railroads transports ethanol, with some serving several dozen plants. An estimated 15 to 20 percent of ethanol rail movements originate on non-Class I railroads — not surprising, given the rural nature of many short lines and much of

America's ethanol production. Most corn used in ethanol production moves to ethanol plants by truck, although at a few ethanol plants corn arrives by rail.

- Most ethanol carried by railroads moves in approximately 30,000-gallon tank cars. Almost all of these cars are owned by shippers or leasing companies, not by railroads.
- Midwestern states — led by Iowa, Nebraska, South Dakota, and Illinois — account for most rail ethanol originations. Texas, California, and New Jersey are the top states for rail terminations of ethanol.