BEFORE THE KANSAS DEPARTMENT OF TRANSPORTATION

K.A.R. 36-43-1. CREW REQUIREMENTS

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

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July 5, 2023
TABLE OF CONTENTS

TABLE OF EXHIBITS ........................................................................................................ iii
INTRODUCTION ........................................................................................................... 1
BACKGROUND ............................................................................................................. 2
   I. Federal Railroad Administration Crew-Size Rulemaking ........................................ 4
   II. Kansas Crew-Size Regulation .............................................................................. 5
DISCUSSION ................................................................................................................ 6
   I. KDOT Lacks the Statutory Authority to Enact Crew-Size Regulation ......................... 7
   II. There Is No Safety Justification for Crew-Size Regulation .................................... 8
      A. The Evidence Shows That One-Person Crews Are Safe ...................................... 8
      B. PTC Eliminates Any Operational Need for A Second Crewmember in the Cab ...... 13
   III. The Majority of Railroads Operating in Kansas Use Two-Person Crews ................. 14
   IV. KDOT's Economic Impact Analysis is Deficient .................................................. 15
   V. The Proposed Regulation Will Run Aftoul Existing Federal Law and Ongoing Federal Agency Rulemaking ................................................................. 19
CONCLUSION ............................................................................................................. 20
## TABLE OF EXHIBITS


2. Oliver Wyman, *Assessment of European Railways: Characteristics and Crew-Related Safety* (June 2016)


4. Oliver Wyman, *Assessment of Conductor and Engineer In-Cab Work Activities* (May 14, 2021)

5. Statement of Dewayne Swindall (December 2022)


7. Statement of Brendan M. Branon (December 2022)


10. K.A.R. 36-43-1
The Association of American Railroads ("AAR"), on behalf of itself and its member railroads, respectfully submits these comments in response to the Kansas Department of Transportation's ("KDOT") Notice of Public Hearing on Proposed Administrative Regulation, K.A.R. 36-43-1, entitled “Crew requirements, exceptions.”

AAR is an incorporated, nonprofit trade association representing the nation’s major freight railroads, Amtrak, and some smaller freight railroads and commuter authorities. AAR's members account for the vast majority of the rail industry’s line haul mileage, freight revenues, and employment. In Kansas alone, AAR members employ thousands of employees and operate thousands of miles of railroad track.

INTRODUCTION

Through the implementation of K.A.R. 36-43-1, KDOT, with limited exceptions, seeks to require that any railroad operating within the State of Kansas maintain at least two crewmembers in the control compartment of the lead locomotive of all trains. In support of the proposed regulation, KDOT presents a Notice of Public Hearing on Proposed Administrative Regulation ("Notice") and an Economic Impact Statement ("EIS") outlining KDOT’s assessment of the costs and benefits of the regulation.

Absent from the materials related to K.A.R. 36-43-1 is any evaluation of the need for the proposed regulation or any accounting of the expected benefits. Instead, KDOT claims merely that the state “may see reduced accidents,” and admits that the primary impact of K.A.R. 36-43-1 will be to increase costs for some railroads operating in Kansas—costs which KDOT expects will be passed on to Kansans. See Notice, at 1 (emphasis added).

The proposed KDOT regulation will not improve safety. Instead, it will chill research and innovation of safer and more efficient railroad operations. As the U.S. Department of
Transportation—and other federal and state regulators—have recognized, safety is advanced by “harness[ing] technological innovations to reduce and mitigate safety incidents.” U.S. Dep’t of Transp., Strategic Plan FY 2022-2026 at 10, https://bit.ly/3jnGH5Y. KDOT’s proposed regulation takes precisely the opposite approach by freezing the status quo (the majority trains in Kansas currently operate with multiple crewmembers in the lead locomotive). In the railroad context, just as in other dynamic industries, locking in the status quo will stall the development of new technologies that will further promote safety.

Beyond being bad policy, the KDOT regulation is preempted by the federal regulatory scheme that applies to railroads. The proposed regulation should be withdrawn.

BACKGROUND

There is no immediate need for KDOT to implement this proposed regulation. Should it be promulgated, it threatens to do long-term harm to the railroad industry. “Historically, crew size has been an issue for labor relations.” Fed. R.R. Admin., Proposed Rule—Train Crew Staffing, 81 Fed. Reg. 13918, 13937 (Mar. 15, 2016). As explained in the Statement of Brendan M. Branon, the chair of the National Carriers’ Conference Committee, debates over crew size have historically been resolved through collective bargaining rather than under the guise of safety regulation. “The carriers and the unions have a long-standing, proven ability to handle these issues in a safe and effective way.” Statement of Brendan M. Branon (December 2022), at ¶ 5 (attached as Ex. 7). The most recent round of collective bargaining between the nation’s freight railroads and the 2 rail unions concluded in December 2022, resulting in the implementation of an agreement providing significant wage increases, continued access to high-quality health care, additional paid time off, and related quality of life benefits. National Rail Labor Council, Freight Rail National Bargaining Concluded, https://raillaborfacts.org/news/freight-rail-bargaining.
round-to-conclude/(December 1, 2022). This national status quo will remain in place until at least January 1, 2025, which is the soonest the next round of collective bargaining may resume unless otherwise agreed to by all participants.

While Class I railroads plan to continue using two-person crews for most operations until at least January 1, 2025, KDOT fails to take into account the long-term negative impacts of setting a two-person requirement in stone. The railroad industry has a long history of building on technological improvements to increase productivity and improve safety. FRA acknowledges that “technology has enabled a gradual reduction in the number of train crewmembers from about five in the 1960s to two in 2014,” 81 Fed. Reg. at 13937, and, in fact, two-person crews have been used by Class I railroads since well before 2014.

Class I railroads have installed Positive Train Control (“PTC”) on a significant portion of the national rail network in response to a mandate in the Rail Safety Improvement Act of 2008. See Pub. L. No. 110-432, Div. A, 122 Stat. 4848-4906 (Oct. 16, 2008). PTC is a computerized system that delivers real-time information to the engineer and monitors train location, speed and direction and, if necessary, stops a train automatically if the engineer fails to take necessary actions. PTC makes it unnecessary for a conductor to perform onboard functions such as observing wayside signal information and recording dispatching orders, thus eliminating one of the key purported rationales for a multiple-person crew. PTC has been fully implemented since December 29, 2020, and is in operation across the national rail network including in Kansas. See Federal Railroad Administration, *Positive Train Control (PTC)*, https://railroads.dot.gov/research-development/program-areas/train-control/ptc/positive-train-control-ptc (last accessed July 5, 2023).
I. Federal Railroad Administration Crew-Size Rulemaking.

FRA has never mandated a minimum crew size and has historically left the issue to the collective bargaining process. In 2009, FRA denied a petition to require multiple person crews, explaining that it “ha[d] no factual evidence” that would justify such a mandate. See Denial of BLET Petition on RCO and Other Single-Person Operations (Nov. 10, 2009).

In 2016, FRA issued an NPRM proposing a minimum crew-size rule. See Docket No. FRA-2014-0033. In 2019, FRA withdrew the 2016 NPRM. See Fed. R.R. Admin., Proposed Rule—Train Crew Staffing, 84 Fed. Reg. 24735 (May 29, 2019) (“Withdrawal Order”). The agency determined that “no regulation of train crew staffing is necessary or appropriate for railroad operations to be conducted safely at this time.” Id. at 24735. It stated that “FRA does not have information that suggests that there have been any previous accidents involving one-person crew operations that could have been avoided by adding a second crewmember.” Id. at 24738 (quoting 81 Fed. Reg. at 13921). The Withdrawal Order explained that although there were “some indirect connections between crew staffing and railroad safety with respect to the . . . accidents, those connections are tangential at best and do not provide a sufficient basis for FRA regulation of train crew staffing requirements.” Id. In short, the Withdrawal Order concluded that FRA’s safety data “does not establish that one-person operations are less safe than multi-person train crews,” that “existing one-person operations ‘have not yet raised serious safety concerns,’” and that “it is possible that one-person crews have contributed to the [railroads’] improving safety record.” Id. at 24739 (quoting 81 Fed. Reg. at 13950 and 13932 (alteration in original)).

In 2021, a panel of the U.S. Court of Appeals for the Ninth Circuit vacated the Withdrawal Order. See Trans. Div. of the Int’l Ass’n of Sheet Metal, Air, Rail & Transp. Workers v. FRA, 988 F.3d 1170 (9th Cir. 2021). The court “conclude[d] that the issuance of the Order violated the APA’s notice-and-comment requirements and that the Order is arbitrary and
capricious.” *Id.* at 1179. But the court did not conclude that a crew-size rule was warranted or that the evidence showed two-person crews would increase safety.

In 2022, FRA issued a new crew-size-related NPRM. Fed. R.R. Admin., *Train Crew Size Safety Requirements*, 87 Fed. Reg. 45564 (July 28, 2022). While the 2022 NPRM suffers from many of the same shortcomings outlined here, if finalized the FRA’s rule would indisputably preempt any state crew-size related regulation, including this one. In fact, in the NPRM, FRA stated expressly that a preemptive rule was “necessary to prevent the multitude of State laws regulating crew size from creating a patchwork of rules governing train operations across the country” and repeatedly emphasized the importance of a nationally uniform standard. *Id.* at 45565; 45570.

II. Kansas Crew-Size Regulation.

This is not KDOT’s first attempt at enacting crew-size regulation. KDOT initially proposed K.A.R. 36-43-1, a substantially similar regulation to that at issue today on July 27, 2020. The proposed 2020 regulation provided that “[r]ailroads operating within Kansas shall maintain a minimum of two crew members in the control compartment of the lead locomotive unit of a train,” but exempted switching operations, brake testing, safety inspections, or operations undertaken while performing setouts in conjunction with road service. See Kansas Office of the Governor, Kansas Department of Transportation Proposes Safety Rule Regulating Minimum Railroad Crew Size, July 27, 2020, https://governor.kansas.gov/kansas-department-of-transportation-proposes-safety-rule-regulating-minimum-railroad-crew-size/.

Following its review of the legality of K.A.R. 36-43-1, the Kansas Attorney General’s Office refused to approve the proposed regulation, finding that neither statute cited by KDOT, K.S.A. 66,216 or K.S.A. 75-5078, authorized the Kansas Corporation Commission and in turn the KDOT “to adopt rules and regulations concerning the subject of K.S.A. [sic] 36-43-1.” Sept.
1, 2020, Correspondence re: K.A.R. 36-43-1, State of Kansas Office of the Attorney General to Kansas Departmen: of Transportation (attached as Ex. 9). The Attorney General also found that crew-size regulation was preempted by both the Federal Railroad Safety Act, and the Interstate Commerce Commission Termination Act. *Id.*

Less than three years later, KDOT released the Notice on the proposed regulation at issue here, also entitled K.A.R. 36-43-1. This new iteration of K.A.R. 36-43-1 is substantially identical in relevant part to the regulation proposed in 2020, providing that “[e]ach entity operating a railroad in Kansas shall maintain at least two crewmembers in the control compartment of the lead locomotive unit of each train.” The regulation does not apply during switching operations, brake testing, safety inspections, and in situations where a train is stopped at a customer location or where the number of cars in a train are being reduced while on a siding track. *Id.* In support, KDOT once again relies on K.S.A. 66,216 and K.S.A. 75-5078 as authorizing the promulgation of the proposed regulation. See EIS, at 5.

**DISCUSSION**

KDOT’s proposed regulation should be withdrawn because the agency has not provided a legally sufficient justification for its proposed crew-size rule. The Kansas Judicial Review Act (“KJRA”) is the exclusive means of reviewing agency action under Kansas law. Kan. Stat. § 77-606. Agency action is improper if “based on a determination of fact...that is not supported to the appropriate standard of proof by evidence that is substantial when viewed in light of the record as a whole” or if “the agency action is otherwise unreasonable, arbitrary or capricious.” Kan. Stat. 77-621(c).

K.A.R. 36-43-1 cannot satisfy this test because KDOT lacks the statutory authority to enact crew-size regulation, has not presented any authority calling into question the
overwhelming evidence establishing that one-person crews are at least as safe as multi-person crews, based its decision on incorrect assumptions regarding current rail operations and the extensive collective bargaining forming the basis of current rail operations, neglected to consider the actual costs of the proposed regulation, including the chilling effect it will have on future innovation, and ignored the preemptive effect of existing federal law and ongoing federal agency actions.

I. **KDOT Lacks the Statutory Authority to Enact Crew-Size Regulation.**

KDOT should withdraw K.A.R. 36-43-1 because no statute authorizes the agency to promulgate the proposed regulation. In its EIS, KDOT cites K.S.A. 75-5078 and K.S.A. 66,216 as the source of the statutory authority required to enact K.A.R. 36-43-1. KDOT is mistaken. K.S.A. 75-5078 transfers the railroad-related “powers, duties and functions” previously enjoyed by the Kansas Corporation Commission (“KCC”) to the KDOT. K.S.A. 66-1,216 in turn provides the KCC with “full power, authority and jurisdiction to supervise and control the common carriers” and further empowered [the KCC] to do all things necessary and convenient for the exercise of such power, authority and jurisdiction.” Absent from these statutes, however, is any grant of authority to either the KCC or KDOT to propose and adopt crew-size-related regulations.

The Kansas Attorney General’s office reached the same conclusion when it considered and denied approval for substantially identically crew-size regulation in 2020. Ex. 9, at 1, 3. And although the new Kansas Attorney General’s Office has provided its stamp of approval for K.A.R. 36-43-1 as proposed in 2023, see Ex. 10, no justification has been presented for this change in position. Thus, in addition to KDOT lacking the statutory authority to promulgate K.A.R. 36-43-1, without any attempt to establish a “foundation in fact” for the diametric shift in the Attorney General’s position, the agency action is also arbitrary, capricious and violative of

II. **There Is No Safety Justification for Crew-Size Regulation.**

A. **The Evidence Shows That One-Person Crews Are Safe.**

Abundant real-world evidence proves that one-person crews are just as safe as multiple-person crews. Railroads in the United States and other nations have safely used one-person crews in a wide variety of operating contexts for many years. KDOT offers no non-anecdotal evidence to the contrary.

In early 2015, the consulting firm Oliver Wyman concluded, based on U.S. accident data, that single-person train crew operations are just as safe as multiple-person train crew operations. *See* Oliver Wyman, *Analysis of North American Freight Rail Single-Person Crews: Safety and Economics* (February 2015) (attached as Ex. 1). The study compared aggregate statistics on relevant equipment incidents and casualty incidents for 2007 through 2013 for operators using single-person crews versus operators using multiple-person crews. As to equipment incidents, the study found that “[w]hile the data may not conclusively support a claim that single-person crew operations are safer than multiple-person crew operations (given the possible existence of other influencing factors), it does appear that single-person crew operations are at least as safe as multiple-person crew operations.” Ex. 1 at 24. As to casualty incidents, the study likewise found that “those rail operators using single person crews are at least as safe as their counterparts relying on multiple-person crew[s] to operate their trains.” *Id.* at 26.

One-person crews are also commonly used in other countries—and the data confirms that they are safe. In the United Kingdom, for example, where one-person freight operations are common, the Rail Safety and Standards Board found that “one-person crews were at least as safe
as multiple crew operations.” Regulatory Impact Analysis, *Train Crew Staffing—Notice of Proposed Rule Making*, U.S. Dep’t of Transp. 21 (Feb. 18, 2016). Oliver Wyman’s analysis of extensive safety data documenting the performance of one-person crews in Europe confirms this conclusion. Oliver Wyman, *Assessment of European Railways: Characteristics and Crew-Related Safety* (June 2016) (attached as Ex. 2). Oliver Wyman examined rail safety data collected by the European Railway Agency, which includes data from 28 European nations. That data shows that one-person crews have similar or lower accident rates than two-person crews in five of the six accident categories measured—collisions with other trains or obstacles; derailments; level crossings; fires on rolling stock; and other accidents. The only exception was the category of “accidents to persons caused by rolling stock in motion,” which generally involves non-employees hit by a railway vehicle (and there is no evidence to suggest that crew size played a role in those accidents).

The findings in Oliver Wyman’s supplemental report amplify the findings in its 20:5 report, which explained that “[i]nternationally, the use of single-person crews for trains is widespread in developed markets similar to the United States in size and complexity.” Ex. 1 at 1. “In Europe and Australia, for example, the use of single-person crews is the dominant practice on many freight railroads, including those in Germany, France, Sweden, Australia, the United Kingdom, and Queensland/New South Wales.” *Id.* The Wyman study analyzed safety data for collisions, derailments, serious employee injuries, fatalities, and signals passed at danger, and found that “[f]or all of these categories, major European operators using single-person crews appeared to be as safe as Class I multiple-person crew operations.” *Id.* at 2.

More recently, Oliver Wyman updated its analysis of the European experience. *See* Oliver Wyman, *Crew-Related Safety and Characteristic Comparison of European and US*
Railways (April 5, 2021) (attached as Ex. 3). The study reviewed 2006-2019 accident reporting data for 28 railroads in Europe (where 95 percent of rail traffic is moved by one-person crews) and for the U.S. Class I railroads. Oliver Wyman “found no evidence that railroads operating with two-person crews are statistically safer than railroads operating with one-person crews.” Id. at 3. More generally, the study “found no significant differences in safety statistics based on crew size.” Id.

Oliver Wyman conducted its April 2021 study by grouping European railroads into categories based on region and crew size and comparing them to one another and to U.S. Class I railroads, to determine if there were differences in safety performance and whether those differences were related to crew size. Oliver Wyman also compared Western and Eastern Europe, to see if accident data aligns more closely with differences in infrastructure investment and operating characteristics. For all significant accidents, Western European one-person crews have shown the best safety record, whereas Eastern European railroads have seen improvement over time, regardless of crew size; the U.S. accident rate is fairly stable. Oliver Wyman determined that “two-person crews do not appear to be safer than one-person crews according to this metric.” See Ex. 3 at 5-6. Furthermore, in looking at specific categories of accidents, Oliver Wyman did not find that crew size played a significant role in the number of collisions, derailments, accidents at grade crossings, accidents to persons, or employee fatalities. Having a second crewmember also did not reduce economic damages for significant accidents. Finally, Oliver Wyman found no evidence of higher rates of signals passed at danger for one-person crews, thus dispelling claims that one-person crews are “overloaded” with tasks. See Ex. 3 at 5-6.

The information KDOT relies on to suggest a possible safety risk does not call any of
these data-based conclusions into question. First, KDOT cites a SMART TD pamphlet characterizing the 2013 Lac-Mégantic derailment as an incident involving a single crewmember who failed to properly secure the train at the end of a tour of duty. See EIS, Ex. 2, at 1. KDOT fails, however, to include the actual results of the investigation undertaken by the Transportation Safety Board of Canada, which found that it “could not conclude that use of a one-person crew was a cause or contributing factor to the accident.” 81 Reg. 13918, at 13921. KDOT next cites a second SMART TD flyer detailing events surrounding a three-man train crew’s response to discovering an individual suffering injuries of unknown cause on a railroad right-of-way in Stockton, California. See EIS, Ex. 2, at 2. While the actions of the crew were valiant in the face of trying circumstances, nothing in the flyer suggests that a single crewmember would not have been able to render first-aid or coordinate an emergency response. Finally, KDOT declares that the proposed regulation is necessary because there were “71 train accidents in Kansas” in 2022. EIS at 4. But a cursory examination of the data KDOT cites reveals that of these 71 accidents, at least 57 involved railroads KDOT acknowledges only operate with multi-person crews in Kansas. EIS, Ex. 3, at 3. KDOT fails to present any evidence to suggest that the remaining 14 accidents occurred during single-crew operations, or could possibly have been prevented, by a multi-person crew.

It also bears noting that U.S. passenger trains have been operated for many years with only one crewmember in the cab (other crewmembers may serve the passenger compartments but do not routinely ride in the cab). These have been widely viewed as safe operations. As the FRA advised the NTSB in 1986: “Many passenger trains have been operated for years with only one person in the control compartment. Some of these operations have been in place for over 50 years and they have compiled an outstanding safety record.” Response to NTSB
Recommendation R-85-051 (May 20, 1986). The trend toward one-person crews for passenger trains has only increased since that time. Operating with a single crewmember in the cab is now the standard for commuter trains and for Amtrak trips.

Moreover, many short line railroads in the United States operate with one-person crews, and the experience of one such short line—INRD—confirms that such operations are perfectly safe. See Statement of Dewayne Swindell (December 2022) (attached as Ex. 5). INRD is a 250-mile regional railroad operating in Indiana and Illinois. Since 1997, it has been safely and effectively operating with one-person crews. In 2021, INRD utilized one-person crew operations on about 31 train starts per week. The implementation of one-person crew operations at INRD was the result of research, innovation, and the use of new technology. In addition to consulting with FRA, INRD studied the operations of New Zealand’s Tranz Rail, which implemented one-person crews in 1987. INRD observed Tranz Rail’s operating practices, reviewed its Alternative Train Crewing Handbook, interviewed employees, and discussed issues of alertness and fatigue with Tranz Rail officials. INRD also obtained information from a study performed by Tranz Rail that concluded that the health and safety of individuals and the public were not compromised by employing one-person crew operations. Finally, INRD considered suggestions and safety concerns of its own employees and management. See id. at ¶¶ 3-4.

INRD’s evidence and data—collected over more than two decades—establishes that one person crews are just as safe as two-person crews. INRD has had only one FRA-reportable human factor incident involving a one-person crew in 25 years of one-person operations. Of the non-FRA-reportable human factor incidents, while one-person crew operations were 18.3% of INRD man-hours from 2006 through July 2022, they only accounted for 5.9% of human factor incidents. In comparison, two-person crews were 81.7% of INRD man-hours, but accounted for
94.1% of human factor incidents. And the fact that since 2001 the Brotherhood of Locomotive Engineers and Trainmen has agreed to their members operating one-person trains on INRD demonstrates that the union believes these operations are safe. See Ex. 5 at ¶¶ 11-15.

If there were any objective or empirical evidence that operating with one-person crews endangered the safety of INRD employees or the public, INRD would not continue one-person operations regardless of the attendant efficiencies. But there is no such evidence.

B. PTC Eliminates Any Operational Need for A Second Crewmember in the Cab.

PTC – developed by the railroads and installed at the cost of over $10 billion has dramatically changed the operations inside the cab of a locomotive. A 2021 Oliver Wyman study answered two questions: “whether and to what extent PTC alters or eliminates the need for specific conductor roles and responsibilities in the locomotive cab, and . . . whether engineers can safely operate a through-freight train in PTC territory without an onboard conductor.” See Oliver Wyman, Assessment of Conductor and Engineer In-Cab Work Activities (May 14, 2021) at 3 (attached as Ex. 4). Its overall finding was that “for freight trains with PTC-equipped locomotives and operating in PTC territory, there is no continuing need for a second in-cab train crewmember.” Id. at 4.

The Oliver Wyman study reached several specific conclusions (Ex. 4 at 4-9) regarding the ongoing role of a conductor in the cab:

• “Locomotive design and control technology has evolved so that only the engineer has operational controls that impact the train. The engineer is fully and uniquely responsible for starting, stopping, and controlling the speed of the train, and for interacting with the PTC system. The conductor does not interact with the PTC system.”

• “In-cab work requirements for conductors have changed due to the implementation of PTC. Prior to PTC, routine conductor in-cab activities [included] . . . advising the engineer and record-keeping. Now, where PTC has been installed, it has by design removed the need for conductors to perform these tasks.”
• “Oliver Wyman analyzed a random sample of more than 100 hours of in-cab videos of freight duty tours in PTC territory that were provided by Class I railroads. On average across these tour videos, conductors engaged in a train operations-related task for less than five minutes per hour. Video observation confirmed that there are no routine conductor activities required for safe train operations.”

• “Oliver Wyman also conducted a human factors review . . . [that] confirmed that a solo engineer can fully manage train operating requirements in PTC territory within acceptable human factors parameters.”

• “The engineer’s workload has been further reduced by the implementation of locomotive energy management systems, which maximize fuel efficiency and improve train handling by calculating optimal speeds in all conditions [and moving the throttle as necessary].”

In sum, the Oliver Wyman study concluded, “there are no significant or empirically justified concerns about the engineer not having the information needed to safely operate the train, about the engineer’s safety or the safe operation of the train, or about the engineer becoming overloaded with simultaneous tasks for engineer-only operations in PTC-equipped trains.” Ex. 4 at 9.

A separate study prepared by ICF International forecasting future accident rates for one and two-person crews once PTC was fully implemented provides further support for these conclusions. See ICF International, Evaluation of Single Crew Risks (January 2015) (attached as Ex. 8). The ICF study, which used a fault-tree analysis, found virtually no difference in accident rates between one- and two-person operations. Id. at 1. In fact, “[t]rain accidents due to rollaways decrease by a factor of 10 with the removal of a second person from the cab due to fewer potential situations and additional care taken when the sole operator leaves the cab.” Id. at 5.

III. The Majority of Railroads Operating in Kansas Use Two-Person Crews.

KDOT estimates that at least 94% of existing rail traffic in Kansas is operated using two-person crews. EIS at 8. The ongoing use of multi-person crews by Class I railroads is not due to
any rule, regulation, or statute, but rather reflects the current status of labor negotiations on the question. *See id.* ("According to information and belief, Class I railroads operate with two-person crews pursuant to union agreement."). Notices for renewed national bargaining may be issued November 1, 2024 to become effective January 1, 2025, but even then, the multi-crewmember status quo for Class I railroads will only change when there is agreement amongst the parties.

IV. **KDOT’s Economic Impact Analysis is Deficient.**

KDOT’s Economic Impact Statement ("EIS") is further evidence that the reasoning underlying K.A.R. 36-43-1 is based on agency determinations unsupported by sufficient facts. The analysis set forth in the EIS is seriously flawed because it neglects the substantial costs the proposed regulation will impose. The cost of operating with an unnecessary second crewmember inside the cab is the largest regulatory cost associated with the proposed regulation because it would impact operational costs in perpetuity. In 2016, AAR projected a total of $264.7 million in such costs over the first ten years assuming a gradual implementation of single-person crews. *See Comments of the Association of American Railroads, FRA-2014-033, June 15, 2016, at 40.*

While successful negotiation of necessary labor agreements would determine the timing of but-for implementation of one-person crews, the costs of a regulatory freeze are significant and permanent.

KDOT also fails to consider whether its regulation will contribute to a modal shift from railroads to trucks—and the public consequences of such a shift. Requiring two-person crews will prevent decreases in the cost of shipping freight by rail and make freight rail less competitive compared to the trucking industry, which is not burdened by a similar mandate. (In fact, the Department of Transportation has been encouraging the development of autonomous vehicles). Making rail transportation more expensive means that more freight will be moved by truck. Indeed, a recent Department of Transportation-commissioned study concluded that
“freight rates were found to be the most influential explanatory variable” in the shift of traffic between road and rail. National Academies of Sciences, Engineering, and Medicine, *Impacts of Policy-Induced Freight Modal Shifts* at 4, 6 (2019) (“NAS Study”), https://doi.org/10.7226/25660.

The modal shift likely to result from the final regulation is also addressed in the attached study prepared by Mark Burton, formerly a Research Associate Professor at the University of Tennessee. See Mark Burton, *Rail- Truck Competition in an Era of Automation Technology* (attached as Ex. 6). Professor Burton explains that crew-size regulation is likely to divert freight traffic from rail to trucks by allowing the trucking industry to realize cost savings from future innovations in the field of automation (and pass those savings alone to the customer in the form of lower prices) while preventing railroads from doing the same. *Id.* at 10. His study concludes that this modal shift will impose costs in the form of: “A potential incremental increase in truck-involved crashes”; “[a]n incremental increase in freight-related fuel consumption” with a “[p]otential incremental increase in pollutant emissions,” and “[a] probable incremental increase in necessary highway expenditures (both federal and state).” *Id.* at 13.

As Professor Burton’s study confirms, the modal shift will have adverse societal impacts on public safety, the nation’s infrastructure, and the environment. In all three areas, there are well-recognized advantages to shipping freight by rail.

**Public Safety.** The safety impact will also be significant, as rail is the safest method of surface transportation. Between 2000 and 2021, the train accident rate was down 33%, and between 2000 and 2020, the hazmat accident rate was down 60%. Accordingly, shifting freight from the rails to the highways will have an adverse effect on public safety. Professor Burton estimates an increase in fatalities as a result. See Ex. 6 at 14. The Department of Transportation
has historically been very sensitive to the safety impacts caused by a modal shift. For example, the Federal Aviation Administration declined to require the use of child safety restraint systems on commercial airplanes because such a mandate would cause some parents to drive rather than buy an extra plane ticket. The agency concluded that because driving is statistically more likely to result in a fatality or injury than traveling by air, a “safety” regulation that would cause a modal shift would ultimately undermine rather than enhance safety. See Don Phillips, FAA Won’t Mandate Child Safety Seats, Wash. Post (Sept. 15, 1992).

Consistent with Professor Burton’s conclusions, the National Academies study further explained that “prudent planning requires an understanding of the basics of mode choices, what could change those choices, and what the impacts will be.” See NAS Study, Foreword. It recognized that the failure to assess those dynamics could produce “uninformed decisions that have decades-long impacts on transportation infrastructure and business supply chain procurement as well as the economic competitiveness of the country.” Id. Here, however, KDOT fails even to acknowledge, let alone attempt to grapple with, these substantial public costs—to the environment, infrastructure, and safety—arising from the modal shift.

KDOT’s EIS also contains internal inconsistencies as to the Kansan consumers and businesses who would bear true cost of the proposed regulation. KDOT initially claims without support that the proposed regulation “would not restrict Kansas business growth and activities.” EIS at 7. KDOT, however, also tacitly acknowledges that the additional costs imposed on railroads as direct result of the proposed regulation will be passed to the many Kansan businesses and consumers who rely on freight rail. EIS at 8 (“It is anticipated that some portion of any additional railroad operating costs, based on two-person crews, would be passed on to railroad customers.”). KDOT neglects to calculate the dollar amounts involved or adjust its cost.
calculations based on this information. Instead, despite admitting that a crew-size regulation will drive up shipping costs at a time when consumers already are grappling with record inflation and a supply chain under stress, KDOT merely assumes without evidence that the regulation will have a “positive impact on various governmental entities” from additional tax revenue. Id. (“[I]t would be expected that operating a two-person crew would have a positive impact on various governmental entities due to more disposable income, purchases and associated sales tax in local economies.”)

**Infrastructure.** The modal shift will place even greater stress on the nation’s infrastructure. More freight moving by truck means more trucks on congested highways and roads. The increased traffic will also mean more damage to the roads themselves. Railroads, by contrast, operate on their own rights of way and pay for their own infrastructure and improvements. While the railroads bear the maintenance costs of increased rail traffic, taxpayers bear the maintenance costs of increased truck traffic. Professor Burton concludes that “[a]s currently configured and administered, the Interstate Highway Trust Fund will be incapable of meeting the infrastructure demands that will result from unfettered motor carrier automation.” Ex. 6 at 17.

**Environment.** The modal shift will harm the environment, as rail is the most fuel-efficient and environmentally friendly way to move freight over land. On average, trains are three to four times more efficient than trucks. The National Academies study explains that “rail, with around 27 percent of the mode share in ton-miles, contributes just 2 percent of the emissions,” underscoring “how large a role mode shift can play in contributing to, or reducing, GHG emissions of the transportation sector.” NAS Study at 27. Other agencies have reached similar conclusions. Even though freight railroads account for roughly 40% of U.S. long-distance
freight volume—more than any other mode of transportation—they account for just 0.5% of total U.S. greenhouse gas emissions, according to EPA data. A modal shift from rail to truck will have a serious adverse impact on the environment. Professor Burton projects that “[w]hen monetized, based on USDOT guidance, the potential rail-to-truck diversions would inflict nearly $15 billion in, otherwise avoidable, air quality damages over a 20-year planning horizon.” Ex. 6 at 17.


The proposed regulation should also be withdrawn because it is preempted by both the Interstate Commerce Commission Termination Act of 1995 ("ICCTA") and the Federal Railroad Safety Act ("FRSA"). ICCTA provides that “[t]he jurisdiction of the [STB] over ... transportation by rail carriers, and the remedies provided in this part with respect to rates, classifications, rules (including car service, interchange, and other operating rules), practices, routes, services, and facilities of such carriers ... is exclusive.” 49 U.S.C. § 10501(b) (emphasis added). Because ICCTA’s remedies are “exclusive,” they “preempt the remedies provided under Federal or State law.” Id. This includes “all state laws that may reasonably be said to have the effect of managing or governing rail transportation, while permitting the continued application of laws having a more remote or incidental effect on rail transportation.” Delaware v. STB, 859 F.3d 16, 18 (D.C. Cir. 2017) (emphasis added).

Under the FRSA, “[l]aws, regulations, and orders related to railroad safety” must be “nationally uniform to the extent practicable.” 49 U.S.C. § 20106(a)(1). When FRA regulates in an area related to railroad safety, states may not also regulate in that area. 49 U.S.C. 20106(a)(2). Likewise, when “FRA examines a safety concern regarding an activity and affirmatively decides that no regulation is needed, this has the effect of being an order that the activity is permitted.” Burlington N. & Santa Fe Ry. Co. v. Doyle, 186 F.3d 790, 801 (7th Cir. 1999) (emphasis added).
In that circumstance, “States are not permitted to use their police power to enact such a regulation.” *Marshall v. Burlington N., Inc.*, 720 F.2d 1149, 1154 (9th Cir. 1983) (emphasis added). Stated plainly, a federal determination not to regulate can “take[ ] on the character of a ruling that no such regulation is appropriate or approved pursuant to the policy of the statute,” and thus any state law enacting such a regulation is preempted. *Ray v. Atl. Richfield Co.*, 435 U.S. 151, 178 (1978).

The proposed regulation also necessarily conflicts with the FRA’s ongoing concerns regarding the development of an incongruous patchwork of state crew size regulation. FRA has already expressed its intention to regulate crew size, and in particular, has cited the importance of preemption and a single national rule as one justification for federal regulation. See 87 Fed. Reg. 45564 at 45570-71 (“Of particular concern to FRA is the patchwork of State laws regulating crew size in some manner and the impact of those various State requirements on safe rail operations... FRA expects a final rule will have preemptive effect on those State laws that are Statewide in character and do not address narrow, local safety hazards.”). Whether the decision by FRA (currently expected in February 2024) is a legally viable rule regulating crew size, or a decision that no regulation is warranted or appropriate, state regulation will be preempted.

Regulation by Kansas of an issue the federal regulator has specifically stated should and will be addressed nationally serves no purpose.

**CONCLUSION**

For all the reasons discussed above, KDOT should withdraw proposed regulation K.A.R. 36-43-1.

Kathryn D. Kirmayer  
Stephen N. Gordon  
Charlie Kazemzadeh  
Association of American Railroads
July 5, 2023
July 13, 2023

Gelene Savage  
Chief Counsel  
Kansas Department of Transportation  
700 SW Harrison Street, 3rd Floor West  
Topeka, Kansas 66603

Sent via email to: emily.brown@ks.gov

Re: K.A.R. 36-43-1, “Crew requirements; exceptions.”

Dear Ms. Savage,

The American Short Line and Regional Railroad Association (“ASLRRA”), on behalf of itself and its member railroads, submits the following comments in response to the Kansas Department of Transportation’s (“KDOT”) Notice of Public Hearing on Proposed Administrative Regulation, K.A.R. 36-43-1, entitled “Crew requirements; exceptions,” by which the State of Kansas seeks to regulate the size of locomotive crews operating within the State. ASLRRA supports and incorporates by reference comments from Watco, the Association of American Railroads, BNSF Railway Company, and Union Pacific Railroad.

ASLRRA is a non-profit trade association representing the interests of the nation’s approximately 600 Class II and Class III (short line) railroads. Short lines operate about 50,000 miles of track, or approximately 30% of the national freight network, employ approximately 18,000 people, and play a vital role in the railroad industry’s strong safety record. These small businesses succeed in a competitive environment because of their flexibility, cost control, and customer-driven service.

Railroads are the most fuel-efficient way to move freight over land. It would have taken approximately 1.6 million additional trucks to handle the 28.6 million tons of freight that originated by rail in Kansas in 2021.¹ Ten short line railroads currently operate in Kansas, including at least three that provide service with a single-person crew. In fact, short lines operated about 43% of the freight miles in Kansas in 2021.² These small, entrepreneurial businesses operate in a highly regulated capital-intensive environment that requires efficient operating practices in order to provide the best rail service to meet customer and community needs and power Kansas’s industrial and agricultural economy. Unfortunately, K.A.R. 36-43-1 rule would add costs with no safety benefit, jeopardizing short line rail service viability.

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² Id.
Inexplicably, the proposed regulation purports to mandate a two-person crew operating model knowing that only these small business railroads would be immediately impacted. The proposed regulation is preempted by federal law, unsupported by any safety data, will harm small businesses, and will force freight traffic to truck. ASLRA urges KDOT to withdraw K.A.R. 36-43-1, or, in the alternative, to exempt short line railroads from its provisions.

I. The Proposed Regulation is Preempted by Federal Law

The proposed regulation is preempted by the ICC Termination Act (“ICCTA”), which provides that “[t]he jurisdiction of the [Surface Transportation] Board over ... transportation by rail carriers, and the remedies provided in this part with respect to rates, classifications, rules (including car service, interchange, and other operating rules), practices, routes, services, and facilities of such carriers ... is exclusive.” 49 U.S.C. § 10501(b) (emphasis added). Because ICCTA’s remedies are “exclusive,” they “preempt the remedies provided under Federal or State law.” Id. “Congress’s intent in [ICCTA] to preempt state and local regulation of railroad transportation has been recognized as broad and sweeping.” Union Pac. R.R. Co. v. Chi. Transit Auth., 647 F.3d 675, 678 & n.1 (7th Cir. 2011) (collecting cases). ICCTA “preempts all state laws that may reasonably be said to have the effect of managing or governing rail transportation, while permitting the continued application of laws having a more remote or incidental effect on rail transportation.” Delaware v. STB, 859 F.3d 16, 18 (D.C. Cir. 2017) (emphasis added; quotation marks omitted). “[S]tate or local statutes or regulations are preempted categorically if they have the effect of managing or governing rail transportation.” Id. at 19 (emphasis added; quotation marks omitted). And even state laws “that are not categorically preempted may still be impermissible if, as applied, they would have the effect of unreasonably burdening or interfering with rail transportation.” Id. The proposed regulation clearly conflicts with and is preempted by ICCTA because it will manage and govern rail transportation.

The proposed regulation is also preempted by the Federal Railroad Safety Act of 1970 (“FRSA”). The Federal Railroad Administration (“FRA”) has the authority to regulate train crew staffing pursuant to its broad authority to, “as necessary, . . . prescribe regulations and issue orders for every area of railroad safety.” 49 U.S.C. § 20103; 49 C.F.R. § 1.89. The FRSA mandates that laws, regulations, and orders “related to railroad safety” be nationally uniform and allows states to enforce such rules only until the FRA has covered the subject matter. 4 As Union Pacific Railroad’s comment explains, FRA has taken multiple actions over the past two decades reflecting the agency’s determination that state crew-size rules lack a safety justification and burden interstate commerce. While the FRSA also includes a narrow savings clause for “essentially local safety hazards,” laws and regulations that apply statewide do not address “local” concerns as a matter of law. E.g., Duluth, Winnipeg, & Pacific Railway Co. v. City of Orr, 529 F.3d 794, 798 (8th Cir. 2008). In any event, this exception also does not apply to state laws that burden interstate commerce, and FRA has determined that state crew-size rules do impose such a burden. Instead, the proposed regulation is an attempt by KDOT to dictate to railroads how their locomotives should be staffed and operated.

II. The Proposed Regulation Provides No Safety Data to Justify a Two-Person Crew Mandate

The Economic Impact Statement (“EIS”) suggests that requiring a minimum of a two-person crew is a public health and safety concern for Kansas. It states that derailments, explosions, hazardous material spills, injuries and fatalities have occurred because of trains with a minimal crew. However, the EIS fails to reference a single derailment, explosion, hazardous material spill, injury or fatality that

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occurred because of a single-person crew operation. Instead, the EIS references anecdotal material from labor unions speculating on operations with less than a two-person crew.

Before passing a law that will fundamentally change the operations of small business railroads, ASLRRA encourages KDOT to examine the safety data of railroads operating in the state. ASLRRA is unaware of any accident or incident occurring due to a single-person crew operation in Kansas. At least three short line railroads maintain current single-person crew operations in Kansas, providing KDOT with real data to compare with the record of railroads operating with two-person crews in the state. The EIS does not show that any sort of comparison was conducted, despite having this readily available data set. Likewise, the EIS does not examine the safety of other known single-person crew operations, such as domestic passenger and foreign freight services.

III. The Proposed Regulation Will Disproportionately Impact Small Business Railroads in Kansas

The EIS correctly states that most railroads in Kansas operate today with a two-person crew. However, it is incorrect that some portion of additional railroad operational costs would be passed on to railroad customers. Many short line railroads cannot pass this additional train staffing cost to their customers because of either line haulage agreements with a Class I partner or the realities of a competitive economic marketplace. Instead, without any data showing a safety concern with current single-person crew operations in the state, the Proposed regulation inexplicably mandates that several small business railroads incur the entire cost of compliance with the new mandate.

For example, the Cimarron Valley Railroad (“CVR”) safely operates unit grain trains with a single-person crew. In this operation, a trainmaster or conductor typically drives a locomotive engineer to Dodge City to pick up the train, and a single-person crew will operate the train. As the train moves to its destination, the conductor will drive ahead to the customer’s facility in a utility vehicle to remove derails, line switches, and perform any other necessary work prior to the train’s arrival. Under the Proposed regulation, this short line railroad would have to hire and train two new employees. Like many short lines, this railroad is considered a handling line and paid on a per-car basis from its Class I partner. CVR estimates that the addition of employees would cost $400,000 annually and the railroad would have no ability to adjust their rates to compensate. Further, as these unit grain trains are largely seasonally driven, the additional work force would not be needed for lengthy periods of the year, making it difficult to recruit, train and retain employees.

Additionally, the South Kansas and Oklahoma Railroad (“SKOL”) and the Kansas and Oklahoma Railroad (“KO”) maintain current safe operations in Kansas with a single-person crew. Both of these railroads provide valuable service to their customers and the public in the state, transporting commodities such as grain, grain products, cement, coal, chemicals, steel, and plastics. Each of these railroads operates at speeds less than 25 mph, reducing the risk profile for any sort of accident or incident. SKOL and KO each estimate that they would have to hire twenty additional employees on each railroad to comply with the proposed regulation. The total cost of compliance with the Proposed regulation for each railroad would be approximately $2.2 million per railroad, an astronomical cost for a small business.

The annual cost of compliance with the proposed regulation for the CVR, SKOL and KO totals $4.8 million. This is dramatically higher than the approximately $1.5 million annual impact stated in the EIS. Further, it is especially disappointing that the entire cost to comply with the proposed regulation would be solely felt by small businesses.

IV. The Proposed Regulation Will Force Freight to Truck
Finally, the increase in costs to short line railroads in Kansas, due to the need to add additional crew members, will inevitably result in a modal shift of freight traffic from rail to its competing mode of truck transportation. The freight that had previously moved by rail will move to trucks and onto the highways, leading to an increase in accidents, injuries, and fatalities, not to mention an increase in pollution, CO\textsuperscript{2} emissions, and cost to the public to maintain the road network.\footnote{See, e.g., AAR, Oppose Longer & Heavier Trucks on Our Nation’s Roads. October 2022. Available at: https://www.aar.org/wp-content/uploads/2020/08/AAR-Truck-Size-Weight-Fact-Sheet.pdf.}

The most recent data from the U.S. Department of Transportation with a direct comparison of fatalities per billion ton-miles is incorporated in the Federal Railroad Administration’s 2010 National Rail Plan Progress Report to Congress and as shown below – it is illustrative of the vast difference in safety between shipping by rail vs. truck.\footnote{Federal Railroad Administration (2010). National Rail Plan, Moving Forward: A Progress Report. Available at: https://railroads.dot.gov/sites/fra.dot.gov/files/fra_net/1336/NRP_Sept2010_WEB.pdf} This difference has only grown over the past twelve years as rail safety has consistently improved and truck safety has declined.

![Figure 1: Fatalities (per billion ton-miles) in 2008](https://example.com/figure1)

A study of FRA safety data shows that train accidents per million train-miles have dropped 33 percent since 2000 and five percent since 2020.\footnote{Sources: http://safetydata.fra.dot.gov/officeofsafety/publicsite/summary.aspx. Note: Excludes grade crossing accidents. Data for 2021 is preliminary, as of March 2022.} On the other hand, the total estimated fatalities in crashes involving at least one large truck increased by 13 percent from 2020 to 2021. This estimate is based on the involvement of large trucks, both in commercial and non-commercial use at the time of the crash. Nationwide, in 2008 there were 4,245 truck-involved fatalities, and in 2021, there were 5,601 fatalities, an increase of nearly 32 percent.\footnote{Sources: Freight rail-related fatalities from FRA website https://safetydata.fra.dot.gov/OfficeofSafety/publicsite/Query/TenYearFreightPassengerOperationsOverview.aspx 2018. Large truck-related fatalities from NHTSA Traffic Safety Facts, https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813021. Both rail and large truck ton-miles in 2018 from Table 1-50 USDOT BTS National Transportation Statistics at https://www.bts.gov/topics/national-transportation-statistics (Truck ton-miles unavailable for 2019-2020.) Large trucks are trucks with a gross vehicle weight rating (GVWR) greater than 10,000 pounds.} On the other hand, freight trains incur 14 percent of the fatalities that large trucks do per trillion ton-miles.\footnote{Sources: Freight rail-related injuries from FRA website, at https://safetydata.fra.dot.gov/OfficeofSafety/publicsite/Query/TenYearFreightPassengerOperationsOverview.aspx} Additionally, freight trains incur about 3 percent of the injuries that large trucks do per trillion ton-miles.\footnote{Sources: Freight rail-related injuries from FRA website, at https://safetydata.fra.dot.gov/OfficeofSafety/publicsite/Query/TenYearFreightPassengerOperationsOverview.aspx} The freight railroad rate of hazmat incidents per
billion ton-miles is about 7 percent that of trucks, and railroads incurred zero fatalities from 2012 through 2020 when transporting hazmat while trucks incurred 81.\textsuperscript{11}

Rail is an efficient and environmentally sustainable mode of freight transportation. U.S. freight railroads, on average, are three-to-four times more fuel efficient than trucks and can move one ton of freight nearly 500 miles on one gallon of fuel.\textsuperscript{12} Moving freight by train instead of truck reduces greenhouse gas emissions for such transportation by up to 75%.\textsuperscript{13} Railroads account for around 40% of long-distance freight volume, but only 1.9% of U.S. transport-related greenhouse gas emissions.\textsuperscript{14}

Short line railroads play an integral role in the freight role network, contributing to its safety and environmental benefits. Given the high cost to add additional crew members to trains in Kansas, short line railroads might be forced to cease operations, forcing freight transportation to truck, thus reducing safety and increasing pollution.

V. Conclusion

ASLRRA and its short line member railroads have always supported and been involved in the development of safe practices and procedures that shape and lead the industry, and we can assure you that we intend to continue that practice as we strive for zero accidents. However, in this situation, we do not believe that the law or safety data supports the need for legislation mandating a two-person crew in Kansas. ASLRRA urges KDOT to withdraw the proposed regulation as it is preempted by federal law, lacks safety justification, inexplicably targets small businesses, and will force freight traffic to truck, to the detriment of safety and the environment. If KDOT will not withdraw the proposed regulation, at the very least, it should exclude short line railroads from its provisions.

Sincerely,

Sarah Yurasko
SVP Law, and General Counsel


\textsuperscript{13} Id.

\textsuperscript{14} Id. According to the U.S. Environmental Protection Agency.
**Testimony of Douglas R. Dalgleish**  
Counsel for BNSF Railway Company  
State of Kansas Department of Transportation  
July 17, 2023, Public Comments Regarding Proposed K.A.R. 36-43-1: Train Crew Requirements

**Introduction**

My name is Douglas R. Dalgleish. I am a partner in the Stinson LLP law firm and work as outside counsel for BNSF Railway Company (“BNSF”). BNSF offers the following statement in response to the Kansas Department of Transportation’s (“KDOT”) Notice of Public Hearing on Proposed Administrative Regulation, K.A.R. 36-43-1, entitled “Crew requirements; exceptions” (the “Rule”), by which the State of Kansas seeks to regulate the size of locomotive crews operating within the State. BNSF opposes the Rule for multiple reasons, and incorporates the Comments of the Association of American Railroads.

I want to provide some information which BNSF believes is important as context to understand the issues involved.

**Background on BNSF**

BNSF is one of the largest railroads in the world and is proud of its extensive history, connections and operations within the State of Kansas. BNSF operates on more than 32,500 miles of track throughout America, and annually moves more than 10 million freight shipments throughout our country. BNSF has more than a thousand miles of tracks in Kansas and employs approximately 3,200 people here.

BNSF is particularly proud of its state of the art Logistics Park which it chose to locate in Edgerton, Kansas. That facility serves as a major intermodal hub for rail shipments throughout the United States. BNSF’s Logistics Park was developed with more than $1 billion in private
investment, employs more than 4,700 people in the area, and provides billions of dollars of labor income annually.

**BNSF's Approach to Safety**

Nothing is more important to BNSF than safety, and our record demonstrates that commitment. At BNSF, we believe that every accident and injury is preventable. Operating without accident or injury is a core part of BNSF's vision and values, and our focus is on preventing accidents from happening in the first place. We do that by nurturing a culture of compliance and commitment within BNSF, and closely partnering with our customers and the communities in which we operate.

Our safety culture is continuously reinforced and improved through multi-faceted employee safety training and compliance programs, as well as significant capital investments that enable us to both maintain our network in world-class condition and pursue technology advancements that will increase the safety of our operations going forward.

This commitment to our safety culture has resulted in BNSF leading the industry in reducing the occurrence of rail equipment incidents over the past decade. Since 2000, train accident rates are down 33%; the employee injury rate is down 61%; grade crossing accidents are down 39%; and hazardous material accident rates have declined 64%. Today 99.99% of all hazardous materials shipments on BNSF reach their destination without a derailment-caused release.

BNSF's safety performance has been part of significant improvement by the entire rail industry as well. Since 2000, the rail industry has achieved a 31% reduction in its train accident rate, and a 64% reduction in its hazmat accident rate. The most recent data released by the Federal Railroad Administration shows that railroads remain a very safe means of transporting large

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1BNSF’s employee injury rate is trending even better in 2023 and currently sits at a new historic low through the first half of the year (.67 injury frequency ratio YTD through July 2).
volumes of freight around the country, with Class I railroads’ mainline accident rates and railroad employee injury rates reaching all-time lows in 2022.

There is no evidence that requiring two train crewmen will enhance safety. The notion that an additional cab crew member is necessary to function as a first responder ignores BNSF’s extensive investment and commitment in training qualified first responders, and deploying equipment throughout the system to deal with incidents. BNSF has trained more than 128,000 first responders throughout the country since 1996, including more than 4,000 in 2022 alone. BNSF has also pre-positioned equipment throughout its system to deal with incidents. BNSF’s people, processes and technologies have contributed to a nearly 50% reduction in mainline derailments on BNSF over the last decade, with our railroad experiencing the fewest number of derailments in the industry for seven of the last eight years.

Vague anecdotes of train incidents, such as the Lac-Megantic derailment in Canada and the Casselton derailment in North Dakota, have been offered to justify mandating crew sizes. But there are no facts establishing that if the crew size in those incidents were different, the accidents would not have occurred. In fact, the exhaustive investigations of those incidents are to the contrary. Most train accidents occur with two person crews; that does not mean two person crews are unsafe. The Norfolk Southern Railway derailment in East Palestine involved a three-person crew.

Rail is the safest mode of land transportation in the United States. Accident and injury rates remain at historic lows. That record will continue to improve via BNSF’s commitment to safety, adoption of developing safety technology, and partnership with our labor unions.

**Railroads Have Unique Operational Issues Which Mandate Uniformity**
Railroads are very complex operations and pose unique regulatory and legal issues. For example, unlike trucks and aircraft, which compete against rail for freight, railroads must purchase and maintain the tracks over which they operate, at great expense. Since 2014, BNSF has invested approximately $40 billion in its network, and will invest $3.96 billion in that network in 2023 alone. Over the last five years, BNSF has invested approximately $970 million in our infrastructure in Kansas, including $248 million in 2022 alone.

Freight railroads compete aggressively against each other but also must cooperate to deliver customers’ cargo. That is because no single railroad can cover America geographically; consequently, railroads must operate in multiple states, over tracks owned by others, share crews, engines and otherwise provide seamless service. Railroads operate around the clock, in all types of weather. All of this requires national uniformity.

In order to facilitate rail transportation throughout the country, Congress decided long ago to implement a variety of federal laws and regulations to ensure uniformity, recognizing that if railroads faced different laws in every state and locality they could not operate efficiently. These federal laws and regulations, which preempt state and local regulation, are intended to create one level playing field which balances the needs of the public, labor, and the railroads, and ensures healthy competition.

Railroad operational issues are best left to federal regulatory bodies which have extensive experience in the field and can balance all of the competing interests involved. As best BNSF can discern, this Rule is the first time Kansas has attempted to jump into the complex arena of railroad crew operations. Although the Rule may be well-intentioned, BNSF believes it is unfounded and is a supposed fix for a problem which does not exist. In fact, the Rule will be deleterious to railroad operations and safety.
The History of Train Crew Size

Up until the 1960s freight railroads typically had five crew members, including one who rode in the caboose. With the advent of diesel-electric locomotives, the crew Fireman, who in times past shoveled coal into the boiler, was eliminated. Similarly, with the development of electronic End of Train Devices, the caboose, with a person inside, was eliminated. Both of these crew size reductions were accomplished safely, increased rail efficiency, and were bargained for between the railroads and their labor unions.

Class 1 railroads generally utilize two-person crews (a certified Engineer and Conductor) in the locomotive cab for most over the road mainline operations. Right now BNSF utilizes two person crews for over the road operations pursuant to negotiated union labor agreements. But there is no factual or empirical evidence that two crewmen are inherently better or safer than one. In fact, the facts suggest otherwise.

For decades, single person crews have been utilized safely by railroads in the United States, and Europe, for both freight and passengers. Amtrak, which carries millions of passengers per year throughout the United States, has long utilized one train crew member. Commuter railroads are the same. There is no evidence that crew practice is unsafe. Indeed, the National Transportation Safety Board has examined the issue and concluded that “[t]here is insufficient data to demonstrate that accidents are avoided by having a second qualified person in the cab. In fact, the NTSB has investigated numerous accidents in which both qualified individuals in a two-person crew made mistakes and failed to avoid an accident.”

Similarly, many short line railroads operating in Kansas and throughout the country safely utilize a single crewman for their over the road operations. The major railroads in Europe,

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2 National Transportation Safety Board, Accident Report, NTSB, RAR-16/02, Derailment of Amtrak Passenger Train 188, at 18-19 (May 17, 2016).
which operate in congested and complex environments, have utilized one crewman for decades. Research has established that these railroads’ safety records are comparable to two-person crews.3

There is no evidence that this historical reduction of train crew size via technology has been unsafe. In fact, railroads have simultaneously improved their safety. Over the last 15 years, the Federal Railway Administration and other safety regulators have evaluated the crew size issue extensively and have never found any data showing two person crews are safer than one person crews.

The Impact of Positive Train Control

Technology is continuing to advance. For example, as a result of federal mandates, the major railroads have spent billions of dollars installing Positive Train Control (“PTC”) technology on thousands of miles of tracks in the United States. PTC is a computerized system which monitors train location, speed and direction, and if necessary, can stop a train automatically if the engineer fails to take necessary action. PTC makes it unnecessary for the Conductor to perform many onboard functions. PTC technology can thus stop and prevent train accidents and collisions without input from the crew.

As this technology has evolved, cab-based Conductors leave the cab for unplanned activities outside the locomotive only infrequently. Instead of being required to staff all locomotives with a cab-based Conductor, it would be more efficient, and work-life desirable, for railroads to utilize ground-based Conductors. Those ground-based Conductors can be strategically located along the network to respond to unplanned events, and utilize mechanized equipment to get to and respond to those events. Ground-based Conductors would also enjoy

being home at the end of their shifts instead of being gone overnight frequently. The latter convenience may be very attractive to the applicable labor unions and will enhance railroad safety and efficiency.

The Rule would stymie and frustrate rail technology improvements which history has demonstrated increase safety and efficiency.

The Rule will Competitively Harm Railroads in General, and Harm Employment in Kansas in Particular

Rail is the most cost and fuel efficient mode of freight transport. The Rule’s proposed creation of a separate crew size rule in Kansas will increase rail costs and thus have substantial negative economic consequences upon BNSF and Kansans. Increasing railroads’ crew costs will inherently make railroads less competitive and shift freight traffic to alternate transportation modes, such as trucking.

Kansas has not proposed to regulate crew sizes for trucks and aircraft, BNSF’s transportation competitors, although the Rule’s apparent premise that “2 crewmen are better than 1” would apply equally well to trucking and aircraft. By making rail transportation absolutely and relatively more expensive, freight will inevitably shift to other modes, such as trucking or air. This shift will adversely affect Kansans.

Trucking uses more fuel and creates highway congestion which will impact all Kansans. Kansans will pay to repair the roadways which trucks utilize (for free). Moving freight by truck, instead of rail, will also significantly increase greenhouse gas emissions.4 Rail is by far the safest method of surface transportation. Trucks are involved in hundreds of accidents annually...

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4 If 25% of highway freight moving more than 750 miles went by rail instead, annual greenhouse gas emissions would fall by approximately 13.1 million tons, the equivalent of taking 2.6 million cars off the roads for a year. AAR, Oppose Efforts to Mandate Train Crew Size, January 2023.
in Kansas but operate across the roadways of our state with single drivers, drivers who are not federally certified like train crewmen.

The Rule’s distortion of the competitive freight market will also inevitably harm the utilization of the Logistics Park in Edgerton, Kansas. The loss of job of jobs there could be substantial. The Rule and its Economic Impact Statement ignore these issues.

Train Crew Size is Best Negotiated with the Applicable Labor Unions

Railroad workers are members of multiple labor unions which have negotiated the terms of their contracts, in great detail, with the various railroads for decades. Consequently, work and operational issues are a matter of balanced negotiation by parties who know the industry best. “Historically, crew size has been an issue for labor relations.”5 Rail industry safety and efficiency have steadily improved via these negotiations.

Determination of the appropriate crew size is best left to specialists within the railroads and their unions who are most familiar with real world conditions. There is no need for Kansas to jump into this complex area of railroad operations and labor negotiations.

BNSF is negotiating with its employees’ union leadership, pursuant to the Railway Labor Act, regarding the implementation of single-person crew operations on its network. BNSF has set monthly meetings this year to further those discussions. BNSF believes single-person crew operations, which could include ground-based Conductors, hold the promise to increase safety for our union workers, increase competitiveness, and provide more predictable work schedules for our employees and their families.

Creating a crew size law in Kansas, which may vary from and conflict with uniform federal law, would harm and distort the bargaining process between BNSF and its unions which

has functioned well for decades. Any benefits unions might be able to negotiate for reduced crew size, including improved working conditions, would be frustrated. Mandatory crew size laws could also be deleterious to overall safety as technological innovations evolve.

Federal Regulation of the Rail Industry: Preemption of the Proposed Rule

BNSF believes the proposed Rule would be preempted by federal law and accomplish nothing other than create litigation. Federal law is designed to establish a uniform set of rules for railroads to operate to prevent railroads from having to deal with a patchwork of different laws across the country. This has very practical, common sense justifications. That uniformity would be ruined by the proposed Kansas Rule.

As an example, imagine a train travelling from Missouri to Colorado through Kansas. If the states were permitted to regulate crew size, Missouri could have a law requiring three crewmen, Kansas two, and Colorado might mandate only one. This would create operational chaos for railroads. Every train would be required to modify its crew at each state’s border, which would be inefficient, unsafe, and contrary to union contracts. The uniformity of rail operations would be destroyed.

That is why BNSF believes federal law preempts, and precludes, the proposed Rule (applicable statutory law is attached with annotations). There has been a federal agency dedicated to regulating the railroad industry since 1887, when Congress created the Interstate Commerce Commission. Today there are two federal agencies primarily devoted to regulating the freight rail industry. The first is the Surface Transportation Board ("STB") which Congress created in 1995 as a successor to the Interstate Commerce Commission. The second is the Federal Railroad Administration ("FRA"), which was created in 1966 as part of the U.S. Department of Transportation. And depending upon what type of activity BNSF is engaged in on any given day,
there may be another dozen federal agencies separate and apart from the STB and FRA that are actively regulating some part of our operations.

The STB derives much of its statutory authority to regulate the rail industry from the Interstate Commerce Commission Termination Act, which is commonly referred to as “ICCTA” (49 USC § 10101, et seq.). While the preemptive power of the ICC's federal regulation of the rail industry had already long been recognized by the courts, ICCTA explicitly stated that the STB's jurisdiction over transportation by rail carriers and the operation of their networks is exclusive. 49 USC § 10501(b). Congress defined the broad scope of the STB's exclusive authority to include, among other things, the movement and storage of locomotives, railcars, and equipment, and the operation of a railroad's side tracks or facilities. 49 USC § 10102(9).

While Congress granted the STB that broad authority, Congress also reserved for the U.S. Department of Transportation the power to regulate "every area of railroad safety" via the Federal Railroad Safety Act (or "FRSA") 49 USC § 20103(a). In the FRSA, Congress mandated that the regulation of railroad safety "shall be nationally uniform to the extent practicable", 49 USC § 20106(a), and explicitly preempted any state laws attempting to address any issue that is already covered by FRA regulation. Id. The only exception from FRSA preemption is for state laws that are necessary to address an essentially local safety hazard, and which do not unreasonably burden interstate commerce.

Congress purposefully created this federal regulatory scheme in recognition of the critical role that the national rail network plays in our economy, and with the intent to implement uniform rail operating and safety standards across the country. Congress wanted to avoid a patchwork of regulations adopted by individual states with potentially parochial interests. The courts have interpreted both ICCTA and the FRSA in a broad manner consistent with that intent. The explicit
purpose for this strong policy of federal preemption is to provide national uniformity for rail transportation which constitutes interstate commerce. Treating crew size as a subject for Kansas “safety” regulation would override the careful balance which has been struck over the decades with railroad-union negotiation, and wreck the national uniformity of operational regulation which permits railroads to operate efficiently.

The ”Local Safety” Exception does not Apply to Attempts to Regulate Railroad Crew Sizes

A very narrow and limited exception is provided wherein States may pass laws “necessary to eliminate or reduce an essentially local safety or security hazard.”6 But any law under that narrow exception may have only a “remote or incidental effect on rail transportation,” and cannot “unreasonably burden interstate commerce.”7 Moreover, any such state law cannot “target the operation of rail carriers;” the exception is intended to apply to, e.g., “electrical, plumbing and fire codes, direct economic regulations and other generally applicable, non-discriminatory regulations and permit requirement.”8

KDOT’s Rule is allegedly premised upon this narrow statutory “local public safety” exception. But KDOT’s interpretation would allow the narrow exception to swallow the longstanding rule of federal preemption over rail operations. Under KDOT’s interpretation, Kansas could regulate all railroad operations so long as KDOT cited a “safety” rationale. That is not the law.

The size of railroad train crews is quintessentially a matter of rail operations and safety, issues which are expressly preempted by both the ICCTA and FRSA. The Rule does not mandate two person crews for all forms of transportation in Kansas; it expressly targets rail

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transportation. There are no unique “local” Kansas issues being addressed by the Rule. Instead, the Rule is an attempt by KDOT to dictate to railroads how their locomotives engaged in interstate commerce, passing through Kansas, should be staffed and operated. Consequently, the Rule is obviously preempted by federal law and will serve no purpose other than creating litigation over issues which Congress has settled long ago.

When asked to identify what was considered when examining whether the Rule was preempted, the Kansas Attorney General identified two cases: *Transportation Div. of the International Association of Sheet Metal, Air, Rail and Transportation Workers v. Federal Railroad Administration*, 988 F.3d 1170 (9th Cir. 2021) (“Transportation Division”), and *Stonebarger v. Union Pac. R. Co.*, 76 F.Supp.3d 1228 (D. Kan. 2015). But neither case negates preemption.

*Transportation Division* held, on administrative procedural grounds, that the Federal Railway Administration failed to properly justify a nationwide maximum one-person crew rule for trains. Notably, the crew size regulation at issue was promulgated by the FRA itself, which has jurisdiction over the issue, not a State or labor union. The Court made no ruling, nor could it, that States such as Kansas have authority to regulate railroad crew sizes. Moreover, the Court made no finding that two-person crews would improve safety.

*Stonebarger* is equally inapt because it held, in a wrongful death case, that claims asserting inadequate railroad warning devices, excessive speed, etc., were preempted by federal law. Only fact questions involving state law claims survived dismissal. Neither case subverts

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9 June 20, 2023 Email from Robert Hutchison, Deputy Attorney General- Civil Division, Office of the Kansas Attorney General, to Barb Wasinger.
10 76 F.Supp.3d at 1251.
the strong preemption policy Congress has articulated to ensure national railroad operational and safety uniformity.

Conclusion

The Rule’s attempt to mandate the size of railroad crews operating within interstate commerce, travelling through Kansas, neither advances safety nor benefits Kansans. There is no evidence that two crew members would be safer or better than one. History has demonstrated that crew size reductions accomplished via advancing technology, and negotiations between railroads and their unions, have made rail the safest and most efficient mode of transportation. The Rule will increase rail costs and result in multiple detriments to Kansans. The Rule may be well intentioned but is indisputably an effort by the State to regulate in areas that Congress has reserved for the STB and the FRA, and thus would be unenforceable. Congress’ creation of a federal regulatory regime for the rail industry appropriately recognizes the critical role that the industry plays in our national economy. It also allows the expert federal agencies to craft uniform national rules that best ensure the safe and efficient operation of trains throughout the country, including here in Kansas. The status quo regarding crew size is not broken so it does not need a regulatory fix. BNSF respectfully requests that the Rule be withdrawn.
49 U.S.C.A. § 10102

§ 10102. Definitions

In this part--

(1) “Board” means the Surface Transportation Board;

(2) “car service” includes (A) the use, control, supply, movement, distribution, exchange, interchange, and return of locomotives, cars, other vehicles, and special types of equipment used in the transportation of property by a rail carrier, and (B) the supply of trains by a rail carrier;

(3) “control”, when referring to a relationship between persons, includes actual control, legal control, and the power to exercise control, through or by (A) common directors, officers, stockholders, a voting trust, or a holding or investment company, or (B) any other means;

(4) “person”, in addition to its meaning under section 1 of title 1, includes a trustee, receiver, assignee, or personal representative of a person;

(5) “rail carrier” means a person providing common carrier railroad transportation for compensation, but does not include street, suburban, or interurban electric railways not operated as part of the general system of rail transportation;

(6) “railroad” includes--

(A) a bridge, car float, lighter, ferry, and intermodal equipment used by or in connection with a railroad;

(B) the road used by a rail carrier and owned by it or operated under an agreement; and
(C) a switch, spur, track, terminal, terminal facility, and a freight depot, yard, and ground, used or necessary for transportation;

(7) “rate” means a rate or charge for transportation;

(8) “State” means a State of the United States and the District of Columbia;

(9) “transportation” includes--

(A) a locomotive, car, vehicle, vessel, warehouse, wharf, pier, dock, yard, property, facility, instrumentality, or equipment of any kind related to the movement of passengers or property, or both, by rail, regardless of ownership or an agreement concerning use; and

(B) services related to that movement, including receipt, delivery, elevation, transfer in transit, refrigeration, icing, ventilation, storage, handling, and interchange of passengers and property; and

(10) “United States” means the States of the United States and the District of Columbia.
Subject to this chapter, the Board has jurisdiction over transportation by rail carrier that is--

(A) only by railroad; or

(B) by railroad and water, when the transportation is under common control, management, or arrangement for a continuous carriage or shipment.

Jurisdiction under paragraph (1) applies only to transportation in the United States between a place in--

(A) a State and a place in the same or another State as part of the interstate rail network;

(B) a State and a place in a territory or possession of the United States;

(C) a territory or possession of the United States and a place in another such territory or possession;

(D) a territory or possession of the United States and another place in the same territory or possession;

(E) the United States and another place in the United States through a foreign country; or

(F) the United States and a place in a foreign country.

The jurisdiction of the Board over--
(1) transportation by rail carriers, and the remedies provided in this part with respect to rates, classifications, rules (including car service, interchange, and other operating rules), practices, routes, services, and facilities of such carriers; and

(2) the construction, acquisition, operation, abandonment, or discontinuance of spur, industrial, team, switching, or side tracks, or facilities, even if the tracks are located, or intended to be located, entirely in one State,
is exclusive. Except as otherwise provided in this part, the remedies provided under this part with respect to regulation of rail transportation are exclusive and preempt the remedies provided under Federal or State law.

(c)(1) In this subsection--

(A) the term “local governmental authority”--

(i) has the same meaning given that term by section 5302 of this title; and

(ii) includes a person or entity that contracts with the local governmental authority to provide transportation services; and

(B) the term “public transportation” means transportation services described in section 5302 of this title that are provided by rail.

(2) Except as provided in paragraph (3), the Board does not have jurisdiction under this part over--

(A) public transportation provided by a local government authority; or

(B) a solid waste rail transfer facility as defined in section 10908 of this title, except as provided under sections 10908 and 10909 of this title.
(3)(A) Notwithstanding paragraph (2) of this subsection, a local governmental authority, described in paragraph (2), is subject to applicable laws of the United States related to--

(i) safety;

(ii) the representation of employees for collective bargaining; and

(iii) employment, retirement, annuity, and unemployment systems or other provisions related to dealings between employees and employers.

(B) The Board has jurisdiction under sections 11102 and 11103 of this title over transportation provided by a local governmental authority only if the Board finds that such governmental authority meets all of the standards and requirements for being a rail carrier providing transportation subject to the jurisdiction of the Interstate Commerce Commission that were in effect immediately before January 1, 1996. The enactment of the ICC Termination Act of 1995 shall neither expand nor contract coverage of employees and employers by the Railway Labor Act, the Railroad Retirement Act of 1974, the Railroad Retirement Tax Act, and the Railroad Unemployment Insurance Act.
§ 20103. General authority

Effective: November 15, 2021

(a) **Regulations and orders.**—The Secretary of Transportation, as necessary, shall prescribe regulations and issue orders for every area of railroad safety supplementing laws and regulations in effect on October 16, 1970. When prescribing a security regulation or issuing a security order that affects the safety of railroad operations, the Secretary of Homeland Security shall consult with the Secretary.

(b) **Regulations of practice for proceedings.**—The Secretary shall prescribe regulations of practice applicable to each proceeding under this chapter. The regulations shall reflect the varying nature of the proceedings and include time limits for disposition of the proceedings. The time limit for disposition of a proceeding may not be more than 12 months after the date it begins.

(c) **Consideration of information and standards.**—In prescribing regulations and issuing orders under this section, the Secretary shall consider existing relevant safety information and standards.

(d) **Nonemergency waivers.**

(1) **In general.**—The Secretary of Transportation may waive, or suspend the requirement to comply with, any part of a regulation prescribed or an order issued under this chapter if such waiver or suspension is in the public interest and consistent with railroad safety.

(2) **Notice required.**—The Secretary shall--

(A) provide timely public notice of any request for a waiver under this subsection or for a suspension under subpart E of part 211 of title 49, Code of Federal Regulations, or successor regulations;
(B) make available the application for such waiver or suspension and any nonconfidential underlying data to interested parties;

(C) provide the public with notice and a reasonable opportunity to comment on a proposed waiver or suspension under this subsection before making a final decision; and

(D) publish on a publicly accessible website the reasons for granting each such waiver or suspension.

(3) Information protection.--Nothing in this subsection may be construed to require the release of information protected by law from public disclosure.

(4) Rulemaking.--

(A) In general.--Not later than 1 year after the first day on which a waiver under this subsection or a suspension under subpart E of part 211 of title 49, Code of Federal Regulations, or successor regulations, has been in continuous effect for a 6-year period, the Secretary shall complete a review and analysis of such waiver or suspension to determine whether issuing a rule that is consistent with the waiver is--

(i) in the public interest; and

(ii) consistent with railroad safety.

(B) Factors.--In conducting the review and analysis under subparagraph (A), the Secretary shall consider--

(i) the relevant safety record under the waiver or suspension;

(ii) the likelihood that other entities would have similar safety outcomes;
(iii) the materials submitted in the applications, including any comments regarding such materials; and

(iv) related rulemaking activity.

(C) Notice and comment.--

(i) In general.--The Secretary shall publish the review and analysis required under this paragraph in the Federal Register, which shall include a summary of the data collected and all relevant underlying data, if the Secretary decides not to initiate a regulatory update under subparagraph (D).

(ii) Notice of proposed rulemaking.--The review and analysis under this paragraph shall be included as part of the notice of proposed rulemaking if the Secretary initiates a regulatory update under subparagraph (D).

(D) Regulatory update.--The Secretary may initiate a rulemaking to incorporate relevant aspects of a waiver under this subsection or a suspension under subpart E of part 211 of title 49, Code of Federal Regulations, or successor regulations, into the relevant regulation, to the extent the Secretary considers appropriate.

(5) Rule of construction.--Nothing in this subsection may be construed to delay any waiver granted pursuant to this subsection that is in the public interest and consistent with railroad safety.

(e) Hearings.--The Secretary shall conduct a hearing as provided by section 553 of title 5 when prescribing a regulation or issuing an order under this part, including a regulation or order establishing, amending, or providing a waiver, described in subsection (d), of compliance with a railroad safety regulation prescribed or order issued under this part. An opportunity for an oral presentation shall be provided.

(f) Tourist railroad carriers.--In prescribing regulations that pertain to railroad safety that affect tourist, historic, scenic, or excursion railroad carriers, the Secretary of Transportation shall take into consideration any financial, operational, or other factors that may be unique to such railroad carriers. The Secretary shall submit a report to Congress not later than September 30, 1995, on actions taken under this subsection.
(g) Emergency waivers.--

(1) In general.--The Secretary may waive compliance with any part of a regulation prescribed or order issued under this part without prior notice and comment if the Secretary determines that--

(A) it is in the public interest to grant the waiver;

(B) the waiver is not inconsistent with railroad safety; and

(C) the waiver is necessary to address an actual or impending emergency situation or emergency event.

(2) Period of waiver.--A waiver under this subsection may be issued for a period of not more than 60 days and may be renewed upon application to the Secretary only after notice and an opportunity for a hearing on the waiver. The Secretary shall immediately revoke the waiver if continuation of the waiver would not be consistent with the goals and objectives of this part.

(3) Statement of reasons.--The Secretary shall state in the decision issued under this subsection the reasons for granting the waiver.

(4) Consultation.--In granting a waiver under this subsection, the Secretary shall consult and coordinate with other Federal agencies, as appropriate, for matters that may impact such agencies.

(5) Emergency situation; emergency event.--In this subsection, the terms “emergency situation” and “emergency event” mean a natural or manmade disaster, such as a hurricane, flood, earthquake, mudslide, forest fire, snowstorm, terrorist act, biological outbreak, release of a dangerous radiological, chemical, explosive, or biological material, or a war-related activity, that poses a risk of death, serious illness, severe injury, or substantial property damage. The disaster may be local, regional, or national in scope.
49 U.S.C.A. § 20106

§ 20106. Preemption

Effective: August 3, 2007

(a) National uniformity of regulation.--(1) Laws, regulations, and orders related to railroad safety and laws, regulations, and orders related to railroad security shall be nationally uniform to the extent practicable.

(2) A State may adopt or continue in force a law, regulation, or order related to railroad safety or security until the Secretary of Transportation (with respect to railroad safety matters), or the Secretary of Homeland Security (with respect to railroad security matters), prescribes a regulation or issues an order covering the subject matter of the State requirement. A State may adopt or continue in force an additional or more stringent law, regulation, or order related to railroad safety or security when the law, regulation, or order--

(A) is necessary to eliminate or reduce an essentially local safety or security hazard;

(B) is not incompatible with a law, regulation, or order of the United States Government; and

(C) does not unreasonably burden interstate commerce.

(b) Clarification regarding State law causes of action.--(1) Nothing in this section shall be construed to preempt an action under State law seeking damages for personal injury, death, or property damage alleging that a party--

(A) has failed to comply with the Federal standard of care established by a regulation 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), covering the subject matter as provided in subsection (a) of this section;
(B) has failed to comply with its own plan, rule, or standard that it created pursuant to a regulation or order issued by either of the Secretaries; or

(C) has failed to comply with a State law, regulation, or order that is not incompatible with subsection (a)(2).

(2) This subsection shall apply to all pending State law causes of action arising from events or activities occurring on or after January 18, 2002.

(c) Jurisdiction.--Nothing in this section creates a Federal cause of action on behalf of an injured party or confers Federal question jurisdiction for such State law causes of action.
BEFORE THE KANSAS DEPARTMENT OF TRANSPORTATION

K.A.R. 36-43-1. CREW REQUIREMENTS

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

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July 17, 2023
# TABLE OF CONTENTS

TABLE OF EXHIBITS .................................................................................................................. iii

INTRODUCTION .......................................................................................................................... 1

BACKGROUND ............................................................................................................................ 2
   I. Federal Railroad Administration Crew-Size Rulemaking. .................................................. 4
   II. Kansas Crew-Size Regulation .......................................................................................... 5

DISCUSSION ................................................................................................................................. 6
   I. KDOT Lacks the Statutory Authority to Enact Crew-Size Regulation. .............................. 7
   II. There Is No Safety Justification for Crew-Size Regulation ............................................. 8
      A. The Evidence Shows That One-Person Crews Are Safe. ............................................. 8
      B. PTC Eliminates Any Operational Need for A Second Crewmember in the Cab ....... 13
   III. The Majority of Railroads Operating in Kansas Use Two-Person Crews. ..................... 14
   IV. K DOT’s Economic Impact Analysis is Deficient ............................................................. 15
   V. The Proposed Regulation Will Run Afoul Existing Federal Law and Ongoing Federal Agency Rulemaking ................................................................. 19

CONCLUSION ............................................................................................................................. 20
<table>
<thead>
<tr>
<th></th>
<th>Table of Exhibits</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Oliver Wyman, <em>Assessment of European Railways: Characteristics and Crew-Related Safety</em> (June 2016)</td>
</tr>
<tr>
<td>3</td>
<td>Oliver Wyman, <em>Crew-Related Safety and Characteristic Comparison of European and US Railways</em> (April 5, 2021)</td>
</tr>
<tr>
<td>4</td>
<td>Oliver Wyman, <em>Assessment of Conductor and Engineer In-Cab Work Activities</em> (May 14, 2021)</td>
</tr>
<tr>
<td>5</td>
<td>Statement of Dewayne Swindall (December 2022)</td>
</tr>
<tr>
<td>6</td>
<td>Mark Burton, <em>Rail-Truck Competition in an Era of Automation Technology</em> (December 2022)</td>
</tr>
<tr>
<td>7</td>
<td>Statement of Brendan M. Branon (December 2022)</td>
</tr>
<tr>
<td>9</td>
<td>Correspondence re: K.A.R. 36-43-1, State of Kansas Office of the Attorney General to Kansas Department of Transportation, Sept. 1, 2020</td>
</tr>
<tr>
<td>10</td>
<td>K.A.R. 36-43-1</td>
</tr>
</tbody>
</table>
The Association of American Railroads (“AAR”), on behalf of itself and its member railroads, respectfully submits these comments in response to the Kansas Department of Transportation’s (“KDOT”) Notice of Public Hearing on Proposed Administrative Regulation, K.A.R. 36-43-1, entitled “Crew requirements; exceptions.”

AAR is an incorporated, nonprofit trade association representing the nation’s major freight railroads, Amtrak, and some smaller freight railroads and commuter authorities. AAR’s members account for the vast majority of the rail industry’s line haul mileage, freight revenues, and employment. In Kansas alone, AAR members employ thousands of employees and operate thousands of miles of railroad track.

**INTRODUCTION**

Through the implementation of K.A.R. 36-43-1, KDOT, with limited exceptions, seeks to require that any railroad operating within the State of Kansas maintain at least two crewmembers in the control compartment of the lead locomotive of all trains. In support of the proposed regulation, KDOT presents a Notice of Public Hearing on Proposed Administrative Regulation (“Notice”) and an Economic Impact Statement (“EIS”) outlining KDOT’s assessment of the costs and benefits of the regulation.

Absent from the materials related to K.A.R. 36-43-1 is any evaluation of the need for the proposed regulation or any accounting of the expected benefits. Instead, KDOT claims merely that the state “may see reduced accidents,” and admits that the primary impact of K.A.R. 36-43-1 will be to increase costs for some railroads operating in Kansas—costs which KDOT expects will be passed on to Kansans. See Notice, at 1 (emphasis added).

The proposed KDOT regulation will not improve safety. Instead, it will chill research and innovation of safer and more efficient railroad operations. As the U.S. Department of
Transportation—and other federal and state regulators—have recognized, safety is advanced by “harness[ing] technological innovations to reduce and mitigate safety incidents.” U.S. Dep’t of Transp., Strategic Plan FY 2022-2026 at 10, https://bit.ly/3jnGH5Y. KDOT’s proposed regulation takes precisely the opposite approach by freezing the status quo (the majority trains in Kansas currently operate with multiple crewmembers in the lead locomotive). In the railroad context, just as in other dynamic industries, locking in the status quo will stall the development of new technologies that will further promote safety.

Beyond being bad policy, the KDOT regulation is preempted by the federal regulatory scheme that applies to railroads. The proposed regulation should be withdrawn.

**BACKGROUND**

There is no immediate need for KDOT to implement this proposed regulation. Should it be promulgated, it threatens to do long-term harm to the railroad industry. “Historically, crew size has been an issue for labor relations.” Fed. R.R. Admin., Proposed Rule—Train Crew Staffing, 81 Fed. Reg. 13918, 13937 (Mar. 15, 2016). As explained in the Statement of Brendan M. Branon, the chair of the National Carriers’ Conference Committee, debates over crew size have historically been resolved through collective bargaining rather than under the guise of safety regulation. “The carriers and the unions have a long-standing, proven ability to handle these issues in a safe and effective way.” Statement of Brendan M. Branon (December 2022), at ¶ 5 (attached as Ex. 7). The most recent round of collective bargaining between the nation’s freight railroads and the 12 rail unions concluded in December 2022, resulting in the implementation of an agreement providing significant wage increases, continued access to high-quality health care, additional paid time off, and related quality of life benefits. National Rail Labor Council, Freight Rail National Bargaining Concluded, https://raillaborfacts.org/news/freight-rail-bargaining-
round-to-conclude/ (December 1, 2022). This national status quo will remain in place until at least January 1, 2025, which is the soonest the next round of collective bargaining may resume unless otherwise agreed to by all participants.

While Class I railroads plan to continue using two-person crews for most operations until at least January 1, 2025, KDOT fails to take into account the long-term negative impacts of setting a two-person requirement in stone. The railroad industry has a long history of building on technological improvements to increase productivity and improve safety. FRA acknowledges that “technology has enabled a gradual reduction in the number of train crewmembers from about five in the 1960s to two in 2014,” 81 Fed. Reg. at 13937, and, in fact, two-person crews have been used by Class I railroads since well before 2014.

Class I railroads have installed Positive Train Control (“PTC”) on a significant portion of the national rail network in response to a mandate in the Rail Safety Improvement Act of 2008. See Pub. L. No. 110-432, Div. A, 122 Stat. 4848-4906 (Oct. 16, 2008). PTC is a computerized system that delivers real-time information to the engineer and monitors train location, speed and direction and, if necessary, stops a train automatically if the engineer fails to take necessary actions. PTC makes it unnecessary for a conductor to perform onboard functions such as observing wayside signal information and recording dispatching orders, thus eliminating one of the key purported rationales for a multiple-person crew. PTC has been fully implemented since December 29, 2020, and is in operation across the national rail network including in Kansas. See Federal Railroad Administration, Positive Train Control (PTC), https://railroads.dot.gov/research-development/program-areas/train-control/ptc/positive-train-control-ptc (last accessed July 5, 2023).
I. Federal Railroad Administration Crew-Size Rulemaking.

FRA has never mandated a minimum crew size and has historically left the issue to the collective bargaining process. In 2009, FRA denied a petition to require multiple person crews, explaining that it “ha[d] no factual evidence” that would justify such a mandate. See Denial of BLET Petition on RCO and Other Single-Person Operations (Nov. 10, 2009).

In 2016, FRA issued an NPRM proposing a minimum crew-size rule. See Docket No. FRA-2014-0033. In 2019, FRA withdrew the 2016 NPRM. See Fed. R.R. Admin., Proposed Rule—Train Crew Staffing, 84 Fed. Reg. 24735 (May 29, 2019) (“Withdrawal Order”). The agency determined that “no regulation of train crew staffing is necessary or appropriate for railroad operations to be conducted safely at this time.” Id. at 24735. It stated that “FRA does not have information that suggests that there have been any previous accidents involving one-person crew operations that could have been avoided by adding a second crewmember.” Id. at 24738 (quoting 81 Fed. Reg. at 13921). The Withdrawal Order explained that although there were “some indirect connections between crew staffing and railroad safety with respect to the . . . accidents, those connections are tangential at best and do not provide a sufficient basis for FRA regulation of train crew staffing requirements.” Id. In short, the Withdrawal Order concluded that FRA’s safety data “does not establish that one-person operations are less safe than multi-person train crews,” that “existing one-person operations ‘have not yet raised serious safety concerns,’” and that “it is possible that one-person crews have contributed to the [railroads’] improving safety record.” Id. at 24739 (quoting 81 Fed. Reg. at 13950 and 13932 (alteration in original)).

In 2021, a panel of the U.S. Court of Appeals for the Ninth Circuit vacated the Withdrawal Order. See Trans. Div. of the Int’l Ass’n of Sheet Metal, Air, Rail & Transp. Workers v. FRA, 988 F.3d 1170 (9th Cir. 2021). The court “conclude[d] that the issuance of the Order violated the APA’s notice-and-comment requirements and that the Order is arbitrary and
capricious.” Id. at 1179. But the court did not conclude that a crew-size rule was warranted or that the evidence showed two-person crews would increase safety.

In 2022, FRA issued a new crew-size-related NPRM. Fed. R.R. Admin., Train Crew Size Safety Requirements, 87 Fed. Reg. 45564 (July 28, 2022). While the 2022 NPRM suffers from many of the same shortcomings outlined here, if finalized the FRA’s rule would indisputably preempt any state crew-size related regulation, including this one. In fact, in the NPRM, FRA stated expressly that a preemptive rule was “necessary to prevent the multitude of State laws regulating crew size from creating a patchwork of rules governing train operations across the country” and repeatedly emphasized the importance of a nationally uniform standard. Id. at 45565; 45570.

II. Kansas Crew-Size Regulation.

This is not KDOT’s first attempt at enacting crew-size regulation. KDOT initially proposed K.A.R. 36-43-1, a substantially similar regulation to that at issue today on July 27, 2020. The proposed 2020 regulation provided that “[r]ailroads operating within Kansas shall maintain a minimum of two crew members in the control compartment of the lead locomotive unit of a train,” but exempted switching operations, brake testing, safety inspections, or operations undertaken while performing setouts in conjunction with road service. See Kansas Office of the Governor, Kansas Department of Transportation Proposes Safety Rule Regulating Minimum Railroad Crew Size, July 27, 2020, https://governor.kansas.gov/kansas-department-of-transportation-proposes-safety-rule-regulating-minimum-railroad-crew-size/.

Following its review of the legality of K.A.R. 36-43-1, the Kansas Attorney General’s Office refused to approve the proposed regulation, finding that neither statute cited by KDOT, K.S.A. 66,216 or K.S.A. 75-5078, authorized the Kansas Corporation Commission and in turn the KDOT “to adopt rules and regulations concerning the subject of K.S.A. [sic] 36-43-1.” Sept.
1, 2020, Correspondence re: K.A.R. 36-43-1, State of Kansas Office of the Attorney General to Kansas Department of Transportation (attached as Ex. 9). The Attorney General also found that crew-size regulation was preempted by both the Federal Railroad Safety Act, and the Interstate Commerce Commission Termination Act. *Id.*

Less than three years later, KDOT released the Notice on the proposed regulation at issue here, also entitled K.A.R. 36-43-1. This new iteration of K.A.R. 36-43-1 is substantially identical in relevant part to the regulation proposed in 2020, providing that “[e]ach entity operating a railroad in Kansas shall maintain at least two crewmembers in the control compartment of the lead locomotive unit of each train.” The regulation does not apply during switching operations, brake testing, safety inspections, and in situations where a train is stopped at a customer location or where the number of cars in a train are being reduced while on a siding track. *Id.* In support, KDOT once again relies on K.S.A. 66,216 and K.S.A. 75-5078 as authorizing the promulgation of the proposed regulation. *See* EIS, at 5.

**DISCUSSION**

KDOT’s proposed regulation should be withdrawn because the agency has not provided a legally sufficient justification for its proposed crew-size rule. The Kansas Judicial Review Act (“KJRA”) is the exclusive means of reviewing agency action under Kansas law. Kan. Stat. § 77-606. Agency action is improper if “based on a determination of fact...that is not supported to the appropriate standard of proof by evidence that is substantial when viewed in light of the record as a whole” or if “the agency action is otherwise unreasonable, arbitrary or capricious.” Kan. Stat. 77-621(c).

K.A.R. 36-43-1 cannot satisfy this test because KDOT lacks the statutory authority to enact crew-size regulation, has not presented any authority calling into question the
overwhelming evidence establishing that one-person crews are at least as safe as multi-person crews, based its decision on incorrect assumptions regarding current rail operations and the extensive collective bargaining forming the basis of current rail operations, neglected to consider the actual costs of the proposed regulation, including the chilling effect it will have on future innovation, and ignored the preemptive effect of existing federal law and ongoing federal agency actions.

I. KDOT Lacks the Statutory Authority to Enact Crew-Size Regulation.

KDOT should withdraw K.A.R. 36-43-1 because no statute authorizes the agency to promulgate the proposed regulation. In its EIS, KDOT cites K.S.A. 75-5078 and K.S.A. 66,216 as the source of the statutory authority required to enact K.A.R. 36-43-1. KDOT is mistaken. K.S.A. 75-5078 transfers the railroad-related “powers, duties and functions” previously enjoyed by the Kansas Corporation Commission (“KCC”) to the KDOT. K.S.A. 66-1,216 in turn provides the KCC with “full power, authority and jurisdiction to supervise and control the common carriers” and further empowered [the KCC] to do all things necessary and convenient for the exercise of such power, authority and jurisdiction.” Absent from these statutes, however, is any grant of authority to either the KCC or KDOT to propose and adopt crew-size-related regulations.

The Kansas Attorney General’s office reached the same conclusion when it considered and denied approval for substantially identically crew-size regulation in 2020. Ex. 9, at 1, 3. And although the new Kansas Attorney General’s Office has provided its stamp of approval for K.A.R. 36-43-1 as proposed in 2023, see Ex. 10, no justification has been presented for this change in position. Thus, in addition to KDOT lacking the statutory authority to promulgate K.A.R. 36-43-1, without any attempt to establish a “foundation in fact” for the diametric shift in the Attorney General’s position, the agency action is also arbitrary, capricious and violative of

II. **There Is No Safety Justification for Crew-Size Regulation.**

A. **The Evidence Shows That One-Person Crews Are Safe.**

Abundant real-world evidence proves that one-person crews are just as safe as multiple-person crews. Railroads in the United States and other nations have safely used one-person crews in a wide variety of operating contexts for many years. KDOT offers no non-anecdotal evidence to the contrary.

In early 2015, the consulting firm Oliver Wyman concluded, based on U.S. accident data, that single-person train crew operations are just as safe as multiple-person train crew operations. *See* Oliver Wyman, *Analysis of North American Freight Rail Single-Person Crews: Safety and Economics* (February 2015) (attached as Ex. 1). The study compared aggregate statistics on relevant equipment incidents and casualty incidents for 2007 through 2013 for operators using single-person crews versus operators using multiple-person crews. As to equipment incidents, the study found that “[w]hile the data may not conclusively support a claim that single-person crew operations are safer than multiple-person crew operations (given the possible existence of other influencing factors), it does appear that single-person crew operations are at least as safe as multiple-person crew operations.” Ex. 1 at 24. As to casualty incidents, the study likewise found that “those rail operators using single person crews are at least as safe as their counterparts relying on multiple-person crew[s] to operate their trains.” *Id.* at 26.

One-person crews are also commonly used in other countries—and the data confirms that they are safe. In the United Kingdom, for example, where one-person freight operations are common, the Rail Safety and Standards Board found that “one-person crews were at least as safe
as multiple crew operations.” Regulatory Impact Analysis, *Train Crew Staffing—Notice of Proposed Rule Making*, U.S. Dep’t of Transp. 21 (Feb. 18, 2016). Oliver Wyman’s analysis of extensive safety data documenting the performance of one-person crews in Europe confirms this conclusion. Oliver Wyman, *Assessment of European Railways: Characteristics and Crew-Related Safety* (June 2016) (attached as Ex, 2). Oliver Wyman examined rail safety data collected by the European Railway Agency, which includes data from 28 European nations. That data shows that one-person crews have similar or lower accident rates than two-person crews in five of the six accident categories measured—collisions with other trains or obstacles; derailments; level crossings; fires on rolling stock; and other accidents. The only exception was the category of “accidents to persons caused by rolling stock in motion,” which generally involves non-employees hit by a railway vehicle (and there is no evidence to suggest that crew size played a role in those accidents).

The findings in Oliver Wyman’s supplemental report amplify the findings in its 2015 report, which explained that “[i]nternationally, the use of single-person crews for trains is widespread in developed markets similar to the United States in size and complexity.” Ex. 1 at 1. “In Europe and Australia, for example, the use of single-person crews is the dominant practice on many freight railroads, including those in Germany, France, Sweden, Australia, the United Kingdom, and Queensland/New South Wales.” *Id.* The Wyman study analyzed safety data for collisions, derailments, serious employee injuries, fatalities, and signals passed at danger, and found that “[f]or all of these categories, major European operators using single-person crews appeared to be as safe as Class I multiple-person crew operations.” *Id.* at 2.

More recently, Oliver Wyman updated its analysis of the European experience. *See* Oliver Wyman, *Crew-Related Safety and Characteristic Comparison of European and US...*
The study reviewed 2006-2019 accident reporting data for 28 railroads in Europe (where 95 percent of rail traffic is moved by one-person crews) and for the U.S. Class I railroads. Oliver Wyman “found no evidence that railroads operating with two-person crews are statistically safer than railroads operating with one-person crews.” Id. at 3. More generally, the study “found no significant differences in safety statistics based on crew size.” Id.

Oliver Wyman conducted its April 2021 study by grouping European railroads into categories based on region and crew size and comparing them to one another and to U.S. Class I railroads, to determine if there were differences in safety performance and whether those differences were related to crew size. Oliver Wyman also compared Western and Eastern Europe, to see if accident data aligns more closely with differences in infrastructure investment and operating characteristics. For all significant accidents, Western European one-person crews have shown the best safety record, whereas Eastern European railroads have seen improvement over time, regardless of crew size; the U.S. accident rate is fairly stable. Oliver Wyman determined that “two-person crews do not appear to be safer than one-person crews according to this metric.” See Ex. 3 at 5-6. Furthermore, in looking at specific categories of accidents, Oliver Wyman did not find that crew size played a significant role in the number of collisions, derailments, accidents at grade crossings, accidents to persons, or employee fatalities. Having a second crewmember also did not reduce economic damages for significant accidents. Finally, Oliver Wyman found no evidence of higher rates of signals passed at danger for one-person crews, thus dispelling claims that one-person crews are “overloaded” with tasks. See Ex. 3 at 5-6.

The information KDOT relies on to suggest a possible safety risk does not call any of
these data-based conclusions into question. First, KDOT cites a SMART TD pamphlet characterizing the 2013 Lac-Mégantic derailment as an incident involving a single crewmember who failed to properly secure the train at the end of a tour of duty. See EIS, Ex. 2, at 1. KDOT fails, however, to include the actual results of the investigation undertaken by the Transportation Safety Board of Canada, which found that it “could not conclude that use of a one-person crew was a cause or contributing factor to the accident.” 81 Reg. 13918, at 13921. KDOT next cites a second SMART TD flyer detailing events surrounding a three-man train crew’s response to discovering an individual suffering injuries of unknown cause on a railroad right-of-way in Stockton, California. See EIS, Ex. 2, at 2. While the actions of the crew were valiant in the face of trying circumstances, nothing in the flyer suggests that a single crewmember would not have been able to render first-aid or coordinate an emergency response. Finally, KDOT declares that the proposed regulation is necessary because there were “71 train accidents in Kansas” in 2022. EIS at 4. But a cursory examination of the data KDOT cites reveals that of these 71 accidents, at least 57 involved railroads KDOT acknowledges only operate with multi-person crews in Kansas. EIS, Ex. 3, at 3. KDOT fails to present any evidence to suggest that the remaining 14 accidents occurred during single-crew operations, or could possibly have been prevented, by a multi-person crew.

It also bears noting that U.S. passenger trains have been operated for many years with only one crewmember in the cab (other crewmembers may serve the passenger compartments but do not routinely ride in the cab). These have been widely viewed as safe operations. As the FRA advised the NTSB in 1986: “Many passenger trains have been operated for years with only one person in the control compartment. Some of these operations have been in place for over 50 years and they have compiled an outstanding safety record.” Response to NTSB
Recommendation R-85-051 (May 20, 1986). The trend toward one-person crews for passenger trains has only increased since that time. Operating with a single crewmember in the cab is now the standard for commuter trains and for Amtrak trips.

Moreover, many short line railroads in the United States operate with one-person crews, and the experience of one such short line—INRD—confirms that such operations are perfectly safe. See Statement of Dewayne Swindall (December 2022) (attached as Ex. 5). INRD is a 250-mile regional railroad operating in Indiana and Illinois. Since 1997, it has been safely and effectively operating with one-person crews. In 2021, INRD utilized one-person crew operations on about 31 train starts per week. The implementation of one-person crew operations at INRD was the result of research, innovation, and the use of new technology. In addition to consulting with FRA, INRD studied the operations of New Zealand’s Tranz Rail, which implemented one-person crews in 1987. INRD observed Tranz Rail’s operating practices, reviewed its Alternative Train Crewing Handbook, interviewed employees, and discussed issues of alertness and fatigue with Tranz Rail officials. INRD also obtained information from a study performed by Tranz Rail that concluded that the health and safety of individuals and the public were not compromised by employing one-person crew operations. Finally, INRD considered suggestions and safety concerns of its own employees and management. See id. at ¶¶ 3-4.

INRD’s evidence and data—collected over more than two decades—establishes that one person crews are just as safe as two-person crews. INRD has had only one FRA-reportable human factor incident involving a one-person crew in 25 years of one-person operations. Of the non-FRA-reportable human factor incidents, while one-person crew operations were 18.3% of INRD man-hours from 2006 through July 2022, they only accounted for 5.9% of human factor incidents. In comparison, two-person crews were 81.7% of INRD man-hours, but accounted for
94.1% of human factor incidents. And the fact that since 2001 the Brotherhood of Locomotive Engineers and Trainmen has agreed to their members operating one-person trains on INRD demonstrates that the union believes these operations are safe. See Ex. 5 at ¶¶ 11-15.

If there were any objective or empirical evidence that operating with one-person crews endangered the safety of INRD employees or the public, INRD would not continue one-person operations regardless of the attendant efficiencies. But there is no such evidence.

B. PTC Eliminates Any Operational Need for A Second Crewmember in the Cab.

PTC – developed by the railroads and installed at the cost of over $10 billion has dramatically changed the operations inside the cab of a locomotive. A 2021 Oliver Wyman study answered two questions: “whether and to what extent PTC alters or eliminates the need for specific conductor roles and responsibilities in the locomotive cab, and . . . whether engineers can safely operate a through-freight train in PTC territory without an onboard conductor.” See Oliver Wyman, *Assessment of Conductor and Engineer In-Cab Work Activities* (May 14, 2021) at 3 (attached as Ex. 4). Its overall finding was that “for freight trains with PTC-equipped locomotives and operating in PTC territory, there is no continuing need for a second in-cab train crewmember.” *Id.* at 4.

The Oliver Wyman study reached several specific conclusions (Ex. 4 at 4-9) regarding the ongoing roll of a conductor in the cab:

- “Locomotive design and control technology has evolved so that only the engineer has operational controls that impact the train. The engineer is fully and uniquely responsible for starting, stopping, and controlling the speed of the train, and for interacting with the PTC system. The conductor does not interact with the PTC system.”

- “In-cab work requirements for conductors have changed due to the implementation of PTC. Prior to PTC, routine conductor in-cab activities [included] . . . advising the engineer and record-keeping. Now, where PTC has been installed, it has by design removed the need for conductors to perform these tasks.”
- “Oliver Wyman analyzed a random sample of more than 100 hours of in-cab videos of freight duty tours in PTC territory that were provided by Class I railroads. On average across these tour videos, conductors engaged in a train operations-related task for less than five minutes per hour. Video observation confirmed that there are no routine conductor activities required for safe train operations.”

- “Oliver Wyman also conducted a human factors review . . . [that] confirmed that a solo engineer can fully manage train operating requirements in PTC territory within acceptable human factors parameters.”

- “The engineer’s workload has been further reduced by the implementation of locomotive energy management systems, which maximize fuel efficiency and improve train handling by calculating optimal speeds in all conditions [and moving the throttle as necessary].”

In sum, the Oliver Wyman study concluded, “there are no significant or empirically justified concerns about the engineer not having the information needed to safely operate the train, about the engineer’s safety or the safe operation of the train, or about the engineer becoming overloaded with simultaneous tasks for engineer-only operations in PTC-equipped trains.” Ex. 4 at 9.

A separate study prepared by ICF International forecasting future accident rates for one and two-person crews once PTC was fully implemented provides further support for these conclusions. See ICF International, Evaluation of Single Crew Risks (January 2015) (attached as Ex. 8). The ICF study, which used a fault-tree analysis, found virtually no difference in accident rates between one- and two-person operations. Id. at 1. In fact, “[t]rain accidents due to rollaways decrease by a factor of 10 with the removal of a second person from the cab due to fewer potential situations and additional care taken when the sole operator leaves the cab.” Id. at 5.

III. The Majority of Railroads Operating in Kansas Use Two-Person Crews.

KDOT estimates that at least 94% of existing rail traffic in Kansas is operated using two-person crews. EIS at 8. The ongoing use of multi-person crews by Class I railroads is not due to
any rule, regulation, or statute, but rather reflects the current status of labor negotiations on the question. See id. (“According to information and belief, Class I railroads operate with two-person crews pursuant to union agreement.”). Notices for renewed national bargaining may be issued November 1, 2024 to become effective January 1, 2025, but even then, the multi-crewmember status quo for Class I railroads will only change when there is agreement amongst the parties.

IV. KDOT’s Economic Impact Analysis is Deficient.

KDOT’s Economic Impact Statement (“EIS”) is further evidence that the reasoning underlying K.A.R. 36-43-1 is based on agency determinations unsupported by sufficient facts. The analysis set forth in the EIS is seriously flawed because it neglects the substantial costs the proposed regulation will impose. The cost of operating with an unnecessary second crewmember inside the cab is the largest regulatory cost associated with the proposed regulation because it would impact operational costs in perpetuity. In 2016, AAR projected a total of $264.7 million in such costs over the first ten years assuming a gradual implementation of single-person crews. See Comments of the Association of American Railroads, FRA-2014-033, June 15, 2016, at 40.

While successful negotiation of necessary labor agreements would determine the timing of but-for implementation of one-person crews, the costs of a regulatory freeze are significant and permanent.

KDOT also fails to consider whether its regulation will contribute to a modal shift from railroads to trucks—and the public consequences of such a shift. Requiring two-person crews will prevent decreases in the cost of shipping freight by rail and make freight rail less competitive compared to the trucking industry, which is not burdened by a similar mandate. (In fact, the Department of Transportation has been encouraging the development of autonomous vehicles). Making rail transportation more expensive means that more freight will be moved by truck. Indeed, a recent Department of Transportation-commissioned study concluded that
“freight rates were found to be the most influential explanatory variable” in the shift of traffic between road and rail. National Academies of Sciences, Engineering, and Medicine, *Impacts of Policy-Induced Freight Modal Shifts* at 4, 6 (2019) (“NAS Study”), https://doi.org/10.17226/25660.

The modal shift likely to result from the final regulation is also addressed in the attached study prepared by Mark Burton, formerly a Research Associate Professor at the University of Tennessee. See Mark Burton, *Rail-Track Competition in an Era of Automation Technology* (attached as Ex. 6). Professor Burton explains that crew-size regulation is likely to divert freight traffic from rail to trucks by allowing the trucking industry to realize cost savings from future innovations in the field of automation (and pass those savings alone to the customer in the form of lower prices) while preventing railroads from doing the same. *Id.* at 10. His study concludes that this modal shift will impose costs in the form of: “A potential incremental increase in truck-involved crashes”; “[a]n incremental increase in freight-related fuel consumption” with a “[p]otential incremental increase in pollutant emissions;” and “[a] probable incremental increase in necessary highway expenditures (both federal and state).” *Id.* at 13.

As Professor Burton’s study confirms, the modal shift will have adverse societal impacts on public safety, the nation’s infrastructure, and the environment. In all three areas, there are well-recognized advantages to shipping freight by rail.

**Public Safety.** The safety impact will also be significant, as rail is the safest method of surface transportation. Between 2000 and 2021, the train accident rate was down 33%, and between 2000 and 2020, the hazmat accident rate was down 60%. Accordingly, shifting freight from the rails to the highways will have an adverse effect on public safety. Professor Burton estimates an increase in fatalities as a result. See Ex. 6 at 14. The Department of Transportation
has historically been very sensitive to the safety impacts caused by a modal shift. For example, the Federal Aviation Administration declined to require the use of child safety restraint systems on commercial airplanes because such a mandate would cause some parents to drive rather than buy an extra plane ticket. The agency concluded that because driving is statistically more likely to result in a fatality or injury than traveling by air, a “safety” regulation that would cause a modal shift would ultimately undermine rather than enhance safety. See Don Phillips, FAA Won’t Mandate Child Safety Seats, Wash. Post (Sept. 15, 1992).

Consistent with Professor Burton’s conclusions, the National Academies study further explained that “prudent planning requires an understanding of the basics of mode choices, what could change those choices, and what the impacts will be.” See NAS Study, Foreword. It recognized that the failure to assess those dynamics could produce “uninformed decisions that have decades-long impacts on transportation infrastructure and business supply chain procurement as well as the economic competitiveness of the country.” Id. Here, however, KDOT fails even to acknowledge, let alone attempt to grapple with, these substantial public costs—to the environment, infrastructure, and safety—arising from the modal shift.

KDOT’s EIS also contains internal inconsistencies as to the Kansan consumers and businesses who would bear true cost of the proposed regulation. KDOT initially claims without support that the proposed regulation “would not restrict Kansas business growth and activities.” EIS at 7. KDOT, however, also tacitly acknowledges that the additional costs imposed on railroads as direct result of the proposed regulation will be passed to the many Kansan businesses and consumers who rely on freight rail. EIS at 8 (“It is anticipated that some portion of any additional railroad operating costs, based on two-person crews, would be passed on to railroad customers.”). KDOT neglects to calculate the dollar amounts involved or adjust its cost
calculations based on this information. Instead, despite admitting that a crew-size regulation will drive up shipping costs at a time when consumers already are grappling with record inflation and a supply chain under stress, KDOT merely assumes without evidence that the regulation will have a “positive impact on various governmental entities” from additional tax revenue. Id. (“[I]t would be expected that operating a two-person crew would have a positive impact on various governmental entities due to more disposable income, purchases and associated sales tax in local economies.”).

**Infrastructure.** The modal shift will place even greater stress on the nation’s infrastructure. More freight moving by truck means more trucks on congested highways and roads. The increased traffic will also mean more damage to the roads themselves. Railroads, by contrast, operate on their own rights of way and pay for their own infrastructure and improvements. While the railroads bear the maintenance costs of increased rail traffic, taxpayers bear the maintenance costs of increased truck traffic. Professor Burton concludes that “[a]s currently configured and administered, the Interstate Highway Trust Fund will be incapable of meeting the infrastructure demands that will result from unfettered motor carrier automation.” Ex. 6 at 17.

**Environment.** The modal shift will harm the environment, as rail is the most fuel-efficient and environmentally-friendly way to move freight over land. On average, trains are three to four times more efficient than trucks. The National Academies study explains that “rail, with around 27 percent of the mode share in ton-miles, contributes just 2 percent of the emissions,” underscoring “how large a role mode shift can play in contributing to, or reducing, GHG emissions of the transportation sector.” NAS Study at 27. Other agencies have reached similar conclusions. Even though freight railroads account for roughly 40% of U.S. long-distance
freight volume—more than any other mode of transportation—they account for just 0.5% of total U.S. greenhouse gas emissions, according to EPA data. A modal shift from rail to truck will have a serious adverse impact on the environment. Professor Burton projects that “[w]hen monetized, based on USDOT guidance, the potential rail-to-truck diversions would inflict nearly $15 billion in, otherwise avoidable, air quality damages over a 20-year planning horizon.” Ex. 6 at 17.


The proposed regulation should also be withdrawn because it is preempted by both the Interstate Commerce Commission Termination Act of 1995 (“ICCTA”) and the Federal Railroad Safety Act (“FRSA”). ICCTA provides that “[t]he jurisdiction of the [STB] over … transportation by rail carriers, and the remedies provided in this part with respect to rates, classifications, rules (including car service, interchange, and other operating rules), practices, routes, services, and facilities of such carriers … is exclusive.” 49 U.S.C. § 10501(b) (emphasis added). Because ICCTA’s remedies are “exclusive,” they “preempt the remedies provided under Federal or State law.” Id. This includes “all state laws that may reasonably be said to have the effect of managing or governing rail transportation, while permitting the continued application of laws having a more remote or incidental effect on rail transportation.” Delaware v. STB, 859 F.3d 16, 18 (D.C. Cir. 2017) (emphasis added).

Under the FRSA, “[l]aws, regulations, and orders related to railroad safety” must be “nationally uniform to the extent practicable.” 49 U.S.C. § 20106(a)(1). When FRA regulates in an area related to railroad safety, states may not also regulate in that area. 49 U.S.C. 20106(a)(2). Likewise, when “FRA examines a safety concern regarding an activity and affirmatively decides that no regulation is needed, this has the effect of being an order that the activity is permitted.” Burlington N. & Santa Fe Ry. Co. v. Doyle, 186 F.3d 790, 801 (7th Cir. 1999) (emphasis added).
In that circumstance, “States are not permitted to use their police power to enact such a regulation.” *Marshall v. Burlington N., Inc.*, 720 F.2d 1149, 1154 (9th Cir. 1983) (emphasis added). Stated plainly, a federal determination not to regulate can “take[] on the character of a ruling that no such regulation is appropriate or approved pursuant to the policy of the statute,” and thus any state law enacting such a regulation is preempted. *Ray v. Atl. Richfield Co.*, 435 U.S. 151, 178 (1978).

The proposed regulation also necessarily conflicts with the FRA’s ongoing concerns regarding the development of an incongruous patchwork of state crew size regulation. FRA has already expressed its intention to regulate crew size, and in particular, has cited the importance of preemption and a single national rule as one justification for federal regulation. See 87 Fed. Reg. 45564 at 45570-71 (“Of particular concern to FRA is the patchwork of State laws regulating crew size in some manner and the impact of those various State requirements on safe rail operations... FRA expects a final rule will have preemptive effect on those State laws that are Statewide in character and do not address narrow, local safety hazards.”). Whether the decision by FRA (currently expected in February 2024) is a legally viable rule regulating crew size, or a decision that no regulation is warranted or appropriate, state regulation will be preempted. Regulation by Kansas of an issue the federal regulator has specifically stated should and will be addressed nationally serves no purpose.

**CONCLUSION**

For all the reasons discussed above, KDOT should withdraw proposed regulation K.A.R. 36-43-1.

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July 5, 2023
BEFORE THE KANSAS DEPARTMENT OF TRANSPORTATION

K.A.R. 36-43-1. CREW REQUIREMENTS

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

EXHIBIT 1

Analysis of North American Freight Rail Single-Person Crews: Safety and Economics

Association of American Railroads

February 3, 2015
# Contents

I. Executive Summary ........................................................................................................ 1

II. Introduction .................................................................................................................. 4
   A. Summary of FRA Proposed Rulemaking .................................................................. 4
   B. Overview of Positive Train Control ....................................................................... 4

III. Background and Context of Single-Person Crews ....................................................... 6
   A. Existing North American Single-Person Operations ................................................. 6

IV. International Experience with Single-Person Crews .................................................... 9
   A. Relevant Deployment ............................................................................................... 9
   B. Operating Case Studies: European Union .............................................................. 11
   C. Safety Record ....................................................................................................... 15

V. Safety Analysis and Comparison .................................................................................. 17
   A. Availability and Reporting Requirements for Railroad Safety Statistics ............... 17
   B. Potentially Relevant Safety Statistics ..................................................................... 19
   C. Statistical Comparison of Relevant Safety Data: Intra-US .................................... 21
   D. Statistical Comparison of Relevant Safety Data: US versus Europe ...................... 27
   E. Summary of Safety Analysis Findings .................................................................... 36

VI. Economic Analysis ...................................................................................................... 37
   A. Economic Model and Scenario Overview ............................................................... 37
   B. Approach and Assumptions .................................................................................... 37
   C. Scenario A Modeling Results ................................................................................ 44
   D. Scenario B Modeling Results ................................................................................ 47
   E. Summary of Economic Analysis Findings .............................................................. 49

VII. Conclusion .................................................................................................................. 50

Annex A. Safety Analysis Input Detail ............................................................................. 51
I. Executive Summary

Existing Federal Railroad Administration (FRA) regulations do not mandate minimum crew requirements, although standard freight rail industry practice since 1991 has been to use a minimum of two employees per crew for over-the-road operations. In April 2014, however, the FRA announced its intention to issue a Notice of Proposed Rulemaking (NPRM) that would most likely require a minimum of two-person crews for most mainline train operations.

Multiple-person train crews have been the freight railroad industry norm over the past several decades for two reasons: 1) industry labor agreements have required them; 2) multiple-person crews made sense from an economic standpoint, as they could expeditiously handle work events between terminals and resolve en route equipment failures more quickly than a single-person crew. As labor relations, technology, and railroad operations continue to evolve, however, the need for multiple-person train crews for over-the-road trains is rapidly waning.

The FRA’s proposed crew size rule appears to run counter to trends, both in the US and abroad, that are driving the use of single-person train crews. There is a long history of technological improvements in the railroad industry leading to productivity gains while, at the same time, setting new safety records. The advent of diesel locomotives eliminated the need for firemen; end-of-train (EOT) devices eliminated the need for a caboose and personnel at the end of the train; and remote controlled locomotives (RCL) have eliminated the need for locomotive engineers on many yard jobs.

Now, the Class I railroad industry is in the process of implementing federally mandated positive train control (PTC) on some 60,000 miles of railroad track (and at a total cost, including 20 years of maintenance, of up to $13.2 billion). PTC is designed to provide additional remote and continuous monitoring of train crews to automatically override any human error in controlling train speed and movements. By its design, PTC-based monitoring will render redundant the additional person in multiple-person train crews on affected routes. Other factors affecting railroad industry consideration of single-person train operations is the need to reduce costs for non-productive assets.

Single-person crews are neither novel nor untested. In North America, Amtrak and commuter rail operations both make use of single-person crews (in the cab). Regional freight railroads Indiana Rail Road (INRD) in the United States and the Quebec North Shore and Labrador (QNS&L) in Canada operate a significant number of trains with single-person crews.

Internationally, the use of single-person crews for trains is widespread in developed markets similar to the United States in size and complexity. In Europe and Australia for example, the use of single-person crews is the dominant practice on many freight railroads, including those in Germany, France, Sweden, Australia, the United Kingdom, and Queensland/New South Wales.
Safety Analysis and Comparison

Oliver Wyman screened public data on safety from the FRA and the European Railway Agency (ERA) to develop a set of safety statistics that could be used to compare the safety records of single- and multiple-person crews. Statistics were deemed relevant for this analysis where the crew had some degree of control over the incident, and where the presence of multiple persons versus one person in the cab could arguably make a difference in the outcome of the incident.¹

For intra-US data, Oliver Wyman compared aggregate statistics on relevant equipment incidents and casualty incidents for 2007 through 2013 for operators using single-person crews (Amtrak, commuter operators, and INRD) versus operators using multiple-person crews (Class Is and other regional freight railroads). Across equipment incidents (derailments and collisions) and casualty incidents (serious injuries and fatalities), the analysis found that single-person train crew operations were as safe as multiple-person train crew operations.

For the US versus Europe, Oliver Wyman developed a comparative data set for 2007 through 2012 for US Class I rail operators and a selection of major European freight railroads that make use of single-person train crews. Oliver Wyman analyzed safety data for collisions, derailments, serious employee injuries, fatalities, and signals passed at danger. For all of these categories, major European operators using single-person crews appeared to be as safe as Class I multiple-person crew operations.

In addition, it is worth noting that there has been a positive long-term trend of declining rail accident risk within the European Union (EU), despite significant cuts in railroad staff and the expansion of single-person crew operations. In fact, those EU countries with the best safety records (least fatalities and weighted serious injuries per million train-kilometers) are all countries where railroads operate with single-person crews.

Economic Analysis

Oliver Wyman also developed an economic model to establish the value of single-person crew operations to the US Class I freight railroad industry. Two scenarios were modeled to represent the range of potential single-person crew operating options: the removal of trainmen (i.e., conductors) from all road trains without intermediate work, and the removal of trainmen only from road trains operating on high-density lines (on low-density rail lines, the use of round-the-clock utility personnel would be far more expensive than retaining the trainman position on the few trains operating over those lines). Together, these two scenarios bracket the range of

¹ The data is not robust enough to support a direct causal relationship, nor can other factors be discounted for which data is not readily available, such as level of experience and training of crews.
operational configurations that railroads could employ when implementing single-person crew operations.

Oliver Wyman modeled the savings that would be realized by the railroads on an aggregate basis under each scenario for 2013 and for 2020 through 2029 (since single-person crew operations are unlikely to be fully implemented prior to 2020). In both scenarios, the railroads would realize significant reductions to their cost of operations.

In conclusion, single-person crew operations are widespread in the world and appear to be as safe as multiple-person crew operations, even on complex systems running many mixed freight and passenger trains per day, as is the case in major European countries. With the coming implementation of PTC and other technologies that reduce human error and work on trains, single-person train crew operations could make sense on significant portions of the US Class I rail network. Reductions in train crew size would provide significant cost savings, which in turn could be used by the railroads to fund further capital and safety improvements. Prohibiting railroads from using technological improvements to reduce crew size greatly decreases the railroads’ ability to control operating costs, without making the industry any safer.
II. Introduction

A. Summary of FRA Proposed Rulemaking

Existing FRA regulations do not mandate minimum crew requirements, although standard freight rail industry practice is to use two-person crews for over-the-road operations. In an April 9, 2014 press release, the FRA announced its intention to issue an NPRM that would require two-person crews on crude oil trains and establish minimum crew sizes for most mainline freight and passenger rail operations. The FRA further noted in its press release that the NPRM “will most likely require a minimum of two-person crews for most mainline train operations.”

The proposed rulemaking follows in the wake of the formation of three Railroad Safety Advisory Committee (RSAC) Working Groups, as requested by the US Department of Transportation (DOT) following the Lac-Megantic, Quebec derailment. These groups were asked to evaluate a number of different proposals to enhance railroad safety. Two produced recommendations that were adopted by the full RSAC for consideration in future rulemakings. The Working Group on “Appropriate Train Crew Size,” failed to reach consensus, according to the FRA. Despite this, and a lack of data on the safety of two-person crews versus single-person crews, the agency has determined to proceed with direct rulemaking.

B. Overview of Positive Train Control

Any measurement of the potential benefits of a mandatory two-person crew must look closely at the safety improvements provided by PTC. PTC is a system of train control that is “designed to override human error in controlling the speed and movement of trains.” In essence, it is a more modern signaling control system.

Currently, there are three types of signaling control systems in use in the United States: No signal, otherwise known as “dark territory,” automatic block signaling (ABS), and centralized traffic control (CTC). CTC automates the lining of turnouts and integrates this with the signal system affording the highest (excluding PTC) level of control, automation, and integration of safety logic. Dark territory is completely manual and has the lowest level of control.

CTC, which is common on medium and high density lines, allows a dispatcher to remotely operate a series of interlocking signals and switches, and ensures that conflicting movements of

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trains are not authorized (i.e., that two trains are not sharing the same section of track).⁴ PTC is essentially the next generation of signal system after CTC and is expected to provide an additional layer of safety by ensuring that an inattentive crew cannot accidentally move their train into unauthorized territory or operate above authorized speeds.

The Rail Safety Improvement Act (2008) requires each Class I railroad carrier and each entity providing regularly scheduled intercity or commuter rail passenger transportation to implement PTC on all segments or routes of mainline railroad tracks that (a) carry intercity passenger or commuter rail service, or (b) carry more than five million gross tons of freight per year and also are used for transporting poison-by-inhalation hazardous materials (PIH) (more commonly known as TIH – toxic inhalation hazard).⁵ This mandate is expected to apply to about 60,000 miles of railroad track.

As per federal law, PTC it is a “system designed to prevent train-to-train collisions, over speed derailments, incursions into established work zone limits, and the movement of a train through a switch left in the wrong position.”⁶ The government has not imposed technical specifications for PTC systems, but all PTC systems share similar characteristics, and most importantly, from a safety perspective, “if the locomotive is violating a speed restriction or movement authority, onboard equipment will automatically slow or stop the train.”⁷ Thus, PTC essentially takes the place of a second crew member in the cab. Indeed, as a recent article noted, “On four occasions since September 2010, multi-person crews have been involved in serious train accidents where human error was the cause. PTC likely would have prevented each of the accidents.”⁸

The cost to implement PTC – an unfunded mandate – for the major railroads will be significant: The FRA itself has estimated total capital costs for full deployment on all affected railroads, as well as 20 years of maintenance, to be up to $13 billion.⁹

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⁵ P.L. 110-432, §104.
⁶ US Code of Federal Regulations, Title 49, Section §236.
⁹ “Positive Train Control Systems Economic Analysis,” Federal Railroad Administration, FRA-2006-0132, Notice No. 1, July 10, 2009, p. 120.
III. Background and Context of Single-Person Crews

A. Existing North American Single-Person Operations

Single-person crew operations currently exist in North America. Although labor agreements or, until recently, technology issues, generally have precluded the use of single-person crews in freight operations on Class I railroads, single-person crews are in use by other types of rail operators.

1. Amtrak and Commuter Operations

Amtrak often operates trains with a single person in the cab controlling train movements; the rest of the crew is entrained with the passengers. As the locomotive is usually isolated from the rest of the train, the locomotive engineer is physically isolated from the rest of the crew. Amtrak has operated single-person crews on the Northeast and Keystone corridors for more than 20 years.10

Safety backup for the engineer on the Northeast Corridor and Keystone lines is provided through the Advanced Civil Speed Enforcement System (ACSES), which can ensure compliance with speed restrictions, or signal indications, in the event of loss of engineer attentiveness. The system also includes cab signals, which allow the operator to be aware of the signal ahead and permitted approach speed, even in adverse weather conditions or on curves that may block the road signal view. In addition, on Amtrak’s Michigan corridor, an ITCS (Incremental Train Control System) is used, which enforces signal compliance and conformance to temporary speed limits.11

Amtrak also uses single-person crews on their long distance trains where the planned duration of the engine crew’s run is less than six hours. On these routes, the safety system is the same for the Amtrak trains and the freight trains operated by the host railroad. Amtrak estimates that 95 percent of its engine crews called to work comprise only one person.12

Overall safety of single-person crew operation on Amtrak is also supported by maintaining equipment in good condition and responsible scheduling of engineer shifts. Data presented in a 1985 US Government Accountability Office report shows no deterioration of operational safety and a decline in the number of injuries to employees over five years of Amtrak single-person operations from 1979 to 1984.13

12 Amtrak, 2014.
Similarly, locomotive engineers operating trains from either locomotives or cab cars on commuter lines also are physically isolated (either the locomotive is separate from the passenger compartments, or there is only space for one person in the controller’s cabin). Metrolink in California operates commuter trains with single-person crews over an Automatic Train Stop (ATS) system, which provides control of signal violation and over speed. In a dedicated 16-month pilot project, following the fatal Chatsworth, California accident in 2008, Metrolink converted 13 percent of its train operations to two-person crews. In reports to the California Public Utilities Commission in 2010, Metrolink found no evidence of increased safety of operations with two-person crews versus single-person crew operation.14

Other commuter railroads that operate over Class I freight lines (such as Chicago’s Metra system), use Automatic Train Control (ATC) systems that will stop the train if the engineer does not acknowledge alerts or signals, although such systems do not enforce speed compliance.

2. US Non-Class I Operations

There are a small number of freight rail operations in North America that have utilized, or are currently utilizing, single-person crews. Montreal, Maine and Atlantic15 and Wisconsin Central prior to its purchase by CN have operated trains with single-person crews in the United States. Their operations have been suspended, however, for various economic and/or state regulatory reasons.

One railroad that continues to employ single-person crews is Class II INRD, a regional railroad located in the US Midwest. INRD runs approximately 40 percent of its trains with single-person crews.16 The INRD operates over about 500 miles of track, including in downtown Indianapolis.17 Another railroad that makes limited use of single-person crews is the Genesee & Wyoming (G&W).

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14 “Data drought haunts FRA crew-size mandate,” Railway Age, April 2014, op. cit.
15 In the case of the MM&A, single-person crew operations were suspended after an incident on July 6, 2013, where the engineer of a single-person crewed train failed to properly secure his train. The train rolled uncontrolled into the town of Lac Megantic, Quebec, derailed, and exploded, killing 47 people. The subsequent Transportation Safety Board (TSB) investigation, however, could not conclude “whether single-person train operations contributed to the incorrect securement of the train or to the decision to leave the locomotive running … despite its abnormal condition” (TSB Railway Investigation Report R13D0054, p. 131).
16 Regional railroads are defined by the Association of American Railroads as non-Class I line-haul railroads earning revenue of at least $40 million, or that operate at least 350 miles of road and earn at least $20 million in revenue. Data on percentage of trains run with single-person crews from Robert Babcock, Senior Vice President of Operations and Business Development, INRD, email dated May 13, 2014.
17 Indiana Rail Road website.
3. Canadian Operations

Canadian railroad legislation permits the use of single-person crews, as long as certain parameters are met and Transport Canada determines that there is no risk to safe railroad operations.18 Two smaller railroads in Canada have regularly operated with single-person crews: the Montreal, Maine and Atlantic (MM&A) and the Quebec North Shore and Labrador (QNS&L). QNS&L was the first long-haul freight railroad in Canada to move to operations with a sole locomotive engineer. The QNS&L operates heavy iron ore unit trains from mine to port through a remote territory in Labrador which experiences severe winter weather. In addition to ore trains, it operates limited passenger and general freight traffic. Two-person crews however are used for the mainline operations of Canada’s two major (Class I size) railroads – Canadian National and Canadian Pacific.

After an incident in July 1996, the Transportation Safety Board of Canada required the implementation of certain safety measures where single-person crews were in use.19 One of the key requirements was the installation and operation of proximity detection devices (PDD) on all lead locomotive units, track units, and on-track vehicles operating on main line track. These devices use GPS-based tracking of all trains on the line, with connection to a central server, and can alert the locomotive engineer if a train is approaching another train on the track. Organizational changes, such as specific dispatcher training for single-person crews and fatigue controls, were also implemented.

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IV. International Experience with Single-Person Crews

A. Relevant Deployment

Single-person crews for trains are common in mature international rail markets similar to the US in size and complexity. As in the United States, these markets generally have a long history of passenger and freight rail operation, well developed safety oversight and regulatory regimes, and have taken advantage of modern technology to improve safety while reducing crew sizes. The use of single-person crews is common practice on most freight railroads the world over, including DB Schenker (Germany), SNCF (France), Green Cargo (Sweden), Rail Cargo Austria, and Aurizon (Queensland/NSW), as well as on the passenger operations in those countries.

Data on a number of mature rail networks that make use of single-person operations are shown in Exhibit IV-1 on the next page (the US is included for comparative purposes). The systems shown are “mixed” systems that include both freight and passenger services. All systems, except Queensland, feature higher train densities than the US, by as much as seven to eight times. Although the US runs the heaviest freight trains on average, several systems also have comparable ratios of single track, while Germany, Japan, and the UK have comparable train-miles.

The next section profiles several case studies of operational and safety conditions that pertain to single-person crew operation within the European Union.
### Exhibit IV-1: Mature International Rail Systems with Single-Person Train Operations

<table>
<thead>
<tr>
<th>Rail Network</th>
<th>Country</th>
<th>Rail line mileage</th>
<th>Gross ton-miles millions, freight</th>
<th>Train-miles thousands, total</th>
<th>Ratio: Passenger to freight trains</th>
<th>Network type</th>
<th>Train density train miles per line mile</th>
<th>Single-line track ratio</th>
<th>Average freight train weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Class I</td>
<td>USA</td>
<td>120,817</td>
<td>2,992,769</td>
<td>498,746</td>
<td>5%</td>
<td>Heavy-haul freight, minimal freight</td>
<td>4,128</td>
<td>83%</td>
<td>6,289</td>
</tr>
<tr>
<td>Queensland</td>
<td>Australia</td>
<td>5,352</td>
<td>56,515</td>
<td>23,930</td>
<td>36%</td>
<td>Heavy-haul freight, some passenger</td>
<td>4,471</td>
<td>91%</td>
<td>3,691</td>
</tr>
<tr>
<td>OBB/RCA</td>
<td>Austria</td>
<td>3,132</td>
<td>30,930</td>
<td>89,203</td>
<td>69%</td>
<td>Light freight, predominant passenger</td>
<td>28,483</td>
<td>65%</td>
<td>1,122</td>
</tr>
<tr>
<td>Deutsche Bahn</td>
<td>Germany</td>
<td>20,949</td>
<td>184,357</td>
<td>642,332</td>
<td>75%</td>
<td>Light freight, predominant passenger, high speed</td>
<td>30,662</td>
<td>46%</td>
<td>1,155</td>
</tr>
<tr>
<td>Trafikverket</td>
<td>Sweden</td>
<td>6,188</td>
<td>31,826</td>
<td>81,897</td>
<td>68%</td>
<td>Light freight, predominant passenger, high speed</td>
<td>13,234</td>
<td>82%</td>
<td>1,223</td>
</tr>
<tr>
<td>Network Rail</td>
<td>UK</td>
<td>10,016</td>
<td>28,778</td>
<td>351,160</td>
<td>93%</td>
<td>Minimal freight, predominant passenger, high speed</td>
<td>35,061</td>
<td>26%</td>
<td>1,192</td>
</tr>
<tr>
<td>RFF/SNCF</td>
<td>France</td>
<td>18,546</td>
<td>81,775</td>
<td>301,280</td>
<td>84%</td>
<td>Light freight, predominant passenger, high speed</td>
<td>16,245</td>
<td>42%</td>
<td>1,704</td>
</tr>
<tr>
<td>FS</td>
<td>Italia</td>
<td>11,194</td>
<td>N/A</td>
<td>207,165</td>
<td>85%</td>
<td>Light freight, predominant passenger, high speed</td>
<td>18,507</td>
<td>53%</td>
<td>N/A</td>
</tr>
<tr>
<td>Japan Rail</td>
<td>Japan</td>
<td>11,986</td>
<td>N/A</td>
<td>433,608</td>
<td>Minimal freight, predominant passenger, high speed</td>
<td>36,177</td>
<td>61%</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

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B. Operating Case Studies: European Union

In the European Union, single-person crew operation has two preconditions:

- The presence of a working dead-man control system on the locomotive. This system involves a pedal or button that must be periodically pressed, thereby signaling that the train engineer is active and alert. If the device is not pressed when required, the train will come to a stop.

- The locomotive is equipped with working Automatic Train Control/Automatic Train Protection (ATC/ATP), which is similar to CTC in the United States. That is, ATC/ATP enables dispatchers to remotely operate signals and switches to ensure trains do not make conflicting movements.

As noted above, single-person crews in Europe operate in a somewhat different operating environment from North America. Specifically, population density and network density/train density on the network is higher in most EU countries than for much of North America outside of urban centers.

European rail lines are traditionally equipped with line-side signaling and interlocking facilities, which have recently been centralized into larger control centers, similar to North American CTC. In most countries, ATC/ATP systems have been installed for a long time. Temporary slow orders and other exceptional circumstances along the train run are typically communicated to train crews in written or electronic form before departure; their transmission via radio is possible, but confined to exceptional situations such as line-side signal failures.

Dark territory and operating regimes in which safety depends on (radio) communication and/or track warrants exchanged between the train crew and a central dispatcher are limited to low-density lines with low speeds and limited traffic. Such lines are often operated with single-person train crews, but supported as necessary by ground personnel. Consequently, in most European countries, a second crew member is required by regulation only in exceptional cases, such as equipment failures.

Three case studies are presented below that present more detail on the specific operating characteristics of European railroads operating single-person crews: Germany, Italy, and Sweden.

1. Germany

Germany has one of the largest and densest rail networks in Western Europe and carries significant freight volumes (compared to many other EU countries). With the exception of two dedicated high-speed lines, the entire network runs mixed freight and passenger traffic. On some of the more heavily traveled double-track lines, train volume can exceed 200 trains per day in both directions.
Germany was one of the first countries to implement an ATP system. The “Indusi” (short for Induktive Zugsicherung) was introduced in the 1920s and subsequently spread across nearly the entire network. It is based on track-side magnets that emit various frequencies, which stand for stopping signal, proceed with limited speed, and a warning to expect a stopping or speed limiting signal. While the line-side equipment has remained largely unchanged, the Indusi devices mounted on locomotives have seen steady improvement to reflect higher speeds and increased safety standards. Since 1972, the Indusi system also has been able to monitor train speed ahead of critical speed restrictions that are not protected by signals. This function is achieved by placing a sequence of Indusi magnets in a segment of track ahead of the speed restriction. For about the same period of time, dead-man devices (called “Sifa”) have been in use on German railroads to ensure the engineer’s attention and ability to work.

Single-person crews were introduced with the abolishment of steam traction in the 1950s and 1960s. With the introduction of electric and diesel engines and the essential safety systems of Indusi (ATC/ATP) and Sifa (dead-man device) already in place, eliminating the second crew member on the locomotive was widely seen as a natural productivity gain.

A second crew member was still required for speeds above 140 km/h (87 mph) by the “Eisenbahn-Bau- und Betriebsordnung” (EBO), the basic legal directive regarding railroad safety in Germany, until 1991. By the end of the 1980s, however, a new generation of Indusi locomotive devices had been introduced that could automatically adjust for high-speed braking on curves. Following this modification and after field testing, the requirement of having a second crew member for speeds above 140 km/h (87 mph) was abandoned with the third revision of the EBO in 1991.

As a result of this development, a second crew member (“Triebfahrzeugbegleiter” or locomotive assistant) is required only in exceptional circumstances:

- In case of a failure of the dead-man device, train speed is limited to 50 km/h (31 mph) unless a second crew member is present in the cabin. The second crew member needs to be able to stop the train in case of the inability of the engineer to work (apply the brakes, turn off engine power, and secure the train by applying the hand brake once stopped) and call for help over the radio. To perform these tasks, the second crew member does not need to be a qualified engineer; this task can be performed by other employees such as conductors (passenger trains), switchers, or car inspectors.

• If the locomotive is only equipped with an Indusi device of older type, and so does not provide distance and time-dependent supervision of braking curves, train speed is limited to 140 km/h (87 mph) unless a second crew member is present in the cab. The second crew member needs to be able to observe the correct approach of the train to a stopping signal or a signal limiting its speed, thus substituting the continuous supervision of the braking curve performed by a more modern Indusi device. In these cases, the second crew member needs to be a qualified engineer.

There are no limitations in Germany on freight train size, train weight, or carriage of hazardous materials when trains are operated by single-person crews.

In passenger service, single-person operation (engineer-only operation) of trains is widespread on regional low density lines, on suburban networks, and more recently on bigger regional trains. In some of these cases, there may be a second employee on board the train who is not trained in operations and who only performs commercial tasks such as ticket inspection.

2. Italy

Italy only recently made the transition from two-person to one-person crews. Similar to other European countries, most of the network is electrified and has mixed passenger and freight operations; a few recently built high-speed lines are the exception to this rule.

Until recently, Italy did not have an ATC/ATP system covering the most important lines on the network. There was a cab signaling system “rs4codici” (similar to American Pulse Code Cab Signaling) in place,23 which only covered high-speed and some of the more important main lines. It systematically excluded bigger stations and many passing tracks. Also, there were no dead-man devices mounted on locomotives.

Starting in 2003, a new state-of-the-art ATC system, Sistema di Controllo della Marcia del Treno (SCMT), was introduced and installed on the entire core network, as well as parts of the secondary network. The system is a national implementation of the ETCS concept (the European version of PTC). It transmits infrastructure data, most importantly permitted speed, to the locomotive at fixed locations along the track, typically at signals. Speed and speed reductions are then monitored by the locomotive device, which also includes a dead-man function, and the SCMT can apply emergency braking automatically. The remaining network of about 4,900 km has been equipped with the simpler Sistema Supporto Condotta (SSC), based on microwave

23 Cab signaling is a system which provides a display of upcoming track signals inside the locomotive cab.
transponder technology, which only displays information, such as traffic signals, speed limits, and special conditions, in the cab for the engineer.24

Single-person crews have been introduced in line with equipping the network with modern ATC/ATP systems. Freight trains are permitted to be operated with single-person crews and are in use on new entrant operators. Italy’s largest rail freight operator, Trenitalia Cargo, still relies on two-person crews, but this is considered to be primarily for social reasons, i.e., a result of labor union resistance.

Passenger trains are generally operated with single-person crews and a minimum of one conductor present in the train, but not in the locomotive cab. The conductor may be required to assist the engineer in certain circumstances (i.e., a train recovery or equipment failure).

3. Sweden

Sweden’s rail system is in some respects more similar to North American freight rail operations than those of other European countries. Specifically, train densities are lower than in central/western Europe, there is a higher proportion of single-track lines, and climate conditions are similar to the north/central portions of the US and Canada. In addition, lines in northern Sweden are in remote areas with no road access for long stretches of the network.

The entire Swedish rail network operates mixed passenger and freight services (although passenger train density in the upper north is low by European standards (2-4 trains per day in each direction). All passenger and freight trains in Sweden operate with single-person crews.

The Swedish ATC/ATP system (EBICAB) uses track-side bases to transmit signaling information to on-board devices mounted on locomotives and multiple units. It was rolled out originally in 1979-1980. In addition to ATC/ATP, all locomotives are equipped with a dead-man device.

There are no limitations on train size, train weight, or carriage of hazardous materials when trains are operated by single-person crews in Sweden. In addition, there is extensive use of remote-controlled locomotives, both for switching as well as for line-haul.

Single-crew operation notably also extends to iron ore trains operated by the mining company LKAB in northern Sweden, which run from mines in remote areas to ports and steel works on the coast. These trains are over 9,500 US tons with 264,000 pound car load limits. In winter,

24 Rete Ferroviaria Italiana (RFI): Website. Sicurezza e tecnologia. SCMT, per il controllo della marcia del treno / SSC, per il supporto alla guida (http://www.rfi.it/cms/v/index.jsp?vgnextoid=7c908c3e13e0a110VgnVCM10000080a3e90aRCRD and http://www.rfi.it/cms/v/index.jsp?vgnextoid=e3908c3e13e0a110VgnVCM10000080a3e90aRCRD).
temperatures can fall to -30° C (-22° F) and long stretches of this single track railroad are not accessible by road. Crew composition has not been identified as a factor in any incidents involving train operation.

C. Safety Record

As the case examples above make clear, single-person crew operations are common on mixed-use rail systems in Europe with high train densities, provided that safeguards are in place – be they automated train control or some other protection system – to provide a safety backup to the engineer.

Given the long history and widespread use of single-person crews in various European countries, it is possible at a summary level to consider the impact of such operations on safety. According to the European Railway Agency (ERA), there has been a positive long-term trend of declining rail accident risk within the EU, despite significant reductions in overall railroad staff and the expansion of single-person operations over the same period (Exhibit IV-2).

Exhibit IV-2: Fatal Train Collisions and Derailments, EU 27 Nations, Switzerland, and Norway, 1990-2013

Per billion train-kilometers

Since efforts to harmonize European rail systems are recent and safety systems and standards do vary among EU member nations, it is important to note that there are still significant differences in the level of rail safety attained by individual EU countries. Most important to note, however,

is that those European countries with the best safety record (< 0.2 fatalities and weighted serious injuries per million train-km, 2007-2012) are Luxembourg, the United Kingdom, the Netherlands, Norway, Ireland, France, Denmark, Germany, Sweden, Portugal, and Spain. In all of these countries, railroads operate with single-person crews.

**Exhibit IV-3: European Union: Fatalities and Weighted Serious Injuries, 2007-2012**

Per million train-kilometers

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V. Safety Analysis and Comparison

Safety is of paramount concern to railroad regulators and operators. The FRA highlights the importance of safety in its mission statement, listing it first, i.e., “The Federal Railroad Administration’s mission is to enable the safe, reliable, and efficient movement of people and goods for a strong America, now and in the future.”

Railroads likewise have a similar focus on safety and consider it part of their corporate culture. Therefore, it is not surprising that extensive data is collected and analyzed for every railroad incident and accident in an effort to prevent future events. As described in this section, Oliver Wyman reviewed the availability of rail safety data for both the US and Europe, screened the data to arrive at a subset of safety statistics potentially relevant to the evaluation of the safety of single-person crews, and finally, compared these safety statistics for single- and multiple-person crews.

A. Availability and Reporting Requirements for Railroad Safety Statistics

Data covering many different aspects of railroad incidents, accidents, and casualties is generated by railroads and tracked by rail regulatory authorities. Reporting categories for equipment and infrastructure incidents and accidents include collisions, derailments, fires, explosions, acts of god, and other events involving mechanical or infrastructure failure or human error that result in damage. Reporting categories for casualties include injuries resulting in medical treatment, loss of consciousness, time away from work, restricted work, job transfer, and death.

The FRA and ERA both collect incident data from the railroads and store the information in electronic databases that are available to the general public. Data collection is ongoing, and thus data is both current and supported by many years of history. Additionally, the incident, accident, and casualty reports provided by the railroads are required by federal law, and must therefore contain information that is accurate and complete to the highest degree possible.

• Under federal law, US railroads are required to report all fatalities, grade crossing collisions, grade crossing signal equipment failures, and rail traffic signal equipment failures to the FRA. In addition, railroads must report rail equipment incidents and personal injuries to the FRA subject to certain financial and medical treatment thresholds, respectively. Publicly available

29 Oliver Wyman also reviewed the availability of rail safety data for Canada. Transport Canada, Canada’s transportation regulatory agency, only has made rail safety data up to 2009 available. As a result, the potential for comparison of Canada, US, and European railroads is limited. Rail safety data for Canada was thus omitted from this analysis, due to a lack of data transparency.
data is grouped into the following categories: rail equipment accidents, railroad casualties, highway-rail accidents, and signal equipment failures. The FRA also collects operational data from the various railroad companies concerning train-miles and employee hours to provide a basis of comparison for safety data.

• In the European Union, member state railroad regulatory agencies are required to report safety-related incidents meeting certain specified thresholds to the ERA. Publically available data is grouped into the following categories: rail equipment accidents, railroad casualties, grade-crossing accidents, and signals passed at danger (SPADs).31 Like the FRA, the ERA also collects operational data for the purpose of providing a consistent basis for comparison of safety statistics.

Comparing FRA data across categories and years is relatively straightforward, as is the internal comparison of ERA data. However, comparing FRA data with ERA data presents some challenges. Each organization has its own mandates detailing which data is to be collected and at what level of detail. These differences are largely due the agencies’ different purposes in collecting data:

• The FRA uses the data it collects to develop hazard elimination and risk reduction programs for the railroad industry that focus on preventing railroad injuries and accidents.32 To develop effective safety programs, the FRA must collect data concerning not only the “who, what, and where” of an incident, but also the “how and why.” Thus, the safety data collected by the FRA includes all of the basic information concerning an incident, as well as information on the underlying causes and circumstances.

• The ERA collects statistics based on agency-defined common safety indicators (CSIs) “to facilitate the assessment of the achievement of [common safety targets] and to provide for the monitoring of the general development of railroad safety.”33 CSIs are not expected to provide the same level of detail as the safety databases of individual railroads and infrastructure management companies, which are tailored to specific company needs.34 Consequently, the available public data provides for limited analysis of underlying incident causes and circumstances.

Exhibit V-1 contains a summary of key differences between the FRA and ERA data, along with the corrective measures Oliver Wyman took to enable direct comparison, and a consideration of

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31 According to the ERA, SPADs occur when any part of a train proceeds beyond its authorized movement.
any remaining differences that could potentially bias the results of the comparisons between the two data sets.

**Exhibit V-1: Differences in FRA and ERA Data, Corrective Measures Taken, and Potential Bias**

<table>
<thead>
<tr>
<th>Category</th>
<th>Item</th>
<th>FRA</th>
<th>ERA</th>
<th>Corrective Measure</th>
<th>Potential Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment incidents</td>
<td>Minimum cost threshold for reporting</td>
<td>$10,500</td>
<td>€150,000</td>
<td>Eliminated all US incidents below €150,000 in cost</td>
<td>None after correction</td>
</tr>
<tr>
<td></td>
<td>Hospitalization</td>
<td>Hospital stays not reported</td>
<td>Only reported if there is a 24-hour minimum hospital stay</td>
<td>Eliminated US injuries resulting in less than eight lost working days</td>
<td>Not clear what bias this may introduce</td>
</tr>
<tr>
<td>Fatalities</td>
<td>Length of time after accident</td>
<td>Any fatality occurring within 180 days of the accident is recorded</td>
<td>Any fatality occurring within 30 days of the accident is recorded</td>
<td>None – data does not show date of death relative to date of incident</td>
<td>May show more deaths for US railroads</td>
</tr>
</tbody>
</table>

**B. Potentially Relevant Safety Statistics**

Only certain data from the FRA and ERA datasets will be relevant to evaluating the effect of road train crew size on railroad safety; specifically, this includes data on incidents where the crew has some control, and where the presence of multiple persons versus one person in the cab could arguably make a difference in the outcome of the incident. What follows is a description of the various safety-related incident categories for which data is collected and publicly available, and which data could be relevant in assessing road train crew size as it relates to safety performance.

1. **Equipment Incidents: Potentially Relevant to Crew Size Analysis**

Equipment incidents include train derailments, collision, fires, explosions, etc. Derailment and collision information, in particular, may be useful for evaluating road train crew safety performance as it relates to crew size. For the purpose of the present analysis, records were screened to ensure that only incidents potentially related to train crew actions were considered (i.e., derailments and collisions with railroad equipment that have a human factor cause). Data concerning the cause of the incident is a key screening criterion, as only incidents that are listed as due to human error in train operation are relevant to an evaluation of train crew safety performance.
2. **Casualties: Potentially Relevant to Crew Size Analysis**

Casualties include both injuries and fatalities. Data regarding such events may be useful in evaluating road train crew safety performance as it relates to crew size. It is important, however, to consider only incidents that may relate causally to a crew’s actions. Therefore, Oliver Wyman screened the data for the type of person injured or killed (e.g., employee, passenger, third party), geographic location of injury, on-track equipment involved, events leading up to the injury, and the stated cause of injury, to weed out incidents that could not have been related to the actions of the train crew.

Oliver Wyman determined that criteria for a casualty incident that could bear some relationship to the actions of a road train crew would include the involvement of a person authorized to be in close proximity to on-track rail equipment, occur on or near the railroad right-of-way, as well as on or near on-track rail equipment, and stem from actions relating to train movement. As a practical matter, trespassers on railroad property were excluded from the analysis, as it is not reasonable to expect a train crew to be aware of an unauthorized person’s presence at all times.

It is worth noting that by virtue of reducing the number of people on a train crew, the number of operating personnel exposed to potential injury is reduced. As a result, the implementation of single-person crews should reduce the overall number of train crew casualties. Still, there are other railroad employees (car men, locomotive mechanics, maintenance of way employees, managers, etc.), as well as other parties, that can be affected by the actions and decisions of train and engine employees. Consequently, the reduction in crew size by half may not necessarily result in a similar reduction in overall casualties.

3. **Red Block Violations (SPADs): Potentially Relevant to Crew Size Analysis**

“Red block violations,” also called SPADs outside of North America, are incidents where a train continues beyond a line-side traffic control signal requiring the train to stop. The failure to stop puts the train onto a section of rail line that it does not have authority to occupy. While incidents reported only as red block violations do not involve derailments, collisions, or injuries, they indicate the potential for a serious incident. Violations are therefore treated as precursor events. As they may indicate human error, such violations may be potentially relevant to an evaluation of crew safety performance.

Red block violation data is publicly available from the ERA. In the United States, however, such information, while collected and tracked by the railroad operators, is not made available to the general public. Nevertheless, several US Class I railroads made their red block violation data available for the purposes of this study. Consequently, a SPAD comparison between US Class Is and some of their European counterparts was made to provide some insights into crew safety performance relative to crew size.
4. **Grade Crossing Incidents: Not Relevant to Crew Size Analysis**

The potential utility of grade crossing incidents in measuring road train crew safety performance as it relates to crew size is limited. Grade crossings, also called level crossings outside of North America, are at-grade intersections between roads and railroads. A grade crossing incident involves the collision between a motor vehicle (or pedestrian) using the road portion of the crossing and a train on the rail portion of the crossing.

According to the US Federal Highway Administration, “Motorists bear most of the responsibility for avoiding collisions with trains,” as drivers of motor vehicles can more easily control the direction and speed of their vehicles than can an engineer in control of a freight or passenger train. Consequently, when motor vehicles and trains meet at a grade crossing, it is the motor vehicle that must yield the right of way. When grade crossing collisions occur, it is almost always due to the motorist’s failure to properly yield the right of way, and the data bears that out. According to the FRA Equipment Incident database, 99.87 percent of all highway-rail crossing collisions are due to motor vehicle driver error.

5. **Signaling Failures: Not Relevant to Crew Size Analysis**

Signaling failures occur when grade crossing or rail traffic control equipment malfunctions in some way. The malfunction could be due to the equipment’s manufacture, installation, inspection, or maintenance. As a train crew is not responsible for any aspect of a railroad’s signaling equipment, short of complying with its indications, signaling failures are not useful in evaluating train crew performance. Further, as the train crew does not have any influence on signal equipment failures, neither does the size of the crew have any impact.

C. **Statistical Comparison of Relevant Safety Data: Intra-US**

The utility of FRA data in evaluating the safety performance of single-person versus multiple-person crews is limited, due to the fact that there are no railroad operators in the United States that use single-person crews exclusively. There are some railroads whose multiple-person crew operations resemble single-person crew operations (they have a single engineer in the locomotive cab, but other crew members present behind the locomotive on board the train) and can be utilized as representative of single-person crew operations. These rail operators, as described in

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36 As the FRA’s grade crossing incident database does not assign cause codes to incidents, it was necessary to look for data elsewhere. The FRA’s equipment incident database contains records for grade crossing incidents that meet the minimum equipment damage thresholds established by the agency for inclusion in the database. More importantly, the incident records contain cause codes. Of the 1,594 non-duplicative grade crossing incident records during the 2006 to 2013 timeframe, only two incidents were not blamed on motorists. One incident involved a multiple-person crew’s failure to flag a highway crossing (FRA cause code H205) on a short line railroad. The other incident involved a grade crossing signaling equipment failure (M307).
Section III, include Amtrak and some commuter railroad authorities. In addition, INRD, a Class II regional freight railroad, operates some of its road trains with single-person crews, and was included in this study as representative of single-person crew operations.

For multiple-person crew operations, Class I and regional railroad operators are representative.

- Class I railroads use multiple-person crews exclusively to move freight trains on main lines (where service density is highest) and provide extensive safety reporting data to the FRA.
- Regional railroads, with the exception of INRD, typically operate trains with multiple-person crews and likewise provide extensive safety reporting data to the FRA.

Oliver Wyman utilized FRA data for the above operators\(^37\) for the years 2007 through 2013 to compare the safety performance of single-person crews to multiple-person crews.

To evaluate the safety performance of single-person crews versus multiple-person crews in relation to equipment incidents and casualty incidents, Oliver Wyman compiled all publically available FRA records for the representative rail operators for 2007 through 2013 on incidents that were potentially affected by the choices, actions, or inactions of a train crew, regardless of crew composition. Further, as this analysis concerns only road train crew performance, only freight, passenger, commuter, and work trains, along with light locomotive moves, were included in the analysis. These are generally the only types of equipment movements under the control of a road train crew.\(^38\)

1. Equipment Incident Analysis

For the equipment incident analysis, all derailments and collisions (save for grade crossing collisions for the reasons given above) that reported a human factor were analyzed. Of those records, all human factor causes not related to actions attributable to a train crew (such as failure to properly secure engines or cars by a non-railroad employee, absence of a blue signal, and improper instruction to train/yard crew) were excluded.

Data compilation resulted in 2,169 equipment incident records.\(^39\) These records were then aggregated into the railroad groups of Amtrak, Commuter, Class I, INRD, and Regionals. When divided by millions of train miles, the equipment incident rate for each group was obtained. Exhibit V-2 shows the seven-year incident rates for the five groups based on this data.

\(^37\) See Exhibits A-1 through A-3 in the Annex for lists of the commuter, Class I, and regional railroads included in the analysis.

\(^38\) See Exhibits A-4 through A-6 in the Annex for complete lists of accident types, human factor cause codes, and equipment types included and excluded from the analysis.

\(^39\) See Exhibit A-7 in the Annex for a table showing how the application of data filters affected the number of equipment incident records remaining in the analysis.
**Exhibit V-2: Equipment Incident Rates for Representative Rail Operator Groups, 2007-2013**

Aggregate data for incidents potentially related to train crew size

<table>
<thead>
<tr>
<th>Incident records</th>
<th>Train-miles (millions)</th>
<th>Incident rate (incidents per million train-miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amtrak</td>
<td>63</td>
<td>270.5</td>
</tr>
<tr>
<td>Commuter</td>
<td>125</td>
<td>384.8</td>
</tr>
<tr>
<td>INRD</td>
<td>2</td>
<td>1.6</td>
</tr>
<tr>
<td>Class I</td>
<td>1,897</td>
<td>3,562.9</td>
</tr>
<tr>
<td>Regionals</td>
<td>82</td>
<td>74.7</td>
</tr>
</tbody>
</table>

For the past seven years, Amtrak and commuter railroads have had a lower equipment incident rate than the Class Is and other regional railroads. While it is impossible to say whether fewer passenger/commuter equipment incidents are at least in part due to a reliance on single-person crews and not to other factors, clearly the statistics show that such operations are as safe from an equipment incident perspective as those using multiple-person crews.

INRD has an equipment incident rate that is slightly higher than the other regionals. This figure is misleading, however. First, one of the two human-factor equipment incidents INRD suffered involved a three-person crew. The other involved a single-person crew where the engineer did not apply enough dynamic braking to control his train. In such a situation, a second person in the cab would have made little difference, as that person would not have had access to the locomotive controls. In addition, that person would most likely have been a trainman and not certified to operate a locomotive. Finally, for the years 2009 through 2013, INRD did not have a single human-factor derailment. Here, total incidents provide a better analysis of incidents due to INRD’s small size. Further, the two equipment incidents had nothing to do with crew composition. Crew communication and poor train handling were the culprits, not crew size.

Because of the comparative rarity of equipment incidents, particularly in the case of INRD, it may be instructive to look at the equipment incident data in a different way. Using the incident data to determine the annual equipment incident rates for each group, it is possible to calculate the minimum, 25th percentile, median, 75th percentile, and maximum incident rate values for each group. When plotted on a chart, as shown in Exhibit V-3, one can see the variability of incident rates for each group of operators. In the case of INRD, it is apparent that it has the greatest variability, which further underscores the fact that one incident can greatly skew the statistics in what is otherwise a good safety record. Class Is have the least amount of variability, indicating greater consistency in the number of incidents suffered. Amtrak and the commuter authorities

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Source: FRA, Oliver Wyman analysis.
have slightly larger spreads than the Class Is, but they are below the minimum posted by the Class Is. The median rates for Amtrak and commuters, as well as INRD, also are below those for Class I and regional railroads. While the data may not conclusively support a claim that single-person crew operations are safer than multiple-person crew operations (given the possible existence of other influencing factors), it does appear that single-person crew operations are at least as safe as multiple-person crew operations.

Exhibit V-3: Annual Equipment Incident Rates for Representative Rail Operator Groups, 2007-2013
Aggregate data for incidents potentially related to train crew size; minimum, 25th percentile, median, 75th percentile and maximum values, per million train miles

2. Casualty Incident Analysis

For the casualty incident analysis, the following records were analyzed:

• Incidents involving on-duty railroad employees, contractors, volunteers, and non-trespassers. Since these people are authorized to be in close proximity to on-track equipment, a train crew can reasonably be expected to be aware of their presence and location.

• Incidents occurring in close proximity to the railroad right of way and on or near trains, locomotives, or rolling stock, either moving or stationary.

• Incidents involving events, causes, physical acts, and tools directly related to train, locomotive, and on-track equipment operation.42

41 Source: FRA, Oliver Wyman analysis.
It should be noted that incidents involving grade crossing collisions and remote control locomotive (RCL) operations were eliminated. As mentioned above, grade crossing collisions are usually the fault of the motor vehicle operator. Road train crews have little control over the casualties incurred as a result of such incidents.

The foregoing data collection resulted in 417 casualty records, which were aggregated into the rail operator groups: Amtrak, Commuter, Class I, INRD, and Regional. The incident numbers for each railroad group were divided by each group’s total employee hours to arrive at a casualty incident rate (incidents per 200,000 employee hours). Exhibit V-4 shows the seven-year incident rates for the five groups based on this data.

Exhibit V-4: Casualty Incident Rates for Representative Rail Operator Groups, 2007-2013

<table>
<thead>
<tr>
<th>Operator Type</th>
<th>Cab Crew Size</th>
<th>Total Incidents</th>
<th>Total Employee Hours (millions)</th>
<th>Incident Rate (Incidents per 200,000 employee hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amtrak</td>
<td>Extensively single-person</td>
<td>17</td>
<td>268.8</td>
<td>0.01</td>
</tr>
<tr>
<td>Commuter</td>
<td>Extensively single-person</td>
<td>41</td>
<td>390.8</td>
<td>0.02</td>
</tr>
<tr>
<td>INRD</td>
<td>Some single-person</td>
<td>0</td>
<td>2.6</td>
<td>0.00</td>
</tr>
<tr>
<td>Class I</td>
<td>Multi-person</td>
<td>348</td>
<td>2,263.8</td>
<td>0.03</td>
</tr>
<tr>
<td>Regional</td>
<td>Multi-person</td>
<td>11</td>
<td>79.2</td>
<td>0.03</td>
</tr>
</tbody>
</table>

For the past seven years, Amtrak, commuter groups, and INRD have had a lower casualty incident rate than the Class I and regional railroads. Due to the fact that there are many different factors involved in casualty incidents, it cannot be stated with certainty that the difference in casualty performance is due to crew composition. However, the data does not indicate that those railroad operators making use of single-person crews are any less safe than those using only multiple-person crews, because their casualty incident rates are no higher than those of rail operators with multiple-person crews.

As with equipment incidents, it may be instructive to look at the variability of the annual casualty incident rates for the five railroad groups. Exhibit V-5 shows the minimum, 25th percentile, median, 75th percentile, and maximum casualty rate for each railroad group.

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42 See Exhibits A-8 through A-15 in the Annex for complete lists of person types, locations, physical acts, injury causes, events, and tools included and excluded from the analysis.
43 See Exhibit A-16 in the Annex for a table showing how the application of data filters affected the number of casualty incident records remaining in the analysis.
44 Source: FRA, Oliver Wyman analysis.
Exhibit V-5: Annual Casualty Incident Rates for Representative Rail Operator Groups, 2007-2013\textsuperscript{45}

Aggregate data for incidents potentially related to train crew size; minimum, 25\textsuperscript{th} percentile, median, 75\textsuperscript{th} percentile and maximum values, per 200,000 employee hours

In Exhibit V-5, the range between maximum and minimum rates for Amtrak and commuter operators generally overlaps those of the Class I railroads. As the annual rates for Amtrak and commuters are generally lower than those for the Class Is, indicating fewer casualty incidents, this analysis also shows that one-person crew operations are as safe as multiple-person crew operations.

As for INRD and other regionals, there is not much to compare. INRD suffered no human-factor casualty incidents between 2007 and 2013. Other regionals show the largest spread between minimum and maximum values of all the groups, indicating a greater level of variability. The greater variability is largely due to the fact that injuries or fatalities stemming from train crew actions are generally rare. Thus when a casualty does occur, it creates a wide fluctuation in annual rates. Nevertheless, the data does not support the view that multiple-person crews have lower casualty rates. All the data shows is that those rail operators using single-person crews are at least as safe as their counterparts relying on multiple-person crew to operate their trains.

\textsuperscript{45} Source: FRA, Oliver Wyman analysis.
D. Statistical Comparison of Relevant Safety Data: US versus Europe

1. Comparing US and European Safety Records

Section IV.A above provides an overview of rail systems comparable to the US in terms of market maturity, regulatory oversight, and technological development in which single-person train operation is frequently the norm. As illustrated by the case studies in Section IV.B, many European railroads employ single-person train crews throughout their national networks. In particular, France, Germany, Italy, Sweden, and the United Kingdom – some of Western Europe’s largest railroad networks in terms of train-kilometers – have used single-person crews to staff both freight and passenger trains for years, sometimes decades. Consequently, the safety performance of the rail operators in these countries presents a potential basis for comparison to the US Class I railroads and their multiple-person crew operations.

2. Comparison of Derailment and Collision Data

According to the ERA, train derailments and collisions belong to a group of events simply called “accidents.” For an event to be considered an accident, it must be “an unwanted and unintended sudden event or a specific chain of such events which have harmful consequences.” To be recorded in CSI statistics, an accident also must be “significant,” where significant accidents are defined as:

- Unwanted or unintended
- Related to a rail vehicle in motion
- Caused at least one fatality or seriously injured person; or damage to rolling stock, track, other installations, or environment that is equivalent to €150,000 or more; or forced suspension of train services on a main railroad line for six hours or more
- Did not occur in a workshop, warehouse, or depot

The FRA’s minimum thresholds for reporting equipment incidents like derailments and collisions are much lower than the ERA’s. Currently, the FRA requires rail equipment incidents involving trains, rolling stock, and other on-track equipment, either moving or standing, and meeting the minimum reportable damage threshold of $10,500 be reported.

47 Ibid.
48 Railroad Reporting Thresholds, Table 9.06, Federal Railroad Administration.
To develop a comparative data set, records involving equipment derailments or collisions were collected from the FRA’s Equipment Incident database. A euro value was calculated from the total damage amount contained in each equipment incident record. If the resulting euro value was less than the €150,000 threshold required by the ERA, the record was then evaluated to determine if any injuries or fatalities were associated with the incident described. If no injuries or fatalities were evident, the record was eliminated from further consideration.

The remaining records were then evaluated for equipment type, speed, and railroad type. Any record involving a single railcar, cut of railcars, or yard and switching activities were eliminated, as the CSIs published by the ERA involve trains only. The ERA defines a train as “one or more railroad vehicles hauled by one or more locomotives or railcars, or one railcar travelling alone, running under a given number or specific designation from an initial fixed point to a terminal fixed point.”

Speed was considered, because, according to the ERA, an accident involves moving railroad vehicles. Incident records in the FRA data showing no speed were looked at more closely to ensure that there truly was no motion related to the incident. After reading through the narratives, it was determined that only ten of those records involved no motion, and these were consequently eliminated from the analysis. Finally, since all US Class I rail carriers employ multiple-person crews for train operation, only those carriers meeting the definition of a Class I remained in the analysis.

Once duplicate records were eliminated, 1,051 records remained (121 collisions and 930 derailments). When aggregated into years of occurrence and divided by total train kilometers, the collision and derailment rates for US Class I railroads from 2007 to 2012 are as shown in Exhibit V-6.

### Exhibit V-6: Annual US Collision and Derailment Rates per Million Train-Kilometers, 2007-2012

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collisions</td>
<td>0.033</td>
<td>0.030</td>
<td>0.016</td>
<td>0.017</td>
<td>0.024</td>
<td>0.026</td>
</tr>
<tr>
<td>Derailments</td>
<td>0.225</td>
<td>0.211</td>
<td>0.198</td>
<td>0.183</td>
<td>0.180</td>
<td>0.138</td>
</tr>
</tbody>
</table>

With this data set in hand, it was possible to compare Class I railroad safety performance to counterparts in Europe operating with single-person crews. Exhibits V-7 through V-9 illustrate...
the collision and derailment rates for the US Class Is, France, Germany, Italy, Sweden, and the United Kingdom.

**Exhibit V-7: Annual Collision Rates by Country, 2007-2012**

Records conforming to ERA CSI guidelines only, incidents per million train kilometers

![Collision Rates Chart]

**Exhibit V-8: Annual Derailment Rates by Country, 2007-2012**

Records conforming to ERA CSI guidelines only, incidents per million train kilometers

![Derailment Rates Chart]

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52 Source: ERA, FRA, Oliver Wyman analysis. For 2007 and 2008, data from France utilized a different reporting procedure for collisions than they do currently. Consequently, the numbers for those years were removed from the chart.

53 Ibid.
Exhibit V-9: Average Annual Collision and Derailment Rates by Country, 2007-2012

Per million train-kilometers

<table>
<thead>
<tr>
<th></th>
<th>US Class Is</th>
<th>France</th>
<th>Germany</th>
<th>Italy</th>
<th>Sweden</th>
<th>United Kingdom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collisions</td>
<td>0.025</td>
<td>0.025</td>
<td>0.016</td>
<td>0.014</td>
<td>0.018</td>
<td>0.018</td>
</tr>
<tr>
<td>Derailments</td>
<td>0.190</td>
<td>0.026</td>
<td>0.011</td>
<td>0.019</td>
<td>0.067</td>
<td>0.019</td>
</tr>
</tbody>
</table>

The collision data, while showing a high degree of variance on a year-by-year basis due to the rarity of such events, still supports the assertion that single-person crews are at least as safe as single-person crews. The United States average is equal to the French average, but higher than the rate for the other major European operations.

US Class I’s have had a significantly higher derailment rate than their European counterparts. However, it is difficult to correlate derailments with crew size, especially since the data for both US and European railroads includes all derailment incidents (not just human-factor related). Either way, the derailment rate data supports the conclusion that single-person crews are at least as safe as multiple-person crews.

3. Evaluation of Casualty Incident Data

For casualty incidents, comparing US and European railroad data is more challenging. The difficulty stems from ERA definitions, as well as the available data in the FRA’s casualty database:

- Serious injuries, according to the ERA, involve injuries where hospitalization for a minimum of 24 hours is required. Since the FRA casualty data contains no information regarding hospitalization, it is not possible to construct a comparable CSI for US railroads.

- Similarly, ERA defines a fatality as “any person killed immediately or dying within 30 days as a result of an accident, excluding suicides.” The FRA defines a fatality in roughly the same manner, except that it can include a death that occurs up to 180 days from the date of injury. Since the FRA does not provide record detail concerning the number of days between the date of injury and the date of death, a direct comparison between US and European fatalities runs the risk of including too many fatalities in the case of US railroads, or not enough in the case of European railroads.

- Finally, accidents to persons caused by rolling stock in motion are defined as “accidents to one or more persons that are either hit by a railroad vehicle or by an object attached to or that

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54 Source: ERA, FRA, Oliver Wyman analysis. Due to different calculation procedures used for French data in 2007 and 2008 for collisions and derailments, annual averages for France include only the four years from 2009 through 2012.
has become detached from the vehicle. Persons that fall from railroad vehicles are included, as well as persons that fall or are hit by loose objects when travelling on-board vehicles.” As mentioned earlier, an incident is included in CSI statistics only if it meets the definition of a significant accident, which, when it comes to casualties, requires injuries that are either serious, or fatal, as defined by the ERA. Again, the FRA does not provide enough detail in its casualty records to allow for a direct comparison.

**Serious Injuries**

Definition issues notwithstanding, it is still possible to construct US railroad CSIs that are somewhat similar to, but not exact matches for, the CSIs used by ERA. To determine serious injuries, days absent (also known as lost work days) in regards to an injury can be used as a proxy for hospitalization. Assuming seven lost work days are equal to a 24-hour hospital stay, all casualty records that did not have at least eight lost work days were removed from the assessment. While not a perfect substitute, this methodology removed minor injuries from the analysis.

Typically, a railroad will only be able to record the work absence of its employees. Other injured parties often do not provide rail carriers with such information due to privacy concerns. Consequently, only records detailing injuries sustained by railroad employees were used in the analysis. Also, as all US Class I rail carriers employ multiple-person crews for train operation, only those employee injuries occurring on carriers meeting the definition of a Class I were used.

Finally, in regards to serious injuries related to rolling stock in motion, data concerning location, cause of injury, physical action, and tools utilized at the time of the injury were taken into account to further screen injury incidents not related to train operation.

The final set of data for the US CSIs involved records for employees seriously injured in accidents involving rolling stock in motion, in train collisions, and in train derailments. Exhibit V-10 shows this data for 2007 through 2012. Exhibits V-11 through V-14 illustrate this data in comparison to the ERA CSI collision and derailment data for a range of European countries that use single-person crews.

55 The assumption that seven lost work days is equal to a 24-hour hospital stay is based on observation of the days absent distribution for railroad employees. Employees of the evaluated railroads (Class Is, regionals, Amtrak, and commuter agencies) posted 14,284 injuries for 2007-2013. Of those injuries, 4,353 resulted in no lost work days and 615 incidents resulted in one lost work day. Between two and seven lost work days, injuries declined from 374 to 260. Finally, 175 injuries resulted in eight lost work days. The inflection point between seven and eight lost work days indicates a change in injury severity, and appears to be a logical point at which to say that a minimum of seven lost work days equals a 24-hour hospital stay.

56 See Exhibits A-18 through A-26 in the Annex for detail on items included and excluded from the US/Europe serious injury analysis.
Exhibit V-10: US Railway Employee Injury Rates per Million Train-Kilometers, 2007-2012\textsuperscript{57}
Screened records only

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolling stock in motion</td>
<td>0.027</td>
<td>0.031</td>
<td>0.022</td>
<td>0.020</td>
<td>0.011</td>
<td>0.017</td>
</tr>
<tr>
<td>Train collisions</td>
<td>0.018</td>
<td>0.020</td>
<td>0.011</td>
<td>0.014</td>
<td>0.012</td>
<td>0.010</td>
</tr>
<tr>
<td>Train derailments</td>
<td>0.007</td>
<td>0.008</td>
<td>0.003</td>
<td>0.010</td>
<td>0.010</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Exhibit V-11: Employee Serious Injury Rates, Rolling Stock in Motion, by Country, 2007-2012\textsuperscript{58}
US screened record set, ERA CSI indicators, incidents per million train-kilometers

Exhibit V-12: Employee Serious Injury Rates, Collisions, by Country, 2007-2012\textsuperscript{59}
US screened record set, ERA CSI indicators, incidents per million train-kilometers

\textsuperscript{57} Source: FRA, Oliver Wyman analysis.
\textsuperscript{58} Source: ERA, FRA, Oliver Wyman analysis.
\textsuperscript{59} Ibid.
US screened record set, ERA CSI indicators, incidents per million train-kilometers

Exhibit V-14: Average Annual Employee Serious Injury Rates by Country, 2007-2012
Per million train-kilometers

<table>
<thead>
<tr>
<th></th>
<th>US Class Is</th>
<th>France</th>
<th>Germany</th>
<th>Italy</th>
<th>Sweden</th>
<th>United Kingdom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collision injuries</td>
<td>0.014</td>
<td>0.002</td>
<td>0.003</td>
<td>0.001</td>
<td>0.001</td>
<td>0.000</td>
</tr>
<tr>
<td>Derailment injuries</td>
<td>0.007</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Rolling stock in motion injuries</td>
<td>0.022</td>
<td>0.002</td>
<td>0.011</td>
<td>0.008</td>
<td>0.012</td>
<td>0.003</td>
</tr>
</tbody>
</table>

The exhibits above show that US rail carriers have had a higher injury rate than their European counterparts, when similar data sets for employee injuries are considered. It should be noted that given the data comparison challenges, the serious injury rate for US rail carriers may be overstated, because seven lost work days may not equate to a hospital stay. Nevertheless, single-person crew operations do appear to be at least as safe as multiple-person crew operations when it comes to the potential for employee injuries.

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60 Ibid.
61 Source: ERA, FRA, Oliver Wyman analysis.
**Fatalities**

Another metric generally used to evaluate the safety of rail operations is the number of employee fatalities. The FRA classifies a fatal accident as one where death occurs within 180 days of the accident, due to injuries sustained during the accident. The ERA uses a smaller time window, considering a fatal accident as one where a death occurs within 30 days. The longer time period considered by the FRA may have the effect of increasing the number of fatalities relative to the ERA data. The data does not enable number of deaths occurring between days 31 and 180 to be determined; however, this number is expected to be small and should not have a significant impact on the results of the evaluation.

Using the same methodology employed to calculate serious injury rates, but keeping only fatality data, employee fatality CSIs were calculated for US Class I railroads and for a range of European railroads that use single-person crews. Due to the fact that fatal events are rare in railroad operations for both the US and Europe, to obtain a larger sample size, the data for rolling stock in motion, train collision, and train derailment fatalities were added together for the years 2007 through 2012. From the amalgamation of fatality data, an average annual fatality rate was calculated for each country. It is presented in Exhibit V-15.

**Exhibit V-15: Average Annual Employee Fatality Rates by Country, 2007-2012**

<table>
<thead>
<tr>
<th></th>
<th>US Class Is</th>
<th>France</th>
<th>Germany</th>
<th>Italy</th>
<th>Sweden</th>
<th>United Kingdom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatalities</td>
<td>0.004</td>
<td>0.003</td>
<td>0.007</td>
<td>0.009</td>
<td>0.005</td>
<td>0.001</td>
</tr>
</tbody>
</table>

The exhibit shows that US Class I employee fatalities occur at roughly the same rate as at their European counterparts. A further calculation to compare the average rates of the US versus the combined five European countries found that the averages are statistically similar.

4. **Evaluation of Signals Passed at Danger (SPADs)**

Unlike data for collisions, derailments, serious injuries, and fatalities, there is little difference between US Class I and ERA reporting of SPADs, as both are concerned with the movement of trains beyond the limits of their authority. As mentioned earlier, SPAD data for European railroads is readily available from the ERA. In the US, the FRA does not make such information available to the general public; however, several Class I railroads made their data available for the purposes of this study. When this data is normalized across millions of train-kilometers for

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62 Source: ERA, FRA, and Oliver Wyman analysis.
each reporting railroad, the resulting data points are reasonable indicators of overall US Class I railroad SPAD performance.

Exhibit V-16 shows the average annual SPAD rates for US Class Is and several of their European counterparts between 2007 and 2012. In addition, a composite SPAD rate for the five European nations is provided (Euro-5).

**Exhibit V-16: Average Annual SPAD Rates by Country, 2007-2012**

<table>
<thead>
<tr>
<th>Country</th>
<th>SPADs (Per million train-kilometers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Class Is</td>
<td>0.630</td>
</tr>
<tr>
<td>France</td>
<td>0.238</td>
</tr>
<tr>
<td>Germany</td>
<td>0.492</td>
</tr>
<tr>
<td>Italy</td>
<td>0.045</td>
</tr>
<tr>
<td>Sweden</td>
<td>2.173</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0.525</td>
</tr>
<tr>
<td>Euro-5</td>
<td>0.480</td>
</tr>
</tbody>
</table>

Overall, US Class Is have a slightly higher rate of SPADs than the majority of their European counterparts. The one exception is Sweden, which experienced SPADs at a higher rate than the other European railroads. According to the Swedish Transport Agency, the reason for the high rate of SPADs is due to several factors. First, the request for SPAD data from the ERA is relatively new. As a consequence, many railroad operators in Sweden are reporting a variety of incidents as SPADs, not just the incidents that meet the ERA definition. Second, incorrect car lists (also known as train consists in the US) have been identified as a contributing factor to the high rate of SPADs. As car lists specify train length and tonnage for the engineer, the lack of correct information can lead to improper train handling (insufficient braking, for instance). Finally, cell phone usage by engineers was identified as a contributing factor to the high rate of SPADs. New regulations restricting cell phone use were introduced in late 2011, but as yet, no discernable improvement in SPAD performance has been noted.

US Class I carriers with multiple-person crews possess a SPAD rate that is slightly higher than the average for all five European nations. As noted before, this difference in performance rates may be due to a range of factors, of which crew composition is only one. While it is possible to argue from this data that European railroads with single-person crews are safer than US multi-person crews when it comes to SPADs, it is more realistic to say that single-person crew operations are at least as safe as multiple-person crew operations.

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63 Source: ERA, several Class I railroads, and Oliver Wyman analysis.  
65 Ibid.  
66 Ibid.
E. Summary of Safety Analysis Findings

The foregoing analysis does not suggest that single-person crews are any less safe than the multiple-person crews currently employed by most US freight railroads. In comparing the single-person crew proxy operations of Amtrak, commuter rail operators, and INRD to Class I and regional railroads with multi-person crews, the data supports the finding that single-person crews are as safe as multiple-person crews. Similarly, when assessing similar data sets for US Class I rail operations and European rail operations, it appears that European railroads and their single-person crews realize better safety performance than their US counterparts when it comes to derailments, employee injuries, and SPADs, and similar outcomes with regard to collisions and fatalities. This data, too, supports the conclusion that single-person crews appear to be as safe as multiple-person crews.
VI. Economic Analysis

A. Economic Model and Scenario Overview

Oliver Wyman developed an economic model to establish the potential cost savings of single-person crews to the freight railroad industry. The implementation of single-person crew operations could take several different forms, based on each Class I’s pace and scope. Hence, two different scenarios were modeled to provide dimensions around potential economic benefits:

- **Scenario A – Single person-crews limited to trains without intermediate work:** This scenario assumes that all road trains (unit and through) with intermediate work between crew change locations are run with a minimum of two employees. Those road trains that do not have intermediate work would operate with only a locomotive engineer. Should an en route failure or unscheduled work event occur, the engineer-only train would be assisted by local railroad personnel in the area.

- **Scenario B – Single-person crews on high density lines, with or without intermediate work:** This scenario assumes that only road trains operating on rail lines with high traffic density would have a single locomotive engineer on board. All en route work events, whether scheduled or unscheduled, and en route equipment failures would be handled by the locomotive engineer working in concert with a utility person. The utility person would help all road trains needing assistance in a defined territory. For road trains operating on corridors with lower traffic densities, the train crew would comprise at least two employees. Staffing utility personnel on low-density lines is assumed to be more expensive than retaining a second employee on each road train.

Taken together, these scenarios represent the lower (Scenario A) and upper bounds (Scenario B) of a range of single-person crew implementation approaches that could be adopted by US freight railroads. Scenario A outlines a base scenario of no ancillary support, where those road trains without scheduled en route work have only an engineer on board and no additional resources are deployed to assist trains between crew change locations. Scenario B outlines a high ancillary support scenario, where the trainman would only be removed from road trains traveling on corridors with traffic volumes high enough to justify the round-the-clock staffing of utility personnel.

B. Approach and Assumptions

In general, modeling of each scenario began with a determination of the number of road trains operated annually over the US Class I railroad network. The number of crews required to operate these trains was then calculated. Historical en route work events and equipment failures were added in to determine the number of times that a second employee may be necessary to the efficient execution of the activities required to complete a work event or resolve an equipment failure.
failure. Those employees not necessary to handle en route events were subtracted from the scenarios, and their wages, fringe benefits, and payroll taxes were calculated to derive the cost savings associated with single-person crew operation. Any additional costs necessary to make the scenario viable, such as utility personnel, additional highway vehicles, and additional locomotive engineers to staff up for potential re-crews, were also calculated and subtracted from the savings generated by eliminating a second person on the train.

Each scenario description in this chapter presents the estimated net economic benefits of single-person crew operations for the year 2013, as if such operations were fully implemented at that time. In addition, estimated net economic benefits for the years 2020 through 2029 are presented. The year 2020 was chosen as a starting point for projections because the next round of national rail labor bargaining will conclude in 2019. Finally, it was assumed that PTC, a key enabling technology for single-person crew operations, will be in full operation by 2020.

The development of each scenario involved calculations and assumptions regarding traffic, en route events, and employees, as outlined below. In addition, Scenario B incorporates an additional dimension, characteristics of the US Class I railroad network, as a core assumption for the scenario is that single-person train crew operations do not make sense on all railroad routes. For Scenario B, traffic density determines where single-person crew operations make the most sense.

1. Traffic

The freight tonnage likely to be handled over the US railroad network in coming years was estimated by applying a compound annual growth rate to the tons carried by Class I railroads in 2013 (as provided by the STB’s annual R-1 reports). The annual growth rate was determined by the US DOT’s projected change in rail (1.138 percent) and multi-modal (2.941 percent) tonnage between the years 2012 and 2040.67

Freight tons were then converted into freight ton-miles, gross ton-miles, and then car-miles using ratios determined from 2013 Class I railroad performance data. In addition, the historic changes in those ratios were derived from prior years’ operating data and applied to the estimates going forward. Thus, several assumptions were built into the forecast: that miles per freight ton carried will continue to increase, that freight ton to gross ton-mile ratio will continue to improve (indicating improved management of empty railcars), and that railcars will carry heavier loads on average in the future.

67 Freight Facts and Figures 2013, US DOT, Table 2-1; Oliver Wyman analysis.
Once car-miles, both loaded and empty, were determined, the number of trains operated, as well as the number of train-miles generated, were calculated. These figures are important inputs for the scenarios. Example data for 2013 and 2029 is shown in Exhibit VI-1.

### Exhibit VI-1: Example Class I Traffic Input Data

<table>
<thead>
<tr>
<th>Car-miles</th>
<th>2013 Actual</th>
<th>2029 Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loaded</td>
<td>20.2 billion</td>
<td>22.4 billion</td>
</tr>
<tr>
<td>Empty</td>
<td>15.0 billion</td>
<td>16.1 billion</td>
</tr>
<tr>
<td>Number of road trains operated</td>
<td>1.26 million</td>
<td>1.28 million</td>
</tr>
<tr>
<td>Number of train-miles</td>
<td>511.3 million</td>
<td>551.5 million</td>
</tr>
</tbody>
</table>

2. **En Route Work Events and Equipment Failures**

Another important input for the economic models is stops en route for work events and equipment failures. Work events, both scheduled and unscheduled, are carried out by road trains between crew change points and terminals and often require more than one employee to accomplish. Similarly, en route equipment failures (e.g., emergencies, line side equipment detector activations, and detector failures) also require more than one employee to inspect and correct. The annual average frequency of these events in recent years was derived from data provided by Class I railroads for the purposes of this study and is shown in Exhibit VI-2.

### Exhibit VI-2: Annual Average En Route Work Events and Equipment Failures

<table>
<thead>
<tr>
<th></th>
<th>Per Million Train-Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduled work events</td>
<td>1,499</td>
</tr>
<tr>
<td>Unscheduled work events</td>
<td>243</td>
</tr>
<tr>
<td>En route equipment failures</td>
<td>278</td>
</tr>
</tbody>
</table>

Another assumption with regard to en route work events and equipment failures is that only one will occur per crew start. So, for instance, in 2013, an estimated 700,000 scheduled en route work events occurred. In keeping with our assumption, this means that 700,000 crew starts had to deal with this type of work. The same assumption was applied to unscheduled work events and en route equipment failures. Further, it was assumed that where a scheduled work event occurs, no unscheduled work or equipment failure will occur.

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68 R-1 Reports for 2013 for all seven Class I railroads, Schedule 755, US STB; Oliver Wyman analysis.
69 Based on 2012-2014 data provided by several Class I railroads and Oliver Wyman analysis.
70 Oliver Wyman analysis.
In short, scheduled and unscheduled work and equipment failure events were assumed to be mutually exclusive. While this is not always the case in reality, it does allow for more conservative estimates in the economic model: A higher number of standalone work events and equipment failures reduces the number of single-person crew starts, thereby lowering the economic advantage that would accrue to the railroad operator.

3. Employees, Wages, Benefits, and Payroll Taxes

Employee productivity is an important consideration for railroads, as employee compensation is the largest component of railroad operating expenses. Exhibit VI-3 shows that, in 2012, salaries, wages, and fringe benefits for all Class I railroad employees accounted for 30 percent of the industry segment’s total operating expenses. Train, engine, and yard (TE&Y) employees comprised approximately 41 percent of all active US Class I railroad employees. With mean annual compensation, not including benefits, of over $80,000, TE&Y personnel represented over $5.3 billion in operational costs for US Class I railroads in 2012. Altogether, TE&Y personnel accounted for 42 percent of total Class I railroad compensation and 11 percent of overall operating expenses. 71

As compensation for TE&Y personnel is a significant percentage of industry operating expenses, railroads can ill afford to continue paying employees when their positions are rendered redundant by technological advances. Federally mandated PTC will do just that for a second person in the locomotive cab, because it is designed to provide the train operation oversight that traditionally rested with the crew. Thus, since PTC investments directly impact crew tasks, crew size reductions are a logical source of expense reductions to fund the PTC investment.

<table>
<thead>
<tr>
<th>Expense category</th>
<th>Amount (billions)</th>
<th>Percent of total expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensation</td>
<td>$15.3</td>
<td>30%</td>
</tr>
<tr>
<td>– TE&amp;Y Compensation</td>
<td>$5.3</td>
<td>11%</td>
</tr>
<tr>
<td>Fuel</td>
<td>$11.5</td>
<td>23%</td>
</tr>
<tr>
<td>Other</td>
<td>$10.1</td>
<td>20%</td>
</tr>
<tr>
<td>Depreciation</td>
<td>$6.1</td>
<td>12%</td>
</tr>
<tr>
<td>Materials, supplies, and rents</td>
<td>$5.6</td>
<td>11%</td>
</tr>
<tr>
<td>Property and taxes</td>
<td>$1.1</td>
<td>2%</td>
</tr>
<tr>
<td>Casualties, insurance, and freight loss and damage</td>
<td>$0.7</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td>$50.3</td>
<td>100%</td>
</tr>
</tbody>
</table>

71 All data in this paragraph: Analysis of Class I Railroads, Association of American Railroads, 2012.
As the economic advantage of single-person crew operations derives primarily from workforce reduction, data on employment, wages, fringe benefits, and payroll taxes are important inputs for all scenarios. The National Railway Labor Conference (NRLC) provided the necessary data for both trainmen and locomotive engineers for the year 2012. Using this data, Oliver Wyman calculated trainmen wage statistics and annual fringe benefit costs and payroll tax information, as shown in Exhibit VI-4.73

**Exhibit VI-4: Trainman Wage, Benefit, and Payroll Tax Base Costs**

<table>
<thead>
<tr>
<th></th>
<th>2012 Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wages</strong></td>
<td></td>
</tr>
<tr>
<td>- Average hourly straight time pay</td>
<td>$25.86</td>
</tr>
<tr>
<td>- Average hourly overtime pay</td>
<td>$33.68</td>
</tr>
<tr>
<td>- Average pay per trip (straight time plus overtime)</td>
<td>$238.31</td>
</tr>
<tr>
<td><strong>Annual fringe benefit cost and payroll tax (per employee)</strong></td>
<td>$33,800</td>
</tr>
</tbody>
</table>

For subsequent years, the 2012 figures were inflated using a compound annual growth rate derived from the wage rate (3.0 percent) and wage supplement (4.6 percent) cost indices for the years 2000 through 2013 found in the AAR’s Railroad Cost Indexes. Finally, basic worker statistics, such as average miles per trip (131) and annual trips per employee (190) were derived from the NRLC’s data.74 Altogether, these different data elements concerning trainmen and locomotive engineers were used to determine the economic benefits stemming from each single-person crew operation scenario.

The economic benefits for each scenario are offset by expenses accrued through the use of utility personnel and others to assist trains operated with only an engineer. As explained above, Scenario A assumes that all unscheduled work events and en route equipment failures are handled by the engineer with assistance from other railroad personnel, such as mechanical, engineering, or operations employees. It would take time for these personnel to travel from their normal job locations to the location of a train needing assistance, and likely by the time they arrived and executed the necessary actions to get the train underway again, the train engineer will have reached the end of his or her federally-mandated hours of service. Consequently, for Scenario A, it was assumed that all unscheduled work events or en route equipment failures would result in a re-crew of the train ($323.20 per instance in 2013).75

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73 Email from H. Glen Williams, Jr., Director Economic Research, National Railway Labor Conference (NRLC), on July 22, 2014, and Oliver Wyman analysis. Comparable figures for locomotive engineers are $31.43 per straight time hour, $38.56 per hour of overtime, and $313.72 average per trip.

74 Email from H. Glen Williams, Jr., NRLC, Oliver Wyman analysis, op. cit.

75 Ibid.
In Scenario B, utility personnel would be staffed on a round-the-clock basis (necessitating three shifts of eight hours each) for crew districts with high traffic density. In lieu of a trainman on board a train, these employees would be responsible for assisting road trains that have work events, both scheduled and unscheduled, and that encounter en route equipment failures. Oliver Wyman estimated the cost of this staffing at $250.60 per shift, plus $35,338 in fringe benefits and payroll taxes per employee, in 2013.76

4. Network

For Scenario B, it was necessary to determine the overall route miles of the densest railroad corridors in the United States. The STB’s annual R-1 reports divide track miles into density categories A through D, with A being the heaviest at 20 million or more gross ton-miles (GTM) per track mile, B between 5 and 20 million GTMs per track mile, C between 1 and 5 million GTMs per track mile, and D with less than 1 million GTMs per track mile. (There is also a category E that includes yard and way switching track miles.) To properly estimate the route miles that fall into each traffic density classification, Oliver Wyman made the following assumptions:

• All second and other main track mileage is part of track category A.
• Passing tracks, crossovers, and turnouts mileage were apportioned as follows:
  ─ Passing tracks: 80% of mileage
  ─ Crossovers: 10% of mileage
  ─ Turnouts: 10% of mileage
• All passing tracks were associated with single-track mainlines only.
• Crossovers were associated with multiple-track mainlines only.
• Turnouts were apportioned evenly across mainline types.

Based on the above assumptions, route mileage under category A was calculated to be approximately 43,000 miles, category B was 29,000 miles, category C was 10,000 miles, and category D was 12,000 miles. Since categories A and B represent the most heavily traveled rail corridors, it was assumed that single-person crew operations would make the most economic sense on these corridors, as there would be enough road trains on average to justify the staffing of utility personnel. Road trains operating over rail lines in categories C and D would continue to operate with multiple-person crews.

76 National Railway Labor Conference, AAR Railroad Cost Indexes, and Oliver Wyman analysis. The average shift length for a utility person is assumed to be 9.08 hours. The additional time would be expended in turnover with the following shift, returning to the home terminal from helping a train, etc.
5. Other Assumptions

To perform their duties, utility personnel would need to use company vehicles assigned to their particular work area. According to one Class I railroad, a suitable vehicle for utility duties costs $33,000. Maintenance, repair, and administration would be an additional $3,200 per year. These costs were inflated by the compound annual growth rate of the AAR’s materials and supplies cost index from 2000 to 2013 (4.5 percent).\(^{77}\) While the Class I railroad providing the information assumed that the vehicle would last 12 years, Oliver Wyman believes that a more likely timeframe is six years, owing to the environment in which such vehicles operate. Each crew district employing utility personnel was assigned one vehicle.

Fuel for the utility vehicles is another cost consideration for Scenario B, and Oliver Wyman calculated 2013 fuel cost per vehicle to be nearly $17,000.\(^{78}\) For subsequent years, fuel price per gallon was increased in the model at a compound annual growth rate of 6.8 percent (the historic CAGR for 2000 to 2013).\(^{79}\)

Finally, train delay costs were estimated for Scenario A, since road trains experiencing en route equipment failures or performing unscheduled work were assumed to require re-crews. The delay entailed by a re-crew generates costs not only for the train involved (direct delay cost), but also for other trains in the general vicinity (indirect delay cost). Costs are incurred for locomotives, railcars, fuel, and crews, as shown in Exhibit VI-5. For years subsequent to 2013, the compound annual growth rate of the appropriate railroad cost inflation factors for the years 2000 through 2013 were applied to unit costs.

**Exhibit VI-5: Scenario A: Train Delay Cost Assumptions**\(^{80}\)

<table>
<thead>
<tr>
<th></th>
<th>Cost per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locomotive</td>
<td>$9.51</td>
</tr>
<tr>
<td>Railcar</td>
<td>$3.65</td>
</tr>
<tr>
<td>Fuel</td>
<td>$12.49</td>
</tr>
<tr>
<td>Single-person crew (includes fringes and taxes)</td>
<td>$46.72</td>
</tr>
<tr>
<td>Multiple-person crew (includes fringes and taxes)</td>
<td>$87.55</td>
</tr>
</tbody>
</table>

\(^{77}\) AAR, Railroad Cost Indexes.  
\(^{78}\) It was assumed that vehicles would average 15 miles per gallon in regular usage and be driven 73,000 miles annually (or 200 miles per day), thus consuming 4,900 gallons of fuel per year, at an average fuel cost of $3.51 per gallon in 2013. Energy Information Administration, http://www.eia.gov/petroleum/gasdiesel/, arithmetic mean of the 52 weeks reported in 2013, US, All grades, conventional.  
\(^{79}\) Energy Information Administration, op. cit.  
\(^{80}\) Locomotive and railcar per hour cost based on Oliver Wyman analysis. Fuel per hour cost based on $3.12 per gallon for diesel fuel (Surface Transportation Board Annual R-1 Reports for 2013) and an estimated four hours idling time per re-crew (Oliver Wyman analysis). Overall crew cost per hour based on National Railway Labor Conference and Oliver Wyman analysis.
For Scenario B, delay costs were not considered, as it was assumed that utility personnel would respond to equipment failures and unscheduled work events in a timely manner, and re-crews would not be required.

C. Scenario A Modeling Results

Under Scenario A, as noted above, train crews with no scheduled work events would have their trainman positions removed. Should an en route failure or unscheduled work event occur, the locomotive engineer in these cases would be assisted by local railroad personnel in the area.

Oliver Wyman baseline data estimates for 2013 US Class I train crews are shown in Exhibit VI-6. Model results for 2013 for Scenario A are shown in Exhibit VI-7. Of note is that under Scenario A, an estimated 15,000 trainman positions could be eliminated, saving almost $1.3 billion in wages, benefits, and payroll taxes. This would be offset by costs for re-crew, direct delay, and indirect delay.

In particular, re-crew costs would include the wages of locomotive engineers called to replace engineers assumed to expire on hours of service, as well as the fringe benefits and payroll taxes associated with the 1,200 additional locomotive engineers that would be needed to handle increased re-crews. Thus, the total estimated savings of Scenario A for the Class I railroads in 2013 would be $703 million.

Exhibit VI-6: Baseline Train Crew Data for 2013

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road trains operated (unit and through)</td>
<td>1.26 million</td>
</tr>
<tr>
<td>Train crews (locomotive engineer, trainman, and conductor)</td>
<td>3.54 million</td>
</tr>
<tr>
<td>Crews performing scheduled work</td>
<td>700,000</td>
</tr>
<tr>
<td>Crews performing unscheduled work or handling en route equipment failures</td>
<td>241,000</td>
</tr>
</tbody>
</table>
Exhibit VI-7: Estimated Results of Scenario A for 2013

<table>
<thead>
<tr>
<th>Description</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Train crews with a trainman removed</td>
<td>2.85 million</td>
</tr>
<tr>
<td>Trainmen positions to eliminate[^81]</td>
<td>15,000</td>
</tr>
<tr>
<td>Wages, fringe benefits, and payroll tax savings</td>
<td>$1.23 billion</td>
</tr>
<tr>
<td>Re-crew costs (for unscheduled work or en route equipment failures)</td>
<td>$126 million</td>
</tr>
<tr>
<td>Direct delay costs</td>
<td>$179 million</td>
</tr>
<tr>
<td>Indirect delay costs</td>
<td>$223 million</td>
</tr>
<tr>
<td>Net scenario savings</td>
<td><strong>$703 million</strong></td>
</tr>
</tbody>
</table>

Since single-person crew operations most likely would not be implemented before 2020, however, Exhibit VI-8 presents the annual savings that Class I railroads could see for the years 2020 through 2029 if Scenario A were implemented. As traffic grows throughout the decade, Class I railroads would see Scenario A savings increase by a compound annual growth rate of 2.8 percent, from $878 million in 2020 to $1.130 billion in 2029.

[^81]: Assumes each trainman is part of approximately 190 crews per annum.
## Exhibit VI-8: Economic Scenario A: Estimated Annual Costs and Savings, 2020-2029

Figures in millions of units and millions of nominal US dollars.

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TRAINS &amp; CREWS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total road trains</td>
<td>1.27</td>
<td>1.27</td>
<td>1.27</td>
<td>1.27</td>
<td>1.27</td>
<td>1.27</td>
<td>1.27</td>
<td>1.28</td>
<td>1.28</td>
<td>1.28</td>
</tr>
<tr>
<td>Total road train crews</td>
<td>3.68</td>
<td>3.70</td>
<td>3.72</td>
<td>3.74</td>
<td>3.76</td>
<td>3.78</td>
<td>3.80</td>
<td>3.82</td>
<td>3.85</td>
<td>3.87</td>
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<tr>
<td><strong>TRAINMEN</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Scheduled work events</td>
<td>0.72</td>
<td>0.72</td>
<td>0.73</td>
<td>0.73</td>
<td>0.74</td>
<td>0.74</td>
<td>0.74</td>
<td>0.75</td>
<td>0.75</td>
<td>0.76</td>
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<tr>
<td>Trainmen trips eliminated</td>
<td>2.96</td>
<td>2.97</td>
<td>2.99</td>
<td>3.01</td>
<td>3.02</td>
<td>3.04</td>
<td>3.06</td>
<td>3.08</td>
<td>3.09</td>
<td>3.11</td>
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<tr>
<td>Total trainmen wage savings</td>
<td>$894</td>
<td>$926</td>
<td>$960</td>
<td>$994</td>
<td>$1,030</td>
<td>$1,067</td>
<td>$1,105</td>
<td>$1,145</td>
<td>$1,187</td>
<td>$1,230</td>
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<tr>
<td>Fringe benefit and payroll tax savings</td>
<td>$753</td>
<td>$791</td>
<td>$832</td>
<td>$875</td>
<td>$919</td>
<td>$967</td>
<td>$1,016</td>
<td>$1,069</td>
<td>$1,124</td>
<td>$1,182</td>
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<tr>
<td>Total savings</td>
<td>$1,647</td>
<td>$1,718</td>
<td>$1,791</td>
<td>$1,869</td>
<td>$1,949</td>
<td>$2,034</td>
<td>$2,122</td>
<td>$2,214</td>
<td>$2,311</td>
<td>$2,412</td>
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<tr>
<td>Equipment failures</td>
<td>0.13</td>
<td>0.13</td>
<td>0.14</td>
<td>0.14</td>
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<td>0.14</td>
<td>0.14</td>
<td>0.14</td>
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<tr>
<td>Engineer wage costs</td>
<td>$100</td>
<td>$10030</td>
<td>$107</td>
<td>$111</td>
<td>$115</td>
<td>$119</td>
<td>$123</td>
<td>$128</td>
<td>$132</td>
<td>$137</td>
</tr>
<tr>
<td>Fringe benefit and payroll tax costs</td>
<td>$68</td>
<td>$72</td>
<td>$75</td>
<td>$79</td>
<td>$83</td>
<td>$88</td>
<td>$92</td>
<td>$97</td>
<td>$102</td>
<td>$107</td>
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<tr>
<td>Total costs</td>
<td>$168</td>
<td>$175</td>
<td>$182</td>
<td>$190</td>
<td>$198</td>
<td>$206</td>
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<td><strong>DELAYS</strong></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct delay costs</td>
<td>$267</td>
<td>$282</td>
<td>$300</td>
<td>$318</td>
<td>$337</td>
<td>$358</td>
<td>$380</td>
<td>$404</td>
<td>$429</td>
<td>$456</td>
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<tr>
<td>Indirect delay costs</td>
<td>$334</td>
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<td>$377</td>
<td>$400</td>
<td>$425</td>
<td>$452</td>
<td>$481</td>
<td>$512</td>
<td>$545</td>
<td>$581</td>
</tr>
<tr>
<td>Total delay costs</td>
<td>$601</td>
<td>$637</td>
<td>$676</td>
<td>$718</td>
<td>$762</td>
<td>$810</td>
<td>$861</td>
<td>$916</td>
<td>$975</td>
<td>$1,037</td>
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<tr>
<td><strong>NET SCENARIO A SAVINGS</strong></td>
<td>$878</td>
<td>$905</td>
<td>$933</td>
<td>$961</td>
<td>$989</td>
<td>$1,017</td>
<td>$1,046</td>
<td>$1,074</td>
<td>$1,102</td>
<td>$1,130</td>
</tr>
</tbody>
</table>

82 Oliver Wyman analysis. Numbers may not add due to rounding.
D. Scenario B Modeling Results

Under Scenario B, as noted above, only road trains operating on rail lines with high traffic density (STB track density categories A and B) would have the trainman position removed from train crews. All en route work events, whether scheduled or unscheduled, and en route equipment failures would be handled by the locomotive engineer working in concert with utility personnel.

Model results for 2013 for Scenario B are shown in Exhibit VI-9. In this instance, an estimated 18,500 trainmen would be furloughed, saving over $1.5 billion in wages, fringe benefits, and payroll taxes. This figure would be offset by utility personnel costs and vehicle costs.

Exhibit VI-9: Estimated Results of Scenario B for 2013

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Train crews with a trainman removed</td>
<td>3.51 million</td>
</tr>
<tr>
<td>Trainmen eligible for furloughs\textsuperscript{83}</td>
<td>18,500</td>
</tr>
<tr>
<td>Trainmen wages, fringe benefits, and payroll tax savings</td>
<td>$1.5 billion</td>
</tr>
<tr>
<td>Utility personnel wages, fringe benefits, and payroll tax costs</td>
<td>$203 million</td>
</tr>
<tr>
<td>Utility vehicle costs (acquisition, maintenance, repair, fuel)</td>
<td>$14.2 million</td>
</tr>
<tr>
<td>Net scenario savings</td>
<td>$1.2 billion</td>
</tr>
</tbody>
</table>

Utility personnel requirements were calculated based on assigning three 8-hour shifts to each crew district. According to NRLC data, miles per trainman trip averaged 131 in 2012, which was assumed to also be the average length of a crew district. The route miles of STB category A and B rail lines were divided by the average crew district length to arrive at an assumed 552 crew districts. With over 600,000 “utility starts”\textsuperscript{84} to be filled annually, however, and assuming that each utility person undertakes 190 starts per year, Class I railroads would need almost 3,200 utility personnel, at a cost of $203 million. As noted above, the vehicles used by utility personnel would generate additional expense, totaling approximately $14.2 million.\textsuperscript{85} Thus, the total estimated savings of Scenario B for the Class I railroads in 2013 would be $1.2 billion.

Since single-person crew operations most likely would not be implemented before 2020, Exhibit VI-10 presents the annual savings that Class I railroads could see for the years 2020 through 2029 if Scenario B were implemented. As traffic grows throughout the decade, Class I railroads would see Scenario B savings increase by a compound annual growth rate of 4.4 percent, from $1.7 billion in 2020 to $2.5 billion in 2029.

\textsuperscript{83} Assumes each trainman is part of approximately 190 crews per annum.

\textsuperscript{84} Utility starts are calculated based on number of crew districts x three shifts per day x 365 days of the year.

\textsuperscript{85} For the model, vehicle acquisition costs were spread evenly over six years. For 2013, those costs would have been over $3.0 million. Maintenance, repair, and administration costs were calculated to be $1.8 million and fuel $9.4 million.
### Exhibit VI-10: Economic Scenario B: Estimated Annual Costs and Savings, 2020-2029

Figures in millions of units and millions of nominal US dollars

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TRAINS &amp; CREWS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total road trains on A and B track</td>
<td>1.25</td>
<td>1.25</td>
<td>1.26</td>
<td>1.26</td>
<td>1.26</td>
<td>1.26</td>
<td>1.26</td>
<td>1.26</td>
<td>1.26</td>
<td>1.26</td>
</tr>
<tr>
<td>Total road train crews on A and B track</td>
<td>3.64</td>
<td>3.66</td>
<td>3.68</td>
<td>3.70</td>
<td>3.72</td>
<td>3.74</td>
<td>3.77</td>
<td>3.79</td>
<td>3.81</td>
<td>3.83</td>
</tr>
<tr>
<td><strong>TRAINMEN</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trainmen trips eliminated</td>
<td>3.64</td>
<td>3.66</td>
<td>3.68</td>
<td>3.70</td>
<td>3.72</td>
<td>3.74</td>
<td>3.77</td>
<td>3.79</td>
<td>3.81</td>
<td>3.83</td>
</tr>
<tr>
<td>Total trainmen wage savings</td>
<td>$1,101</td>
<td>$1,141</td>
<td>$1,182</td>
<td>$1,224</td>
<td>$1,268</td>
<td>$1,314</td>
<td>$1,361</td>
<td>$1,410</td>
<td>$1,461</td>
<td>$1,514</td>
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<tr>
<td>Fringe benefit &amp; payroll tax savings</td>
<td>$927</td>
<td>$974</td>
<td>$1,024</td>
<td>$1,077</td>
<td>$1,132</td>
<td>$1,190</td>
<td>$1,252</td>
<td>$1,316</td>
<td>$1,384</td>
<td>$1,455</td>
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<tr>
<td>Total trainmen savings</td>
<td>$2,028</td>
<td>$2,115</td>
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<td>$2,400</td>
<td>$2,504</td>
<td>$2,613</td>
<td>$2,727</td>
<td>$2,846</td>
<td>$2,970</td>
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<td><strong>UTILITY PERSONNEL</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility wage costs</td>
<td>$187</td>
<td>$192</td>
<td>$198</td>
<td>$204</td>
<td>$210</td>
<td>$216</td>
<td>$223</td>
<td>$230</td>
<td>$237</td>
<td>$244</td>
</tr>
<tr>
<td>Fringe benefit and payroll tax costs</td>
<td>$154</td>
<td>$161</td>
<td>$168</td>
<td>$176</td>
<td>$184</td>
<td>$192</td>
<td>$201</td>
<td>$210</td>
<td>$220</td>
<td>$230</td>
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<tr>
<td>Total utility personnel costs</td>
<td>$340</td>
<td>$353</td>
<td>$366</td>
<td>$380</td>
<td>$394</td>
<td>$409</td>
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<td>$440</td>
<td>$456</td>
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<td><strong>UTILITY VEHICLES</strong></td>
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<td></td>
</tr>
<tr>
<td>Total vehicle purchase cost</td>
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<td>$5</td>
<td>$5</td>
<td>$5</td>
<td>$6</td>
<td>$6</td>
<td>$6</td>
<td>$6</td>
</tr>
<tr>
<td>Maintenance, repair, &amp; admin.</td>
<td>$2</td>
<td>$3</td>
<td>$3</td>
<td>$3</td>
<td>$3</td>
<td>$3</td>
<td>$3</td>
<td>$3</td>
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<td>$4</td>
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<td>Total fuel cost</td>
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<td>$18</td>
<td>$19</td>
<td>$21</td>
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<td>$27</td>
</tr>
<tr>
<td>Total vehicle costs</td>
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<td>$26</td>
<td>$27</td>
<td>$29</td>
<td>$31</td>
<td>$32</td>
<td>$34</td>
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</tr>
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<td>$454</td>
<td>$472</td>
<td>$491</td>
<td>$510</td>
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<tr>
<td><strong>NET SCENARIO B SAVINGS</strong></td>
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<td>$2,159</td>
<td>$2,254</td>
<td>$2,355</td>
<td>$2,460</td>
</tr>
</tbody>
</table>

---

86 Oliver Wyman analysis. Numbers may not add due to rounding.
E. Summary of Economic Analysis Findings

Exhibit VI-11 compares the annual cost savings of both scenarios for the years 2020 through 2029. In each scenario, single-person crew operations would provide substantial cost savings for the US Class I rail industry. Scenario A, where trainmen are eliminated from all road trains with no scheduled en route work, would have provided an estimated industry savings of $703 million in 2013. In 2020, the first year that single-person crew operations would most likely be implemented, Scenario A would save the railroad industry an estimated $878 million. That savings is expected to grow at a compound annual growth rate (CAGR) of 2.8 percent until at least 2029. Scenario B, where trainmen are eliminated from all road trains operating on high-density rail lines and round-the-clock utility positions are created to assist with scheduled and unscheduled events, would have provided the railroad industry with an estimated savings of $1.2 billion in 2013. In 2020, savings are estimated to be almost $1.7 billion, growing at a CAGR of 4.4 percent through at least 2029. Thus, no matter the structure chosen, single-person crew operations would confer substantial cost savings upon the railroad industry.

Exhibit VI-11: Annual Projected Savings by Scenario for Class I Railroad Single-Person Crew Operations, 2020-2029
US $ millions, dollar amounts are nominal values
VII. Conclusion

In conclusion, single-person crew operations are in widespread use on complex railway systems around the world. In particular, major European railway systems running many mixed freight and passenger trains per day have had great success in their implementation of single-person train crews. As both the intra-US and US/EU safety data analyses show, single-person crew operations appear to be as safe as multiple-person crew operations, if not safer.

With the coming implementation of PTC and other technologies that reduce human error in train operations, single-person train crews would make sense on significant portions of the US Class I rail network. Reduction in train crew size would provide significant cost savings without sacrificing operational safety. The cost savings that accrue through the implementation of single-person crew operations could then be used by the railroads to fund further capital and safety improvements. Thus, by prohibiting railroads from adjusting train crew size to take full advantage of coming technological improvements, the FRA will greatly reduce US railroads’ ability to control operating costs, without making the industry any safer.
## Annex A. Safety Analysis Input Detail

### Exhibit A-1: Commuter rail agencies included in Commuter group

<table>
<thead>
<tr>
<th>Group</th>
<th>RAILROAD</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commuter</td>
<td>BNSo</td>
<td>Burlington Northern Santa Fe Suburban Operations</td>
</tr>
<tr>
<td>Commuter</td>
<td>CDOT</td>
<td>Connecticut Department Of Transportation</td>
</tr>
<tr>
<td>Commuter</td>
<td>CMTY</td>
<td>Capital Metropolitan Transportation Authority</td>
</tr>
<tr>
<td>Commuter</td>
<td>DART</td>
<td>Dallas Area Rapid Transit</td>
</tr>
<tr>
<td>Commuter</td>
<td>DCTA</td>
<td>Denton County Transportation Authority</td>
</tr>
<tr>
<td>Commuter</td>
<td>LI</td>
<td>Long Island Rail Road</td>
</tr>
<tr>
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<td>MACZ</td>
<td>MARC Train Service</td>
</tr>
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<td>Commuter</td>
<td>MBTA</td>
<td>Massachusetts Bay Transit Authority</td>
</tr>
<tr>
<td>Commuter</td>
<td>MNCW</td>
<td>Metro North Commuter Railroad Company</td>
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<td>NCTC</td>
<td>North County Transportation District - Coaster</td>
</tr>
<tr>
<td>Commuter</td>
<td>NICD</td>
<td>Northern Indiana Commuter Transportation District</td>
</tr>
<tr>
<td>Commuter</td>
<td>NIRC</td>
<td>Northeast IL Regional Commuter Rail Corp.(METRA)</td>
</tr>
<tr>
<td>Commuter</td>
<td>NJTR</td>
<td>New Jersey Transit Rail Operations</td>
</tr>
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<td>NMRX</td>
<td>New Mexico Rail Runner Express</td>
</tr>
<tr>
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<td>PCMZ</td>
<td>Caltrain Commuter Railroad Company</td>
</tr>
<tr>
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<td>SCAX</td>
<td>Southern California Regional Rail Authority</td>
</tr>
<tr>
<td>Commuter</td>
<td>SCR</td>
<td>Sounder Commuter Rail</td>
</tr>
<tr>
<td>Commuter</td>
<td>SDNX</td>
<td>San Diego Northern Railway</td>
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<td>SEPA</td>
<td>Southeastern Pennsylvania Transportation Authority</td>
</tr>
<tr>
<td>Commuter</td>
<td>SFRV</td>
<td>South Florida Regional Transit Authority</td>
</tr>
<tr>
<td>Commuter</td>
<td>TCCX</td>
<td>Tri-county Commuter Rail Authority</td>
</tr>
<tr>
<td>Commuter</td>
<td>TRE</td>
<td>Trinity Railway Express (previously TREX)</td>
</tr>
<tr>
<td>Commuter</td>
<td>UFRC</td>
<td>UTA Front Runner Commuter Rail</td>
</tr>
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<td>UPME</td>
<td>Union Pacific Metra</td>
</tr>
<tr>
<td>Commuter</td>
<td>VREX</td>
<td>Virginia Railway Express</td>
</tr>
</tbody>
</table>
### Exhibit A-2: Railroads included in Class I group

<table>
<thead>
<tr>
<th>Group</th>
<th>RR_Sys</th>
<th>RAILROAD</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
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<td>BNSF</td>
<td>BNSF Railway Company</td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>BLE</td>
<td>Bessemer &amp; Lake Erie Railroad Company</td>
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<td>Class I</td>
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<td>CEDR</td>
<td>Cedar River Railroad Company</td>
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<tr>
<td>Class I</td>
<td>CN</td>
<td>CN</td>
<td>Canadian National</td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>DMI</td>
<td>Duluth, Missabe &amp; Iron Range Railway Company</td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>DWP</td>
<td>Duluth, Winnipeg &amp; Pacific Railway</td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>EJE</td>
<td>Elgin, Joliet &amp; Eastern Railway Company</td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>GTW</td>
<td>Grand Trunk Western Railroad Incorporated</td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>IC</td>
<td>Illinois Central Railroad Company</td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>MMR</td>
<td>Minnesota &amp; Manitoba Railroad</td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>PI</td>
<td>Paducah &amp; Illinois Railroad Company</td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>WC</td>
<td>Wisconsin Central Ltd. (also Railway)</td>
</tr>
<tr>
<td>Class I</td>
<td>CP</td>
<td>CP</td>
<td>Canadian Pacific</td>
</tr>
<tr>
<td>Class I</td>
<td>CP</td>
<td>DH</td>
<td>Delaware &amp; Hudson Railway Company</td>
</tr>
<tr>
<td>Class I</td>
<td>CP</td>
<td>DME</td>
<td>Dakota, Minnesota &amp; Eastern Railroad</td>
</tr>
<tr>
<td>Class I</td>
<td>CP</td>
<td>ICE</td>
<td>Iowa Chicago and Eastern Railroad Corporation</td>
</tr>
<tr>
<td>Class I</td>
<td>CP</td>
<td>SOO</td>
<td>SOO Line Railroad Company</td>
</tr>
<tr>
<td>Class I</td>
<td>CSX</td>
<td>CSX</td>
<td>CSX Transportation</td>
</tr>
<tr>
<td>Class I</td>
<td>KCS</td>
<td>GWWE</td>
<td>Gateway Eastern Railroad Company</td>
</tr>
<tr>
<td>Class I</td>
<td>KCS</td>
<td>KCS</td>
<td>Kansas City Southern Railroad Company</td>
</tr>
<tr>
<td>Class I</td>
<td>KCS</td>
<td>TM</td>
<td>Texas Mexican Railway Company</td>
</tr>
<tr>
<td>Class I</td>
<td>NS</td>
<td>NS</td>
<td>Norfolk Southern Corporation</td>
</tr>
<tr>
<td>Class I</td>
<td>UP</td>
<td>UP</td>
<td>Union Pacific Railroad Company</td>
</tr>
</tbody>
</table>
### Exhibit A-3: Railroads included in Regional group

<table>
<thead>
<tr>
<th>Group</th>
<th>Railroad</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional</td>
<td>AGR</td>
<td>Alabama &amp; Gulf Coast Railway</td>
</tr>
<tr>
<td>Regional</td>
<td>ARR</td>
<td>Alaska Railroad</td>
</tr>
<tr>
<td>Regional</td>
<td>BPRR</td>
<td>Buffalo &amp; Pittsburgh Railroad, Inc.</td>
</tr>
<tr>
<td>Regional</td>
<td>DMVW</td>
<td>Dakota, Missouri Valley, &amp; Western</td>
</tr>
<tr>
<td>Regional</td>
<td>FEC</td>
<td>Florida East Coast Railway</td>
</tr>
<tr>
<td>Regional</td>
<td>IAIS</td>
<td>Iowa Interstate Railroad, Ltd.</td>
</tr>
<tr>
<td>Regional</td>
<td>KO</td>
<td>Kansas &amp; Oklahoma Railroad, Inc.</td>
</tr>
<tr>
<td>Regional</td>
<td>KYLE</td>
<td>Kyle Railroad</td>
</tr>
<tr>
<td>Regional</td>
<td>MRL</td>
<td>Montana Rail Link</td>
</tr>
<tr>
<td>Regional</td>
<td>MMA</td>
<td>Montreal, Maine &amp; Atlantic Railway Ltd.</td>
</tr>
<tr>
<td>Regional</td>
<td>NKCR</td>
<td>Nebraska Kansas Colorado Railway, Inc.</td>
</tr>
<tr>
<td>Regional</td>
<td>NECR</td>
<td>New England Central Railroad, Inc.</td>
</tr>
<tr>
<td>Regional</td>
<td>NYSW</td>
<td>New York, Susquehanna &amp; Western Rwy.</td>
</tr>
<tr>
<td>Regional</td>
<td>PAL</td>
<td>Paducah &amp; Louisville Railway</td>
</tr>
<tr>
<td>Regional</td>
<td>GRS</td>
<td>Pan Am Railways</td>
</tr>
<tr>
<td>Regional</td>
<td>PWRR</td>
<td>Portland &amp; Western Railroad, Inc.</td>
</tr>
<tr>
<td>Regional</td>
<td>PW</td>
<td>Providence and Worcester Railroad Co.</td>
</tr>
<tr>
<td>Regional</td>
<td>RRVW</td>
<td>Red River Valley &amp; Western Railroad Co.</td>
</tr>
<tr>
<td>Regional</td>
<td>WE</td>
<td>Wheeling &amp; Lake Erie Railway Co.</td>
</tr>
<tr>
<td>Regional</td>
<td>WSOR</td>
<td>Wisconsin &amp; Southern Railroad, LLC</td>
</tr>
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### Exhibit A-4: Type equipment (TYPEQ) data field

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Status</th>
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<tbody>
<tr>
<td>01</td>
<td>Include</td>
<td>Derailment</td>
</tr>
<tr>
<td>02</td>
<td>Include</td>
<td>Head on collision</td>
</tr>
<tr>
<td>03</td>
<td>Include</td>
<td>Rear end collision</td>
</tr>
<tr>
<td>04</td>
<td>Include</td>
<td>Side collision</td>
</tr>
<tr>
<td>05</td>
<td>Include</td>
<td>Raking collision</td>
</tr>
<tr>
<td>06</td>
<td>Include</td>
<td>Broken train collision</td>
</tr>
<tr>
<td>07</td>
<td>Exclude</td>
<td>Hwy-rail crossing</td>
</tr>
<tr>
<td>08</td>
<td>Include</td>
<td>RR grade crossing</td>
</tr>
<tr>
<td>09</td>
<td>Include</td>
<td>Obstruction</td>
</tr>
<tr>
<td>10</td>
<td>Include</td>
<td>Explosive-detonation</td>
</tr>
<tr>
<td>11</td>
<td>Include</td>
<td>Fire/violent rupture</td>
</tr>
<tr>
<td>12</td>
<td>Include</td>
<td>Other impacts</td>
</tr>
<tr>
<td>13</td>
<td>Include</td>
<td>Other (described in narrative)</td>
</tr>
</tbody>
</table>
### Exhibit A-5: Human factor causes (CAUSE) data field

<table>
<thead>
<tr>
<th>Code</th>
<th>Include/Exclude</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H008</td>
<td>Include</td>
<td>Improper operation of train line air connections (bottling the air)</td>
</tr>
<tr>
<td>H017</td>
<td>Include</td>
<td>Failure to properly secure engine(s) (railroad employee)</td>
</tr>
<tr>
<td>H018</td>
<td>Include</td>
<td>Failure to properly secure hand brake on car(s) (railroad employee)</td>
</tr>
<tr>
<td>H019</td>
<td>Include</td>
<td>Failure to release hand brakes on car(s) (railroad employee)</td>
</tr>
<tr>
<td>H020</td>
<td>Include</td>
<td>Failure to apply sufficient number of hand brakes on car(s) (railroad employee)</td>
</tr>
<tr>
<td>H021</td>
<td>Include</td>
<td>Failure to apply hand brakes on car(s) (railroad employee)</td>
</tr>
<tr>
<td>H022</td>
<td>Exclude</td>
<td>Failure to properly secure engine(s) or car(s) (non-railroad employee)</td>
</tr>
<tr>
<td>H025</td>
<td>Include</td>
<td>Failure to control speed of car using hand brake (railroad employee)</td>
</tr>
<tr>
<td>H099</td>
<td>Include</td>
<td>Use of brakes, other (Provide detailed description in narrative)</td>
</tr>
<tr>
<td>H101</td>
<td>Include</td>
<td>Impairment of efficiency or judgment because of drugs or alcohol</td>
</tr>
<tr>
<td>H102</td>
<td>Include</td>
<td>Incapacitation due to injury or illness</td>
</tr>
<tr>
<td>H103</td>
<td>Include</td>
<td>Employee restricted in work or motion</td>
</tr>
<tr>
<td>H104</td>
<td>Include</td>
<td>Employee asleep</td>
</tr>
<tr>
<td>H199</td>
<td>Include</td>
<td>Employee physical condition, other (Provide detailed description in narrative)</td>
</tr>
<tr>
<td>H201</td>
<td>Exclude</td>
<td>Blue Signal, absence of</td>
</tr>
<tr>
<td>H202</td>
<td>Exclude</td>
<td>Blue Signal, imperfectly displayed</td>
</tr>
<tr>
<td>H205</td>
<td>Include</td>
<td>Flagging, improper or failure to flag</td>
</tr>
<tr>
<td>H206</td>
<td>Include</td>
<td>Flagging signal, failure to comply</td>
</tr>
<tr>
<td>H207</td>
<td>Include</td>
<td>Hand signal, failure to comply</td>
</tr>
<tr>
<td>H208</td>
<td>Include</td>
<td>Hand signal improper</td>
</tr>
<tr>
<td>H209</td>
<td>Include</td>
<td>Hand signal, failure to give/receive</td>
</tr>
<tr>
<td>H210</td>
<td>Include</td>
<td>Radio communication, failure to comply</td>
</tr>
<tr>
<td>H211</td>
<td>Include</td>
<td>Radio communication, improper</td>
</tr>
<tr>
<td>H212</td>
<td>Include</td>
<td>Radio communication, failure to give/receive</td>
</tr>
<tr>
<td>H217</td>
<td>Include</td>
<td>Failure to observe hand signals given during a wayside inspection of moving train</td>
</tr>
<tr>
<td>H218</td>
<td>Include</td>
<td>Failure to comply with failed equipment detector warning or with applicable train inspection rules.</td>
</tr>
<tr>
<td>H219</td>
<td>Exclude</td>
<td>Fixed signal (other than automatic block or interlocking signal), improperly displayed.</td>
</tr>
<tr>
<td>H220</td>
<td>Include</td>
<td>Fixed signal (other than automatic block or interlocking signal), failure to comply.</td>
</tr>
<tr>
<td>H221</td>
<td>Include</td>
<td>Automatic block or interlocking signal displaying a stop indication - failure to comply.*</td>
</tr>
<tr>
<td>H222</td>
<td>Include</td>
<td>Automatic block or interlocking signal displaying other than a stop indication - failure to comply.*</td>
</tr>
<tr>
<td>H299</td>
<td>Include</td>
<td>Other signal causes (Provide detailed description in narrative)</td>
</tr>
<tr>
<td>H301</td>
<td>Include</td>
<td>Car(s) shoved out and left out of clear</td>
</tr>
<tr>
<td>H302</td>
<td>Include</td>
<td>Cars left foul</td>
</tr>
<tr>
<td>H303</td>
<td>Include</td>
<td>Derail, failure to apply or remove</td>
</tr>
</tbody>
</table>
### Exhibit A-5: Human factor causes (CAUSE) data field

<table>
<thead>
<tr>
<th>Code</th>
<th>Include/Exclude</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H304</td>
<td>Include</td>
<td>Hazardous materials regulations, failure to comply</td>
</tr>
<tr>
<td>H305</td>
<td>Exclude</td>
<td>Instruction to train/yard crew improper</td>
</tr>
<tr>
<td>H306</td>
<td>Include</td>
<td>Shoving movement, absence of man on or at leading end of movement</td>
</tr>
<tr>
<td>H307</td>
<td>Include</td>
<td>Shoving movement, man on or at leading end of movement, failure to control</td>
</tr>
<tr>
<td>H308</td>
<td>Include</td>
<td>Skate, failure to remove or place</td>
</tr>
<tr>
<td>H309</td>
<td>Include</td>
<td>Failure to stretch cars before shoving</td>
</tr>
<tr>
<td>H310</td>
<td>Include</td>
<td>Failure to couple</td>
</tr>
<tr>
<td>H311</td>
<td>Exclude</td>
<td>Moving cars while loading ramp/hose/chute/cables/bridge plate, etc., not in proper position</td>
</tr>
<tr>
<td>H312</td>
<td>Exclude</td>
<td>Passed couplers (other than automated classification yard)</td>
</tr>
<tr>
<td>H313</td>
<td>Exclude</td>
<td>Retarder, improper manual operation</td>
</tr>
<tr>
<td>H314</td>
<td>Exclude</td>
<td>Retarder yard skate improperly applied</td>
</tr>
<tr>
<td>H315</td>
<td>Exclude</td>
<td>Portable derail, improperly applied</td>
</tr>
<tr>
<td>H316</td>
<td>Exclude</td>
<td>Manual intervention of classification yard automatic control system modes by operator</td>
</tr>
<tr>
<td>H317</td>
<td>Exclude</td>
<td>Humping or cutting off in motion equipment susceptible to damage, or to cause damage to other equipment</td>
</tr>
<tr>
<td>H318</td>
<td>Exclude</td>
<td>Kicking or dropping cars, inadequate precautions</td>
</tr>
<tr>
<td>H399</td>
<td>Include</td>
<td>Other general switching rules (Provide detailed description in narrative)</td>
</tr>
<tr>
<td>H401</td>
<td>Include</td>
<td>Failure to stop train in clear</td>
</tr>
<tr>
<td>H402</td>
<td>Exclude</td>
<td>Motor car or on-track equipment rules, failure to comply</td>
</tr>
<tr>
<td>H403</td>
<td>Include</td>
<td>Movement of engine(s) or car(s) without authority (railroad employee)</td>
</tr>
<tr>
<td>H404</td>
<td>Include</td>
<td>Train order, track warrant, track bulletin, or timetabled authority, failure to comply</td>
</tr>
<tr>
<td>H405</td>
<td>Exclude</td>
<td>Train orders, track warrants, direct traffic control, track bulletins, radio, error in preparation, transmission or delivery</td>
</tr>
<tr>
<td>H406</td>
<td>Exclude</td>
<td>Train orders, track warrants, direct traffic control, track bulletins, written, error in preparation, transmission or delivery</td>
</tr>
<tr>
<td>H499</td>
<td>Include</td>
<td>Other main track authority causes (Provide detailed description in narrative)</td>
</tr>
<tr>
<td>H501</td>
<td>Include</td>
<td>Improper train make-up at initial terminal</td>
</tr>
<tr>
<td>H502</td>
<td>Include</td>
<td>Improper placement of cars in train between terminals</td>
</tr>
<tr>
<td>H503</td>
<td>Include</td>
<td>Buffing or slack action excessive, train handling</td>
</tr>
<tr>
<td>H504</td>
<td>Include</td>
<td>Buffing or slack action excessive, train make-up</td>
</tr>
<tr>
<td>H505</td>
<td>Include</td>
<td>Lateral drawbar force on curve excessive, train handling</td>
</tr>
<tr>
<td>H506</td>
<td>Include</td>
<td>Lateral drawbar force on curve excessive, train make-up</td>
</tr>
<tr>
<td>H507</td>
<td>Include</td>
<td>Lateral drawbar force on curve excessive, car geometry (short car/long car combination)</td>
</tr>
<tr>
<td>H508</td>
<td>Include</td>
<td>Improper train make-up</td>
</tr>
<tr>
<td>H509</td>
<td>Include</td>
<td>Improper train inspection</td>
</tr>
</tbody>
</table>
**Exhibit A-5: Human factor causes (CAUSE) data field**

<table>
<thead>
<tr>
<th>Code</th>
<th>Include/ Exclude</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H510</td>
<td>Include</td>
<td>Automatic brake, insufficient (H001) -- see note after cause H599</td>
</tr>
<tr>
<td>H511</td>
<td>Include</td>
<td>Automatic brake, excessive (H002)</td>
</tr>
<tr>
<td>H512</td>
<td>Include</td>
<td>Automatic brake, failure to use split reduction (H003)</td>
</tr>
<tr>
<td>H513</td>
<td>Include</td>
<td>Automatic brake, other improper use (H004)</td>
</tr>
<tr>
<td>H514</td>
<td>Include</td>
<td>Failure to allow air brakes to fully release before proceeding (H005)</td>
</tr>
<tr>
<td>H515</td>
<td>Include</td>
<td>Failure to properly cut-out brake valves on locomotives (H006)</td>
</tr>
<tr>
<td>H516</td>
<td>Include</td>
<td>Failure to properly cut-in brake valves on locomotives (H007)</td>
</tr>
<tr>
<td>H517</td>
<td>Include</td>
<td>Dynamic brake, insufficient (H009)</td>
</tr>
<tr>
<td>H518</td>
<td>Include</td>
<td>Dynamic brake, excessive (H010)</td>
</tr>
<tr>
<td>H519</td>
<td>Include</td>
<td>Dynamic brake, too rapid adjustment (H011)</td>
</tr>
<tr>
<td>H520</td>
<td>Include</td>
<td>Dynamic brake, excessive axles (H012)</td>
</tr>
<tr>
<td>H521</td>
<td>Include</td>
<td>Dynamic brake, other improper use (H013)</td>
</tr>
<tr>
<td>H522</td>
<td>Include</td>
<td>Throttle (power), improper use (H014)</td>
</tr>
<tr>
<td>H523</td>
<td>Include</td>
<td>Throttle (power), too rapid adjustment (H015)</td>
</tr>
<tr>
<td>H524</td>
<td>Include</td>
<td>Excessive horsepower (H016)</td>
</tr>
<tr>
<td>H525</td>
<td>Include</td>
<td>Independent (engine) brake, improper use (except actuation) (H023)</td>
</tr>
<tr>
<td>H526</td>
<td>Include</td>
<td>Failure to actuate off independent brake (H024)</td>
</tr>
<tr>
<td>H599</td>
<td>Include</td>
<td>Other causes relating to train handling or makeup (Provide detailed description in narrative)</td>
</tr>
<tr>
<td>H601</td>
<td>Include</td>
<td>Coupling speed excessive</td>
</tr>
<tr>
<td>H602</td>
<td>Include</td>
<td>Switching movement, excessive speed</td>
</tr>
<tr>
<td>H603</td>
<td>Include</td>
<td>Train on main track inside yard limits, excessive speed</td>
</tr>
<tr>
<td>H604</td>
<td>Include</td>
<td>Train outside yard limits, in block signal or interlocking territory, excessive speed</td>
</tr>
<tr>
<td>H605</td>
<td>Include</td>
<td>Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal.</td>
</tr>
<tr>
<td>H606</td>
<td>Include</td>
<td>Train outside yard limits in non-block territory, excessive speed</td>
</tr>
<tr>
<td>H607</td>
<td>Include</td>
<td>Failure to comply with restricted speed or its equivalent not in connection with a block or interlocking signal.</td>
</tr>
<tr>
<td>H699</td>
<td>Include</td>
<td>Speed, other (Provide detailed description in narrative)</td>
</tr>
<tr>
<td>H701</td>
<td>Include</td>
<td>Spring Switch not cleared before reversing</td>
</tr>
<tr>
<td>H702</td>
<td>Include</td>
<td>Switch improperly lined</td>
</tr>
<tr>
<td>H703</td>
<td>Include</td>
<td>Switch not latched or locked</td>
</tr>
<tr>
<td>H704</td>
<td>Include</td>
<td>Switch previously run through</td>
</tr>
<tr>
<td>H705</td>
<td>Include</td>
<td>Moveable point switch frog improperly lined</td>
</tr>
<tr>
<td>H706</td>
<td>Include</td>
<td>Switch improperly lined, radio controlled</td>
</tr>
<tr>
<td>H707</td>
<td>Include</td>
<td>Radio controlled switch not locked effectively</td>
</tr>
<tr>
<td>H799</td>
<td>Include</td>
<td>Use of switches, other (Provide detailed description in narrative)</td>
</tr>
</tbody>
</table>
### Exhibit A-5: Human factor causes (CAUSE) data field

<table>
<thead>
<tr>
<th>Code</th>
<th>Include/Exclude</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H821</td>
<td>Include</td>
<td>Automatic cab signal, failure to comply</td>
</tr>
<tr>
<td>H822</td>
<td>Include</td>
<td>Automatic cab signal cut out</td>
</tr>
<tr>
<td>H823</td>
<td>Include</td>
<td>Automatic train-stop device cut out</td>
</tr>
<tr>
<td>H824</td>
<td>Include</td>
<td>Automatic train control device cut out</td>
</tr>
<tr>
<td>H899</td>
<td>Include</td>
<td>Other causes relating to cab signals (provide detailed description in narrative)</td>
</tr>
<tr>
<td>H991</td>
<td>Include</td>
<td>Tampering with safety/protective device(s)</td>
</tr>
<tr>
<td>H992</td>
<td>Include</td>
<td>Operation of locomotive by uncertified/unqualified person</td>
</tr>
<tr>
<td>H993</td>
<td>Exclude</td>
<td>Human Factor - track</td>
</tr>
<tr>
<td>H994</td>
<td>Exclude</td>
<td>Human Factor - Signal installation or maintenance error (field)</td>
</tr>
<tr>
<td>H995</td>
<td>Exclude</td>
<td>Human Factor - motive power and equipment</td>
</tr>
<tr>
<td>H996</td>
<td>Include</td>
<td>Oversized loads or Excess Height/Width cars misrouted or switched.</td>
</tr>
<tr>
<td>H997</td>
<td>Exclude</td>
<td>Motor car or other on-track equipment rules (other than main track authority) - Failure to Comply.</td>
</tr>
<tr>
<td>H999</td>
<td>Include</td>
<td>Other train operation/human factors (Provide detailed description in narrative)</td>
</tr>
<tr>
<td>H99A</td>
<td>Exclude</td>
<td>Human Factor - Signal - Train Control - Installation or maintenance error (shop).</td>
</tr>
<tr>
<td>H99B</td>
<td>Exclude</td>
<td>Human Factor - Signal - Train Control - Operator Input On-board computer incorrect data entry.</td>
</tr>
<tr>
<td>H99C</td>
<td>Exclude</td>
<td>Human Factor - Signal - Train Control - Operator Input On-board computer incorrect data provided</td>
</tr>
<tr>
<td>H99D</td>
<td>Exclude</td>
<td>Computer system design error (non-vendor)</td>
</tr>
<tr>
<td>H99E</td>
<td>Exclude</td>
<td>Computer system configuration/management error (non-vendor)</td>
</tr>
</tbody>
</table>
### Exhibit A-6: Type of equipment (TYPEQ) data field

<table>
<thead>
<tr>
<th>TYPEQ</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Include</td>
<td>Freight train</td>
</tr>
<tr>
<td>2</td>
<td>Include</td>
<td>passenger train pulling <em>(as of June 1, 2011 - name change)</em></td>
</tr>
<tr>
<td>3</td>
<td>Include</td>
<td>commuter train pulling <em>(as of June 1, 2011 - name change)</em></td>
</tr>
<tr>
<td>4</td>
<td>Include</td>
<td>work train</td>
</tr>
<tr>
<td>5</td>
<td>Exclude</td>
<td>single car</td>
</tr>
<tr>
<td>6</td>
<td>Exclude</td>
<td>cut of cars</td>
</tr>
<tr>
<td>7</td>
<td>Exclude</td>
<td>yard/switching</td>
</tr>
<tr>
<td>8</td>
<td>Include</td>
<td>light locos</td>
</tr>
<tr>
<td>9</td>
<td>Exclude</td>
<td>maintenance/inspection car</td>
</tr>
<tr>
<td>-</td>
<td>Exclude</td>
<td>Unknown</td>
</tr>
<tr>
<td>A</td>
<td>Exclude</td>
<td>Special MOW equip</td>
</tr>
<tr>
<td>B</td>
<td>Include</td>
<td>Passenger train pushing <em>(new selection; available after June 1, 2011)</em></td>
</tr>
<tr>
<td>C</td>
<td>Include</td>
<td>Commuter train pushing <em>(new selection; available after June 1, 2011)</em></td>
</tr>
<tr>
<td>D</td>
<td>Include</td>
<td>EMU <em>(new selection; available after June 1, 2011)</em></td>
</tr>
<tr>
<td>E</td>
<td>Include</td>
<td>DMU <em>(new selection; available after June 1, 2011)</em></td>
</tr>
</tbody>
</table>
### Exhibit A-7: Equipment incident data filter

<table>
<thead>
<tr>
<th>Filter</th>
<th>Records</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total equipment records</td>
<td>20,015</td>
<td></td>
</tr>
<tr>
<td>Type accident</td>
<td>18,415</td>
<td>Keeping only records regarding collisions and derailments</td>
</tr>
<tr>
<td>Human factors</td>
<td>7,527</td>
<td>Records remaining after only human factors accidents are retained</td>
</tr>
<tr>
<td>Selected human factors</td>
<td>6,447</td>
<td>Records remaining after only human factors involving road crew retained</td>
</tr>
<tr>
<td>Type equipment</td>
<td>2,727</td>
<td>Records remaining after retaining only records relating to trains and light engine movement</td>
</tr>
<tr>
<td>Remove records involving more than one railroad</td>
<td>2,656</td>
<td>Ensured records naming RR responsible for incident remain</td>
</tr>
<tr>
<td>Railroad</td>
<td>2,375</td>
<td>Keep only those records describing incidents on AMTK, commuters, Class 1s, INRD, and regional</td>
</tr>
<tr>
<td>Final duplicate removal</td>
<td>2,169</td>
<td>Removed duplicates</td>
</tr>
</tbody>
</table>

### Exhibit A-8: Type of person (TYPPERS) data field

<table>
<thead>
<tr>
<th>TYPPERS</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Unassigned</td>
<td>Exclude</td>
</tr>
<tr>
<td>A</td>
<td>Worker on duty - employee</td>
<td>Include</td>
</tr>
<tr>
<td>B</td>
<td>Employee - not on duty</td>
<td>Exclude</td>
</tr>
<tr>
<td>C</td>
<td>Passenger on train</td>
<td>Exclude</td>
</tr>
<tr>
<td>D</td>
<td>Non-trespasser - on railroad property</td>
<td>Include</td>
</tr>
<tr>
<td>E</td>
<td>Trespassers</td>
<td>Exclude</td>
</tr>
<tr>
<td>F</td>
<td>Worker on duty - contractor</td>
<td>Include</td>
</tr>
<tr>
<td>G</td>
<td>Contractor - other</td>
<td>Include</td>
</tr>
<tr>
<td>H</td>
<td>Worker on duty - volunteer</td>
<td>Include</td>
</tr>
<tr>
<td>I</td>
<td>Volunteer - other</td>
<td>Include</td>
</tr>
<tr>
<td>J</td>
<td>Non-trespassers - off railroad property</td>
<td>Include</td>
</tr>
</tbody>
</table>
### Exhibit A-9: Injury cause (INJCAUS) data field

<table>
<thead>
<tr>
<th>INJCAUS</th>
<th>Environment</th>
<th>Circumstance</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Conventional</td>
<td>Environmental</td>
<td>Exclude</td>
</tr>
<tr>
<td>02</td>
<td>Conventional</td>
<td>Safety Equipment not worn or in place</td>
<td>Exclude</td>
</tr>
<tr>
<td>03</td>
<td>Conventional</td>
<td>Procedures for operating/using equipment not followed</td>
<td>Include</td>
</tr>
<tr>
<td>04</td>
<td>Conventional</td>
<td>Equipment</td>
<td>Include</td>
</tr>
<tr>
<td>05</td>
<td>Conventional</td>
<td>Signal</td>
<td>Exclude</td>
</tr>
<tr>
<td>06</td>
<td>Conventional</td>
<td>Track</td>
<td>Exclude</td>
</tr>
<tr>
<td>07</td>
<td>Conventional</td>
<td>Impairment, substance use</td>
<td>Exclude</td>
</tr>
<tr>
<td>08</td>
<td>Conventional</td>
<td>Impairment, physical condition, e.g. fatigue</td>
<td>Exclude</td>
</tr>
<tr>
<td>09</td>
<td>Conventional</td>
<td>Human factors</td>
<td>Include</td>
</tr>
<tr>
<td>10</td>
<td>Conventional</td>
<td>Trespassing</td>
<td>Exclude</td>
</tr>
<tr>
<td>11</td>
<td>Conventional</td>
<td>Object fouling track</td>
<td>Include</td>
</tr>
<tr>
<td>12</td>
<td>Conventional</td>
<td>Outside caused (e.g. assaulted/attached)</td>
<td>Exclude</td>
</tr>
<tr>
<td>13</td>
<td>Conventional</td>
<td>Lack of communication</td>
<td>Include</td>
</tr>
<tr>
<td>14</td>
<td>Conventional</td>
<td>Slack adjustment during switching operation</td>
<td>Include</td>
</tr>
<tr>
<td>15</td>
<td>Conventional</td>
<td>Insufficient training</td>
<td>Include</td>
</tr>
<tr>
<td>16</td>
<td>Conventional</td>
<td>Failure to provide adequate space between equipment during switching operation</td>
<td>Include</td>
</tr>
<tr>
<td>17</td>
<td>Conventional</td>
<td>Close or no clearance</td>
<td>Include</td>
</tr>
<tr>
<td>18</td>
<td>Conventional</td>
<td>Slipped, fell, stumbled due to Passenger Station Platform Gap</td>
<td>Exclude</td>
</tr>
<tr>
<td>19</td>
<td>Conventional</td>
<td>Act of God</td>
<td>Exclude</td>
</tr>
<tr>
<td>21</td>
<td>RCL</td>
<td>Environmental, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>22</td>
<td>RCL</td>
<td>Safety Equipment not worn or in place, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>23</td>
<td>RCL</td>
<td>Procedures for operating/using equipment not followed, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>24</td>
<td>RCL</td>
<td>Equipment, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>25</td>
<td>RCL</td>
<td>Signal, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>26</td>
<td>RCL</td>
<td>Track, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>27</td>
<td>RCL</td>
<td>Impairment, substance use, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>28</td>
<td>RCL</td>
<td>Impairment, physical condition, e.g. fatigue, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>29</td>
<td>RCL</td>
<td>Human factors, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>31</td>
<td>RCL</td>
<td>Trespassing, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>39</td>
<td>RCL</td>
<td>Undetermined, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>41</td>
<td>RCL</td>
<td>Environmental, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>42</td>
<td>RCL</td>
<td>Safety equipment not worn or in place, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-9: Injury cause (INJCAUS) data field

<table>
<thead>
<tr>
<th>INJCAUS</th>
<th>Environment</th>
<th>Circumstance</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>RCL</td>
<td>Procedures for operating/using equipment not followed, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>44</td>
<td>RCL</td>
<td>Equipment, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>45</td>
<td>RCL</td>
<td>Signal, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>46</td>
<td>RCL</td>
<td>Track, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>47</td>
<td>RCL</td>
<td>Impairment, substance use, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>48</td>
<td>RCL</td>
<td>Impairment, physical condition, e.g. fatigue, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>49</td>
<td>RCL</td>
<td>Human factors, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>50</td>
<td>RCL</td>
<td>Trespassing, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>59</td>
<td>RCL</td>
<td>Undetermined, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>99</td>
<td>RCL</td>
<td>Undetermined</td>
<td>Exclude</td>
</tr>
<tr>
<td>R1</td>
<td>RCL</td>
<td>Object fouling track, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>R2</td>
<td>RCL</td>
<td>Outside caused (e.g., assaulted/attacked), related to RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>R3</td>
<td>RCL</td>
<td>Lack of communication, related to RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>R4</td>
<td>RCL</td>
<td>Slack adjustment during switching operation, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>R6</td>
<td>RCL</td>
<td>Failure to provide adequate space between equipment during switching operation, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>R7</td>
<td>RCL</td>
<td>Close or no clearance, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>R8</td>
<td>RCL</td>
<td>Act of God, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>U1</td>
<td>RCL</td>
<td>Object fouling track, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>U2</td>
<td>RCL</td>
<td>Outside caused (e.g., assaulted/attacked), unrelated to RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>U3</td>
<td>RCL</td>
<td>Lack of communication, unrelated to RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>U4</td>
<td>RCL</td>
<td>Slack adjustment during switching operation, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>U6</td>
<td>RCL</td>
<td>Failure to provide adequate space between equipment during switching operation, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>U7</td>
<td>RCL</td>
<td>Close or no clearance, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>U8</td>
<td>RCL</td>
<td>Act of God, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-10: Physical act (PHYSACT) data field

<table>
<thead>
<tr>
<th>PHYACT</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Adjusting coupler</td>
<td>Include</td>
</tr>
<tr>
<td>02</td>
<td>Adjusting drawbar</td>
<td>Include</td>
</tr>
<tr>
<td>03</td>
<td>Adjusting, other</td>
<td>Include</td>
</tr>
<tr>
<td>04</td>
<td>Applying rail anchor/fastener</td>
<td>Exclude</td>
</tr>
<tr>
<td>05</td>
<td>Bending/stooping</td>
<td>Exclude</td>
</tr>
<tr>
<td>06</td>
<td>Carrying</td>
<td>Exclude</td>
</tr>
<tr>
<td>07</td>
<td>Chaining, cabling car or locomotive</td>
<td>Exclude</td>
</tr>
<tr>
<td>08</td>
<td>Cleaning/scrubbing</td>
<td>Exclude</td>
</tr>
<tr>
<td>09</td>
<td>Climbing over/on</td>
<td>Include</td>
</tr>
<tr>
<td>10</td>
<td>Closing</td>
<td>Include</td>
</tr>
<tr>
<td>11</td>
<td>Coupling electric cables</td>
<td>Include</td>
</tr>
<tr>
<td>12</td>
<td>Coupling steam hose</td>
<td>Include</td>
</tr>
<tr>
<td>13</td>
<td>Coupling air hose</td>
<td>Include</td>
</tr>
<tr>
<td>14</td>
<td>Crossing over</td>
<td>Include</td>
</tr>
<tr>
<td>15</td>
<td>Crossing or crawling under</td>
<td>Include</td>
</tr>
<tr>
<td>16</td>
<td>Crossing between</td>
<td>Include</td>
</tr>
<tr>
<td>17</td>
<td>Cutting rail</td>
<td>Exclude</td>
</tr>
<tr>
<td>18</td>
<td>Cutting vegetation</td>
<td>Exclude</td>
</tr>
<tr>
<td>19</td>
<td>Cutting, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>20</td>
<td>Digging, excavating</td>
<td>Exclude</td>
</tr>
<tr>
<td>21</td>
<td>Driving (motor vehicle, forklift, etc.)</td>
<td>Exclude</td>
</tr>
<tr>
<td>22</td>
<td>Flagging</td>
<td>Include</td>
</tr>
<tr>
<td>23</td>
<td>Fueling</td>
<td>Exclude</td>
</tr>
<tr>
<td>24</td>
<td>Getting on</td>
<td>Include</td>
</tr>
<tr>
<td>25</td>
<td>Getting off</td>
<td>Include</td>
</tr>
<tr>
<td>26</td>
<td>Grinding</td>
<td>Exclude</td>
</tr>
<tr>
<td>27</td>
<td>Handling baggage</td>
<td>Exclude</td>
</tr>
<tr>
<td>28</td>
<td>Handling car parts</td>
<td>Exclude</td>
</tr>
<tr>
<td>29</td>
<td>handling material, general</td>
<td>Exclude</td>
</tr>
<tr>
<td>30</td>
<td>handling locomotive parts</td>
<td>Exclude</td>
</tr>
<tr>
<td>31</td>
<td>Handling wheels/trucks</td>
<td>Exclude</td>
</tr>
<tr>
<td>32</td>
<td>handling, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>33</td>
<td>Handling other track material/supplies</td>
<td>Exclude</td>
</tr>
<tr>
<td>34</td>
<td>Handling poles</td>
<td>Exclude</td>
</tr>
<tr>
<td>35</td>
<td>Handling tie plates</td>
<td>Exclude</td>
</tr>
<tr>
<td>36</td>
<td>Handling ties</td>
<td>Exclude</td>
</tr>
<tr>
<td>37</td>
<td>Handling rail</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-10: Physical act (PHYSACT) data field

<table>
<thead>
<tr>
<th>PHYACT</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>Inspecting</td>
<td>Exclude</td>
</tr>
<tr>
<td>39</td>
<td>Installing</td>
<td>Exclude</td>
</tr>
<tr>
<td>40</td>
<td>Jumping from</td>
<td>Include</td>
</tr>
<tr>
<td>41</td>
<td>Jumping onto</td>
<td>Include</td>
</tr>
<tr>
<td>42</td>
<td>Laying</td>
<td>Include</td>
</tr>
<tr>
<td>43</td>
<td>Lifting other materials</td>
<td>Exclude</td>
</tr>
<tr>
<td>44</td>
<td>Lifting equipment (tools, parts, etc.)</td>
<td>Exclude</td>
</tr>
<tr>
<td>45</td>
<td>Lining switches</td>
<td>Include</td>
</tr>
<tr>
<td>46</td>
<td>Lining other</td>
<td>Include</td>
</tr>
<tr>
<td>47</td>
<td>Loading/unloading</td>
<td>Exclude</td>
</tr>
<tr>
<td>48</td>
<td>Maintaining/servicing</td>
<td>Exclude</td>
</tr>
<tr>
<td>49</td>
<td>Opening</td>
<td>Exclude</td>
</tr>
<tr>
<td>50</td>
<td>Opening/closing angle cock</td>
<td>Exclude</td>
</tr>
<tr>
<td>51</td>
<td>Operating</td>
<td>Include</td>
</tr>
<tr>
<td>52</td>
<td>Pulling pin lifter/operating uncoupling lever</td>
<td>Include</td>
</tr>
<tr>
<td>53</td>
<td>Pulling pin lifter/operating uncoupling lever</td>
<td>Include</td>
</tr>
<tr>
<td>54</td>
<td>Pushing</td>
<td>Include</td>
</tr>
<tr>
<td>55</td>
<td>Reaching</td>
<td>Include</td>
</tr>
<tr>
<td>56</td>
<td>Removing rail anchors/fasteners</td>
<td>Exclude</td>
</tr>
<tr>
<td>57</td>
<td>Repairing</td>
<td>Exclude</td>
</tr>
<tr>
<td>58</td>
<td>Riding</td>
<td>Include</td>
</tr>
<tr>
<td>59</td>
<td>Running</td>
<td>Include</td>
</tr>
<tr>
<td>60</td>
<td>Sitting</td>
<td>Include</td>
</tr>
<tr>
<td>61</td>
<td>Spiking</td>
<td>Exclude</td>
</tr>
<tr>
<td>62</td>
<td>Standing</td>
<td>Include</td>
</tr>
<tr>
<td>63</td>
<td>Stepping up</td>
<td>Include</td>
</tr>
<tr>
<td>64</td>
<td>Stepping down</td>
<td>Include</td>
</tr>
<tr>
<td>65</td>
<td>Stepping over</td>
<td>Include</td>
</tr>
<tr>
<td>66</td>
<td>Uncoupling air hose</td>
<td>Include</td>
</tr>
<tr>
<td>67</td>
<td>Uncoupling steam hose</td>
<td>Include</td>
</tr>
<tr>
<td>68</td>
<td>Uncoupling electric cable</td>
<td>Include</td>
</tr>
<tr>
<td>69</td>
<td>Using hand signals</td>
<td>Include</td>
</tr>
<tr>
<td>70</td>
<td>Using hand tool</td>
<td>Exclude</td>
</tr>
<tr>
<td>71</td>
<td>Using, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>72</td>
<td>Walking</td>
<td>Exclude</td>
</tr>
<tr>
<td>73</td>
<td>Welding (including field welding)</td>
<td>Exclude</td>
</tr>
<tr>
<td>74</td>
<td>Handbrakes, applying</td>
<td>Include</td>
</tr>
</tbody>
</table>
### Exhibit A-10: Physical act (PHYSACT) data field

<table>
<thead>
<tr>
<th>PHYACT</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>75</td>
<td>Handbrakes, releasing</td>
<td>Include</td>
</tr>
<tr>
<td>76</td>
<td>Handbrakes, other</td>
<td>Include</td>
</tr>
<tr>
<td>77</td>
<td>Derail, applying</td>
<td>Exclude</td>
</tr>
<tr>
<td>78</td>
<td>Derail, removing</td>
<td>Exclude</td>
</tr>
<tr>
<td>79</td>
<td>Derail, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>80</td>
<td>Stepping across (passenger cars)</td>
<td>Include</td>
</tr>
<tr>
<td>99</td>
<td>Other (narrative must be provided)</td>
<td>Include</td>
</tr>
<tr>
<td>A1</td>
<td>Replacing</td>
<td>Exclude</td>
</tr>
<tr>
<td>A2</td>
<td>Ascending</td>
<td>Include</td>
</tr>
<tr>
<td>A3</td>
<td>Descending</td>
<td>Include</td>
</tr>
<tr>
<td>A4</td>
<td>Exercising</td>
<td>Exclude</td>
</tr>
<tr>
<td>A5</td>
<td>Getting in</td>
<td>Include</td>
</tr>
<tr>
<td>A6</td>
<td>Getting out</td>
<td>Include</td>
</tr>
<tr>
<td>A7</td>
<td>Hauling</td>
<td>Exclude</td>
</tr>
<tr>
<td>A8</td>
<td>Moving</td>
<td>Exclude</td>
</tr>
<tr>
<td>A9</td>
<td>Washing</td>
<td>Exclude</td>
</tr>
<tr>
<td>B1</td>
<td>Servicing</td>
<td>Exclude</td>
</tr>
<tr>
<td>B2</td>
<td>Sanding</td>
<td>Exclude</td>
</tr>
<tr>
<td>B3</td>
<td>Arresting/apprehending/subduing</td>
<td>Exclude</td>
</tr>
<tr>
<td>B4</td>
<td>Sleeping</td>
<td>Include</td>
</tr>
<tr>
<td>B5</td>
<td>Stepped on</td>
<td>Include</td>
</tr>
<tr>
<td>B6</td>
<td>Lying down</td>
<td>Include</td>
</tr>
</tbody>
</table>
### Exhibit A-11: Location circumstance (LOCA) data field

<table>
<thead>
<tr>
<th>LOCA</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Main/branch</td>
<td>Include</td>
</tr>
<tr>
<td>B</td>
<td>Yard</td>
<td>Include</td>
</tr>
<tr>
<td>C</td>
<td>Siding</td>
<td>Include</td>
</tr>
<tr>
<td>D</td>
<td>Industry</td>
<td>Include</td>
</tr>
<tr>
<td>E</td>
<td>Repair</td>
<td>Exclude</td>
</tr>
<tr>
<td>F</td>
<td>Restroom</td>
<td>Exclude</td>
</tr>
<tr>
<td>G</td>
<td>Break/lunch room</td>
<td>Exclude</td>
</tr>
<tr>
<td>H</td>
<td>Freight terminal</td>
<td>Exclude</td>
</tr>
<tr>
<td>J</td>
<td>Highway/roadway</td>
<td>Exclude</td>
</tr>
<tr>
<td>K</td>
<td>Loading dock</td>
<td>Exclude</td>
</tr>
<tr>
<td>L</td>
<td>Lodging facility</td>
<td>Exclude</td>
</tr>
<tr>
<td>M</td>
<td>Office environment</td>
<td>Exclude</td>
</tr>
<tr>
<td>N</td>
<td>Parking lot</td>
<td>Exclude</td>
</tr>
<tr>
<td>P</td>
<td>Passenger terminal</td>
<td>Exclude</td>
</tr>
<tr>
<td>Q</td>
<td>Repair shop</td>
<td>Exclude</td>
</tr>
<tr>
<td>R</td>
<td>Storage facility</td>
<td>Exclude</td>
</tr>
<tr>
<td>S</td>
<td>Sidewalk/walkway</td>
<td>Exclude</td>
</tr>
<tr>
<td>T</td>
<td>Other, (off-site location)</td>
<td>Exclude</td>
</tr>
<tr>
<td>U</td>
<td>Airport/Plane</td>
<td>Exclude</td>
</tr>
<tr>
<td>V</td>
<td>Freight terminal</td>
<td>Exclude</td>
</tr>
<tr>
<td>W</td>
<td>Private property</td>
<td>Exclude</td>
</tr>
<tr>
<td>Y</td>
<td>Other track (explain in narrative)</td>
<td>Exclude</td>
</tr>
<tr>
<td>Z</td>
<td>Other location (describe in narrative)</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-12: Location circumstance (LOCB) data field

<table>
<thead>
<tr>
<th>LOCB</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Camp car - moving</td>
<td>Exclude</td>
</tr>
<tr>
<td>02</td>
<td>camp car - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>03</td>
<td>Freight train - moving</td>
<td>Include</td>
</tr>
<tr>
<td>04</td>
<td>Freight train - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>05</td>
<td>Freight car(s) - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>06</td>
<td>Freight car(s) - moving</td>
<td>Exclude</td>
</tr>
<tr>
<td>07</td>
<td>hi-rail/other inspection vehicle - moving</td>
<td>Exclude</td>
</tr>
<tr>
<td>08</td>
<td>hi-rail/other inspection vehicle - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>09</td>
<td>Locomotive(s), not remote controlled - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>10</td>
<td>Locomotive(s), not remote controlled - moving</td>
<td>Include</td>
</tr>
<tr>
<td>11</td>
<td>MOW Equipment - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>12</td>
<td>MOW equipment - moving</td>
<td>Exclude</td>
</tr>
<tr>
<td>13</td>
<td>Passenger train - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>14</td>
<td>Passenger train - moving</td>
<td>Include</td>
</tr>
<tr>
<td>15</td>
<td>Passenger car(s) - moving</td>
<td>Exclude</td>
</tr>
<tr>
<td>16</td>
<td>Passenger car(s) - moving</td>
<td>Exclude</td>
</tr>
<tr>
<td>17</td>
<td>Locomotive(s), remote control - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>18</td>
<td>Locomotive(s), remote control - moving</td>
<td>Exclude</td>
</tr>
<tr>
<td>49</td>
<td>Other on-track equipment - moving</td>
<td>Exclude</td>
</tr>
<tr>
<td>50</td>
<td>Other on-track equipment - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>51</td>
<td>Automobile</td>
<td>Exclude</td>
</tr>
<tr>
<td>52</td>
<td>Crane, hoists, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>53</td>
<td>Excavating machinery</td>
<td>Exclude</td>
</tr>
<tr>
<td>54</td>
<td>Grading/surfacing machinery</td>
<td>Exclude</td>
</tr>
<tr>
<td>55</td>
<td>Loaders, forklifts, tractor, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>56</td>
<td>Off road vehicle - industrial</td>
<td>Exclude</td>
</tr>
<tr>
<td>57</td>
<td>Off road vehicle - recreational</td>
<td>Exclude</td>
</tr>
<tr>
<td>58</td>
<td>Other construction type equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>59</td>
<td>Taxi/commercial vehicle</td>
<td>Exclude</td>
</tr>
<tr>
<td>60</td>
<td>Truck</td>
<td>Exclude</td>
</tr>
<tr>
<td>61</td>
<td>Van (utility)</td>
<td>Exclude</td>
</tr>
<tr>
<td>62</td>
<td>Van (passenger)</td>
<td>Exclude</td>
</tr>
<tr>
<td>63</td>
<td>Water vehicle, ship, boat, barge, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>64</td>
<td>Motorcycle</td>
<td>Exclude</td>
</tr>
<tr>
<td>65</td>
<td>Bus</td>
<td>Exclude</td>
</tr>
<tr>
<td>66</td>
<td>Tractor</td>
<td>Exclude</td>
</tr>
<tr>
<td>97</td>
<td>Other operated equipment (explain in narrative)</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-12: Location circumstance (LOCB) data field

<table>
<thead>
<tr>
<th>LOCB</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>98</td>
<td>Other equipment (explain in narrative)</td>
<td>Exclude</td>
</tr>
<tr>
<td>99</td>
<td>Not associated with on-track equipment of any listed vehicle type</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-13: Location circumstance (LOCC) data field

<table>
<thead>
<tr>
<th>LOCC</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Alongside of on-track equipment - on ground</td>
<td>Include</td>
</tr>
<tr>
<td>A2</td>
<td>At work station</td>
<td>Exclude</td>
</tr>
<tr>
<td>A3</td>
<td>Track, beside</td>
<td>Include</td>
</tr>
<tr>
<td>A4</td>
<td>Track, between</td>
<td>Include</td>
</tr>
<tr>
<td>A5</td>
<td>Between car/locomotive</td>
<td>Include</td>
</tr>
<tr>
<td>A6</td>
<td>Locomotive, in cab or on walkways</td>
<td>Include</td>
</tr>
<tr>
<td>A7</td>
<td>Car, in (rail car)</td>
<td>Include</td>
</tr>
<tr>
<td>A8</td>
<td>In elevator</td>
<td>Exclude</td>
</tr>
<tr>
<td>A9</td>
<td>In /operating vehicle</td>
<td>Exclude</td>
</tr>
<tr>
<td>AA</td>
<td>At freight terminal</td>
<td>Exclude</td>
</tr>
<tr>
<td>AB</td>
<td>On tower</td>
<td>Exclude</td>
</tr>
<tr>
<td>AC</td>
<td>In cafeteria/lunch room</td>
<td>Exclude</td>
</tr>
<tr>
<td>B1</td>
<td>In tower</td>
<td>Exclude</td>
</tr>
<tr>
<td>B2</td>
<td>In tunnel</td>
<td>Include</td>
</tr>
<tr>
<td>B3</td>
<td>On bridge/trestle</td>
<td>Include</td>
</tr>
<tr>
<td>B4</td>
<td>On highway-rail crossing</td>
<td>Exclude</td>
</tr>
<tr>
<td>B5</td>
<td>On other rail crossing</td>
<td>Exclude</td>
</tr>
<tr>
<td>B6</td>
<td>Car, on side of (rail car)</td>
<td>Include</td>
</tr>
<tr>
<td>B7</td>
<td>Track, on</td>
<td>Include</td>
</tr>
<tr>
<td>B8</td>
<td>Car, on end of (rail car)</td>
<td>Include</td>
</tr>
<tr>
<td>B9</td>
<td>On pole/signal mast</td>
<td>Exclude</td>
</tr>
<tr>
<td>C1</td>
<td>On scaffold</td>
<td>Exclude</td>
</tr>
<tr>
<td>C2</td>
<td>On platform</td>
<td>Include</td>
</tr>
<tr>
<td>C3</td>
<td>On escalator</td>
<td>Exclude</td>
</tr>
<tr>
<td>C4</td>
<td>On stairs</td>
<td>Include</td>
</tr>
<tr>
<td>C5</td>
<td>On ladder</td>
<td>Include</td>
</tr>
<tr>
<td>C6</td>
<td>Locomotive, other location</td>
<td>Include</td>
</tr>
<tr>
<td>C7</td>
<td>Car, under (rail car)</td>
<td>Include</td>
</tr>
<tr>
<td>C8</td>
<td>Locomotive, under</td>
<td>Include</td>
</tr>
<tr>
<td>C9</td>
<td>Locomotive, on top of</td>
<td>Include</td>
</tr>
<tr>
<td>CA</td>
<td>Car, on top of (rail car)</td>
<td>Include</td>
</tr>
<tr>
<td>CB</td>
<td>On top of equipment, other than on-track equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>CC</td>
<td>Depot</td>
<td>Exclude</td>
</tr>
<tr>
<td>CD</td>
<td>On elevated work station</td>
<td>Exclude</td>
</tr>
<tr>
<td>CE</td>
<td>On station platform</td>
<td>Exclude</td>
</tr>
<tr>
<td>D1</td>
<td>At lodging facility</td>
<td>Exclude</td>
</tr>
<tr>
<td>D2</td>
<td>On highway/street</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-13: Location circumstance (LOCC) data field

<table>
<thead>
<tr>
<th>LOCC</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>D3</td>
<td>On private property</td>
<td>Exclude</td>
</tr>
<tr>
<td>D4</td>
<td>On sidewalk/walkway</td>
<td>Exclude</td>
</tr>
<tr>
<td>D5</td>
<td>In airport</td>
<td>Exclude</td>
</tr>
<tr>
<td>D6</td>
<td>In airplane</td>
<td>Exclude</td>
</tr>
<tr>
<td>D7</td>
<td>In hotel room</td>
<td>Exclude</td>
</tr>
<tr>
<td>E1</td>
<td>On parking lot</td>
<td>Exclude</td>
</tr>
<tr>
<td>E2</td>
<td>In building</td>
<td>Exclude</td>
</tr>
<tr>
<td>E3</td>
<td>In restroom</td>
<td>Exclude</td>
</tr>
<tr>
<td>G1</td>
<td>Rail Car Door Threshold Plate to Edge of Platform-GAP</td>
<td>Include</td>
</tr>
<tr>
<td>G2</td>
<td>Area between coupled car and platform</td>
<td>Include</td>
</tr>
<tr>
<td>G3</td>
<td>Area along car body, other than threshold plate and platform edge</td>
<td>Include</td>
</tr>
<tr>
<td>G4</td>
<td>Car in Vestibule</td>
<td>Include</td>
</tr>
<tr>
<td>X9</td>
<td>Other location (describe in narrative)</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-14: Event circumstance (EVENT) data field

<table>
<thead>
<tr>
<th>EVENT</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Aggravated pre-existing condition</td>
<td>Include</td>
</tr>
<tr>
<td>02</td>
<td>Apprehending/removing from property</td>
<td>Exclude</td>
</tr>
<tr>
<td>03</td>
<td>Assaulted by other</td>
<td>Exclude</td>
</tr>
<tr>
<td>04</td>
<td>Assaulted by co-worker</td>
<td>Exclude</td>
</tr>
<tr>
<td>05</td>
<td>Bitten/stung by bee, spider, other insect</td>
<td>Exclude</td>
</tr>
<tr>
<td>06</td>
<td>Bitten by animal</td>
<td>Exclude</td>
</tr>
<tr>
<td>07</td>
<td>Bodily function/sudden movement, e.g., sneezing, twisting</td>
<td>Exclude</td>
</tr>
<tr>
<td>08</td>
<td>Caught in or compressed by hand tools</td>
<td>Exclude</td>
</tr>
<tr>
<td>09</td>
<td>Caught in or compressed by other machinery</td>
<td>Exclude</td>
</tr>
<tr>
<td>10</td>
<td>Caught in or crushed by materials</td>
<td>Exclude</td>
</tr>
<tr>
<td>11</td>
<td>Caught in or crushed in excavation, land slide, cave-in, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>12</td>
<td>Caught in or compressed by powered hand tools</td>
<td>Exclude</td>
</tr>
<tr>
<td>13</td>
<td>Cave in, slide, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>14</td>
<td>Climatic conditions, other (e.g., high winds)</td>
<td>Exclude</td>
</tr>
<tr>
<td>15</td>
<td>Climatic condition, exposure to environmental heat</td>
<td>Exclude</td>
</tr>
<tr>
<td>16</td>
<td>Climatic condition, exposure to environmental cold</td>
<td>Exclude</td>
</tr>
<tr>
<td>17</td>
<td>Collision - between on track equipment</td>
<td>Include</td>
</tr>
<tr>
<td>18</td>
<td>Collision/impact - auto, truck, bus, van, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>19</td>
<td>Committing vandalism/theft</td>
<td>Exclude</td>
</tr>
<tr>
<td>20</td>
<td>Defective/malfunctioning equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>21</td>
<td>Derailment</td>
<td>Include</td>
</tr>
<tr>
<td>22</td>
<td>Electrical shock while operating welding equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>23</td>
<td>Electrical shock due to contact with 3rd rail, catenary, pantograph</td>
<td>Exclude</td>
</tr>
<tr>
<td>24</td>
<td>Electrical shock, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>25</td>
<td>Electrical shock from hand tool</td>
<td>Exclude</td>
</tr>
<tr>
<td>26</td>
<td>Exposure to fumes - inhalation</td>
<td>Exclude</td>
</tr>
<tr>
<td>27</td>
<td>Exposure to chemicals - external</td>
<td>Exclude</td>
</tr>
<tr>
<td>28</td>
<td>Exposure to poisonous plants</td>
<td>Exclude</td>
</tr>
<tr>
<td>29</td>
<td>Exposure to noise over time</td>
<td>Exclude</td>
</tr>
<tr>
<td>30</td>
<td>Exposure to noise - single incident</td>
<td>Exclude</td>
</tr>
<tr>
<td>31</td>
<td>Exposure to welding light</td>
<td>Exclude</td>
</tr>
<tr>
<td>32</td>
<td>Highway-rail collision/impact</td>
<td>Exclude</td>
</tr>
<tr>
<td>33</td>
<td>Horseplay-practical joke, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>34</td>
<td>Lost balance</td>
<td>Exclude</td>
</tr>
<tr>
<td>35</td>
<td>Missed handhold</td>
<td>Exclude</td>
</tr>
<tr>
<td>36</td>
<td>Need puncture/prick/stick</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
## Exhibit A-14: Event circumstance (EVENT) data field

<table>
<thead>
<tr>
<th>EVENT</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>Other impacts - on track equipment</td>
<td>Include</td>
</tr>
<tr>
<td>38</td>
<td>Overexertion</td>
<td>Exclude</td>
</tr>
<tr>
<td>39</td>
<td>Pushed/shoved into/against</td>
<td>Exclude</td>
</tr>
<tr>
<td>40</td>
<td>Pushed/shoved onto</td>
<td>Exclude</td>
</tr>
<tr>
<td>41</td>
<td>Pushed/shoved from</td>
<td>Exclude</td>
</tr>
<tr>
<td>42</td>
<td>Ran into on-track equipment</td>
<td>Include</td>
</tr>
<tr>
<td>43</td>
<td>Ran into object/equipment</td>
<td>Include</td>
</tr>
<tr>
<td>44</td>
<td>Repetitive motion - work processes</td>
<td>Exclude</td>
</tr>
<tr>
<td>45</td>
<td>Repetitive motion - typing, keyboard, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>46</td>
<td>Repetitive motion - tools</td>
<td>Exclude</td>
</tr>
<tr>
<td>47</td>
<td>Repetitive motion - other</td>
<td>Exclude</td>
</tr>
<tr>
<td>48</td>
<td>Rubbed, abraded, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>49</td>
<td>Shot</td>
<td>Exclude</td>
</tr>
<tr>
<td>50</td>
<td>Slack action, draft, compressive</td>
<td>Include</td>
</tr>
<tr>
<td>51</td>
<td>Slipped, fell, stumbled, etc. due to irregular surface, e.g. depression, slope, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>52</td>
<td>Slipped, fell, stumbled, etc. due to climatic condition (rain, snow, ice, etc.)</td>
<td>Exclude</td>
</tr>
<tr>
<td>53</td>
<td>Slipped, fell, stumbled, etc. on oil, grease, other slippery substance</td>
<td>Exclude</td>
</tr>
<tr>
<td>54</td>
<td>Slipped, fell, stumbled, etc. due to object, e.g. ballast, spike, material, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>55</td>
<td>Stabbing, knifing, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>56</td>
<td>Stepped on object</td>
<td>Exclude</td>
</tr>
<tr>
<td>57</td>
<td>Struck by thrown or propelled object</td>
<td>Include</td>
</tr>
<tr>
<td>58</td>
<td>Struck by object</td>
<td>Exclude</td>
</tr>
<tr>
<td>59</td>
<td>Struck by on-track equipment</td>
<td>Include</td>
</tr>
<tr>
<td>60</td>
<td>Struck by falling object</td>
<td>Exclude</td>
</tr>
<tr>
<td>61</td>
<td>Struck against object</td>
<td>Exclude</td>
</tr>
<tr>
<td>62</td>
<td>Sudden release of air</td>
<td>Include</td>
</tr>
<tr>
<td>63</td>
<td>Sudden/Unexpected Movement of material</td>
<td>Exclude</td>
</tr>
<tr>
<td>64</td>
<td>Sudden/unexpected movement of on-track equipment</td>
<td>Include</td>
</tr>
<tr>
<td>65</td>
<td>Sudden/unexpected movement of vehicle</td>
<td>Exclude</td>
</tr>
<tr>
<td>66</td>
<td>Sustained viewing</td>
<td>Exclude</td>
</tr>
<tr>
<td>67</td>
<td>Thrill seeking</td>
<td>Exclude</td>
</tr>
<tr>
<td>68</td>
<td>Caught, crushed, pinched, other.</td>
<td>Exclude</td>
</tr>
<tr>
<td>69</td>
<td>On track equipment, other incidents</td>
<td>Include</td>
</tr>
<tr>
<td>70</td>
<td>Slipped, fell, stumbled, other</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-14: Event circumstance (EVENT) data field

<table>
<thead>
<tr>
<th>EVENT</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>sudden, unexpected, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>72</td>
<td>Bumped</td>
<td>Exclude</td>
</tr>
<tr>
<td>73</td>
<td>Burned</td>
<td>Exclude</td>
</tr>
<tr>
<td>74</td>
<td>Blowing/falling debris</td>
<td>Exclude</td>
</tr>
<tr>
<td>75</td>
<td>Sudden/unexpected movement of tools</td>
<td>Exclude</td>
</tr>
<tr>
<td>76</td>
<td>Struck by own remote control locomotive - controlled equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>77</td>
<td>Struck by other remote control locomotive - controlled equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>79</td>
<td>Caught between machinery</td>
<td>Exclude</td>
</tr>
<tr>
<td>80</td>
<td>Slack adjustment during switching operation</td>
<td>Include</td>
</tr>
<tr>
<td>81</td>
<td>Caught between equipment</td>
<td>Include</td>
</tr>
<tr>
<td>82</td>
<td>Caught between material</td>
<td>Exclude</td>
</tr>
<tr>
<td>99</td>
<td>Other (describe in narrative)</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
## Exhibit A-15: Tools used (TOOLS) data field

<table>
<thead>
<tr>
<th>TOOLS</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Baggage</td>
<td>Exclude</td>
</tr>
<tr>
<td>02</td>
<td>Ballast, stones, etc.</td>
<td>Include</td>
</tr>
<tr>
<td>03</td>
<td>Boring tools</td>
<td>Exclude</td>
</tr>
<tr>
<td>04</td>
<td>Bridge/trestle</td>
<td>Include</td>
</tr>
<tr>
<td>05</td>
<td>Caboose</td>
<td>Include</td>
</tr>
<tr>
<td>06</td>
<td>Coupler</td>
<td>Include</td>
</tr>
<tr>
<td>07</td>
<td>Cutting tools</td>
<td>Exclude</td>
</tr>
<tr>
<td>08</td>
<td>Derail</td>
<td>Include</td>
</tr>
<tr>
<td>09</td>
<td>Door</td>
<td>Exclude</td>
</tr>
<tr>
<td>10</td>
<td>End of train device</td>
<td>Include</td>
</tr>
<tr>
<td>11</td>
<td>Floor</td>
<td>Include</td>
</tr>
<tr>
<td>12</td>
<td>Fuses/torpedoes</td>
<td>Include</td>
</tr>
<tr>
<td>13</td>
<td>Grab iron</td>
<td>Include</td>
</tr>
<tr>
<td>14</td>
<td>Ground</td>
<td>Include</td>
</tr>
<tr>
<td>15</td>
<td>Hand tools, digging, e.g., shovels, picks, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>16</td>
<td>Hand tools, gripping, e.g., pliers, tongs, clamps</td>
<td>Exclude</td>
</tr>
<tr>
<td>17</td>
<td>Hand tools, striking &amp; nailing, e.g., hammers, mallets</td>
<td>Exclude</td>
</tr>
<tr>
<td>18</td>
<td>Highway, street, road</td>
<td>Exclude</td>
</tr>
<tr>
<td>19</td>
<td>Hose</td>
<td>Include</td>
</tr>
<tr>
<td>20</td>
<td>Inspection Pit</td>
<td>Exclude</td>
</tr>
<tr>
<td>21</td>
<td>Jack</td>
<td>Exclude</td>
</tr>
<tr>
<td>22</td>
<td>Ladder</td>
<td>Include</td>
</tr>
<tr>
<td>23</td>
<td>Office equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>24</td>
<td>Power tools</td>
<td>Exclude</td>
</tr>
<tr>
<td>25</td>
<td>Pry bar</td>
<td>Exclude</td>
</tr>
<tr>
<td>26</td>
<td>Rail bike</td>
<td>Exclude</td>
</tr>
<tr>
<td>27</td>
<td>Stair</td>
<td>Include</td>
</tr>
<tr>
<td>28</td>
<td>Switch</td>
<td>Include</td>
</tr>
<tr>
<td>29</td>
<td>Tie</td>
<td>Include</td>
</tr>
<tr>
<td>30</td>
<td>Torch, acetylene, gas, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>31</td>
<td>Trailer/container on flat car (TOFC, COFC)</td>
<td>Include</td>
</tr>
<tr>
<td>32</td>
<td>Welder - electric</td>
<td>Exclude</td>
</tr>
<tr>
<td>33</td>
<td>Window</td>
<td>Include</td>
</tr>
<tr>
<td>34</td>
<td>Chair/seat</td>
<td>Include</td>
</tr>
<tr>
<td>35</td>
<td>Chock</td>
<td>Include</td>
</tr>
<tr>
<td>36</td>
<td>Step/stirrup, equipment</td>
<td>Include</td>
</tr>
<tr>
<td>37</td>
<td>Handbrake</td>
<td>Include</td>
</tr>
</tbody>
</table>
### Exhibit A-15: Tools used (TOOLS) data field

<table>
<thead>
<tr>
<th>TOOLS</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>Spike, tie plates, rail fasteners, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>39</td>
<td></td>
<td>Include</td>
</tr>
<tr>
<td>40</td>
<td>Lever</td>
<td>Include</td>
</tr>
<tr>
<td>41</td>
<td></td>
<td>Include</td>
</tr>
<tr>
<td>42</td>
<td></td>
<td>Include</td>
</tr>
<tr>
<td>43</td>
<td>Platform</td>
<td>Include</td>
</tr>
<tr>
<td>44</td>
<td>Cable</td>
<td>Include</td>
</tr>
<tr>
<td>45</td>
<td>Electrical connections, wiring, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>46</td>
<td>Chemicals, fumes, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>47</td>
<td>Locomotive horn</td>
<td>Exclude</td>
</tr>
<tr>
<td>48</td>
<td>Locomotive refrigerator</td>
<td>Exclude</td>
</tr>
<tr>
<td>49</td>
<td>Locomotive toilet</td>
<td>Exclude</td>
</tr>
<tr>
<td>50</td>
<td>Locomotive fire extinguisher</td>
<td>Exclude</td>
</tr>
<tr>
<td>51</td>
<td>Locomotive cab Door(s)</td>
<td>Exclude</td>
</tr>
<tr>
<td>52</td>
<td>Locomotive cab electric locker doors</td>
<td>Exclude</td>
</tr>
<tr>
<td>53</td>
<td>Locomotive car-body doors</td>
<td>Exclude</td>
</tr>
<tr>
<td>54</td>
<td>Locomotive radios</td>
<td>Exclude</td>
</tr>
<tr>
<td>56</td>
<td>Hose connections</td>
<td>Exclude</td>
</tr>
<tr>
<td>57</td>
<td>Soap</td>
<td>Exclude</td>
</tr>
<tr>
<td>58</td>
<td>Traction motor</td>
<td>Exclude</td>
</tr>
<tr>
<td>59</td>
<td>Anchor</td>
<td>Exclude</td>
</tr>
<tr>
<td>60</td>
<td>Signal equipment (gates, poles, gaffs, etc.)</td>
<td>Exclude</td>
</tr>
<tr>
<td>61</td>
<td>Bed</td>
<td>Exclude</td>
</tr>
<tr>
<td>62</td>
<td>Toilet</td>
<td>Exclude</td>
</tr>
<tr>
<td>63</td>
<td>Food</td>
<td>Exclude</td>
</tr>
<tr>
<td>64</td>
<td>Refrigerator</td>
<td>Exclude</td>
</tr>
<tr>
<td>65</td>
<td>Stove</td>
<td>Exclude</td>
</tr>
<tr>
<td>66</td>
<td>Motor</td>
<td>Exclude</td>
</tr>
<tr>
<td>67</td>
<td>Box</td>
<td>Exclude</td>
</tr>
<tr>
<td>80</td>
<td>Brake-shoe</td>
<td>Exclude</td>
</tr>
<tr>
<td>81</td>
<td>Track (Rail)</td>
<td>Include</td>
</tr>
<tr>
<td>82</td>
<td>Locomotive, other</td>
<td>Include</td>
</tr>
<tr>
<td>83</td>
<td>Crane</td>
<td>Exclude</td>
</tr>
<tr>
<td>84</td>
<td>MOW equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>85</td>
<td>Repair shop-locomotive</td>
<td>Exclude</td>
</tr>
<tr>
<td>86</td>
<td>Repair shop-Car</td>
<td>Exclude</td>
</tr>
<tr>
<td>87</td>
<td>Switch machine</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-15: Tools used (TOOLS) data field

<table>
<thead>
<tr>
<th>TOOLS</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>88</td>
<td>Rock, other than ballast</td>
<td>Exclude</td>
</tr>
<tr>
<td>89</td>
<td>Locomotive cab floor</td>
<td>Include</td>
</tr>
<tr>
<td>90</td>
<td>Locomotive cab seat</td>
<td>Include</td>
</tr>
<tr>
<td>91</td>
<td>Repair shop - MOW</td>
<td>Exclude</td>
</tr>
<tr>
<td>99</td>
<td>Other (describe in narrative)</td>
<td>Include</td>
</tr>
<tr>
<td>1G</td>
<td>Door, End or Side-Passenger Train</td>
<td>Include</td>
</tr>
<tr>
<td>2G</td>
<td>Door, Trap-Passenger Train</td>
<td>Include</td>
</tr>
<tr>
<td>7A</td>
<td>Luggage</td>
<td>Exclude</td>
</tr>
<tr>
<td>7C</td>
<td>Computer equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>7E</td>
<td>Chains, straps, tie down devices.</td>
<td>Exclude</td>
</tr>
<tr>
<td>7F</td>
<td>Animal, insect, reptile</td>
<td>Exclude</td>
</tr>
<tr>
<td>7G</td>
<td>Plants, trees, foliage, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>7H</td>
<td>Compressor</td>
<td>Exclude</td>
</tr>
<tr>
<td>7I</td>
<td>Step</td>
<td>Include</td>
</tr>
<tr>
<td>7J</td>
<td>Needle, syringe, sharps</td>
<td>Exclude</td>
</tr>
<tr>
<td>7K</td>
<td>Motor vehicle, non-rail</td>
<td>Exclude</td>
</tr>
<tr>
<td>7L</td>
<td>Weapon</td>
<td>Exclude</td>
</tr>
<tr>
<td>7M</td>
<td>Welder/torch, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>8F</td>
<td>Hand tools, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>8K</td>
<td>Knuckle</td>
<td>Include</td>
</tr>
<tr>
<td>8N</td>
<td>Remote control transmitter</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-16: Casualty incident data filter

<table>
<thead>
<tr>
<th>Filter</th>
<th>Records</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total casualty records</td>
<td>66,154</td>
<td></td>
</tr>
<tr>
<td>RR selection</td>
<td>59,321</td>
<td>Records remaining after application of railroad filter</td>
</tr>
<tr>
<td>CS 57 Files</td>
<td>51,429</td>
<td>Record remaining after incidents with CS57 reports (rail-highway grade crossings) are eliminated</td>
</tr>
<tr>
<td>Person Type</td>
<td>36,199</td>
<td>Records remaining after trespassers, passengers, and other unauthorized persons eliminated</td>
</tr>
<tr>
<td>Injury Cause</td>
<td>23,350</td>
<td>Records remaining after INJCAUSE filter applied</td>
</tr>
<tr>
<td>Physical Activity</td>
<td>11,407</td>
<td>Records remaining after PHYSACT filter applied</td>
</tr>
<tr>
<td>LOCA</td>
<td>6,933</td>
<td>Records remaining after LOCA filter applied</td>
</tr>
<tr>
<td>LOCB</td>
<td>1,155</td>
<td>Records remaining after LOCB filter applied</td>
</tr>
<tr>
<td>LOCC</td>
<td>1,066</td>
<td>Records remaining after LOCC filter applied</td>
</tr>
<tr>
<td>Event</td>
<td>441</td>
<td>Records remaining after EVENT filter applied</td>
</tr>
<tr>
<td>Tool</td>
<td>417</td>
<td>Records remaining after TOOL filter applied</td>
</tr>
</tbody>
</table>
### Exhibit A-17: Equipment incident data filter

<table>
<thead>
<tr>
<th>Filter</th>
<th>Records</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total equipment records</td>
<td>20,015</td>
<td>Records for 2007 through 2013</td>
</tr>
<tr>
<td>Type accident</td>
<td>17,267</td>
<td>Records remaining after incidents involving only collisions, derailments, obstructions, and other impacts are retained</td>
</tr>
<tr>
<td>Accident damage</td>
<td>2,034</td>
<td>Records remaining after incidents causing less than 150,000 euros of reportable damage or not involving casualties are eliminated</td>
</tr>
<tr>
<td>Incidents with casualties</td>
<td>2,304</td>
<td>Added back those incidents that were below the cost threshold but had injuries or fatalities</td>
</tr>
<tr>
<td>Equipment type</td>
<td>1,963</td>
<td>Records remaining after single cars, cuts of cars, and yard switching are eliminated</td>
</tr>
<tr>
<td>Track type</td>
<td>1,661</td>
<td>Retained records relating incidents occurring on mains or sidings</td>
</tr>
<tr>
<td>Duplicates</td>
<td>1,523</td>
<td>Duplicate records removed</td>
</tr>
<tr>
<td>Train speed</td>
<td>1,502</td>
<td>Records remaining after incidents involving railroad equipment not in motion eliminated</td>
</tr>
<tr>
<td>RR selection</td>
<td>1,222</td>
<td>Non-Class I incident records removed</td>
</tr>
<tr>
<td>Years</td>
<td>1,051</td>
<td>Kept only those records for 2007 through 2012</td>
</tr>
</tbody>
</table>

### Exhibit A-18: Case 57 (FRA highway-rail grade crossing incident report form 57) filed field

<table>
<thead>
<tr>
<th>CAS57</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>No</td>
<td>Include</td>
</tr>
<tr>
<td>Y</td>
<td>Yes</td>
<td>Exclude</td>
</tr>
</tbody>
</table>

### Exhibit A-19: Case 54 (FRA equipment incident form 54) filed filter

<table>
<thead>
<tr>
<th>CAS54</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>No</td>
<td>Include</td>
</tr>
<tr>
<td>Y</td>
<td>Yes</td>
<td>Include</td>
</tr>
</tbody>
</table>
### Exhibit A-20: Location circumstance (LOCB) data field

<table>
<thead>
<tr>
<th>LOCB</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Camp car - moving</td>
<td>Include</td>
</tr>
<tr>
<td>02</td>
<td>camp car - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>03</td>
<td>Freight train - moving</td>
<td>Include</td>
</tr>
<tr>
<td>04</td>
<td>Freight train - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>05</td>
<td>Freight car(s) - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>06</td>
<td>Freight car(s) - moving</td>
<td>Include</td>
</tr>
<tr>
<td>07</td>
<td>hi-rail/other inspection vehicle - moving</td>
<td>Include</td>
</tr>
<tr>
<td>08</td>
<td>hi-rail/other inspection vehicle - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>09</td>
<td>Locomotive(s), not remote controlled - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>10</td>
<td>Locomotive(s), not remote controlled - moving</td>
<td>Include</td>
</tr>
<tr>
<td>11</td>
<td>MOW Equipment - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>12</td>
<td>MOW equipment - moving</td>
<td>Include</td>
</tr>
<tr>
<td>13</td>
<td>Passenger train - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>14</td>
<td>Passenger train - moving</td>
<td>Include</td>
</tr>
<tr>
<td>15</td>
<td>Passenger car(s) - moving</td>
<td>Include</td>
</tr>
<tr>
<td>16</td>
<td>Passenger car(s) - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>17</td>
<td>Locomotive(s), remote control - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>18</td>
<td>Locomotive(s), remote control - moving</td>
<td>Include</td>
</tr>
<tr>
<td>49</td>
<td>Other on-track equipment - moving</td>
<td>Exclude</td>
</tr>
<tr>
<td>50</td>
<td>Other on-track equipment - standing</td>
<td>Exclude</td>
</tr>
<tr>
<td>51</td>
<td>Automobile</td>
<td>Exclude</td>
</tr>
<tr>
<td>52</td>
<td>Crane, hoists, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>53</td>
<td>Excavating machinery</td>
<td>Exclude</td>
</tr>
<tr>
<td>54</td>
<td>Grading/surfacing machinery</td>
<td>Exclude</td>
</tr>
<tr>
<td>55</td>
<td>Loaders, forklifts, tractor, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>56</td>
<td>Off road vehicle - industrial</td>
<td>Exclude</td>
</tr>
<tr>
<td>57</td>
<td>Off road vehicle - recreational</td>
<td>Exclude</td>
</tr>
<tr>
<td>58</td>
<td>Other construction type equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>59</td>
<td>Taxi/commercial vehicle</td>
<td>Exclude</td>
</tr>
<tr>
<td>60</td>
<td>Truck</td>
<td>Exclude</td>
</tr>
<tr>
<td>61</td>
<td>Van (utility)</td>
<td>Exclude</td>
</tr>
<tr>
<td>62</td>
<td>Van (passenger)</td>
<td>Exclude</td>
</tr>
<tr>
<td>63</td>
<td>Water vehicle, ship, boat, barge, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>64</td>
<td>Motorcycle</td>
<td>Exclude</td>
</tr>
<tr>
<td>65</td>
<td>Bus</td>
<td>Exclude</td>
</tr>
<tr>
<td>66</td>
<td>Tractor</td>
<td>Exclude</td>
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<tr>
<td>97</td>
<td>Other operated equipment (explain in narrative)</td>
<td>Exclude</td>
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## Exhibit A-20: Location circumstance (LOCB) data field

<table>
<thead>
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<th>LOCB</th>
<th>Description</th>
<th>Status</th>
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<tbody>
<tr>
<td>98</td>
<td>Other equipment (explain in narrative)</td>
<td>Exclude</td>
</tr>
<tr>
<td>99</td>
<td>A/I was not associated with on-track equipment of any listed vehicle type</td>
<td>Exclude</td>
</tr>
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</table>
### Exhibit A-21: Probable injury cause (INJCAUS) data field

<table>
<thead>
<tr>
<th>INJCAUS</th>
<th>Environment</th>
<th>Circumstance</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Conventional</td>
<td>Environmental</td>
<td>Exclude</td>
</tr>
<tr>
<td>02</td>
<td>Conventional</td>
<td>Safety Equipment not worn or in place</td>
<td>Exclude</td>
</tr>
<tr>
<td>03</td>
<td>Conventional</td>
<td>Procedures for operating/using equipment not followed</td>
<td>Include</td>
</tr>
<tr>
<td>04</td>
<td>Conventional</td>
<td>Equipment</td>
<td>Include</td>
</tr>
<tr>
<td>05</td>
<td>Conventional</td>
<td>Signal</td>
<td>Exclude</td>
</tr>
<tr>
<td>06</td>
<td>Conventional</td>
<td>Track</td>
<td>Exclude</td>
</tr>
<tr>
<td>07</td>
<td>Conventional</td>
<td>Impairment, substance use</td>
<td>Exclude</td>
</tr>
<tr>
<td>08</td>
<td>Conventional</td>
<td>Impairment, physical condition, e.g. fatigue</td>
<td>Exclude</td>
</tr>
<tr>
<td>09</td>
<td>Conventional</td>
<td>Human factors</td>
<td>Include</td>
</tr>
<tr>
<td>10</td>
<td>Conventional</td>
<td>Trespassing</td>
<td>Include</td>
</tr>
<tr>
<td>11</td>
<td>Conventional</td>
<td>Object fouling track</td>
<td>Include</td>
</tr>
<tr>
<td>12</td>
<td>Conventional</td>
<td>Outside caused (e.g. assaulted/attached)</td>
<td>Exclude</td>
</tr>
<tr>
<td>13</td>
<td>Conventional</td>
<td>Lack of communication</td>
<td>Include</td>
</tr>
<tr>
<td>14</td>
<td>Conventional</td>
<td>Slack adjustment during switching operation</td>
<td>Include</td>
</tr>
<tr>
<td>15</td>
<td>Conventional</td>
<td>Insufficient training</td>
<td>Include</td>
</tr>
<tr>
<td>16</td>
<td>Conventional</td>
<td>Failure to provide adequate space between equipment during switching operation</td>
<td>Include</td>
</tr>
<tr>
<td>17</td>
<td>Conventional</td>
<td>Close or no clearance</td>
<td>Include</td>
</tr>
<tr>
<td>18</td>
<td>Conventional</td>
<td>Slipped, fell, stumbling due to Passenger Station Platform Gap</td>
<td>Exclude</td>
</tr>
<tr>
<td>19</td>
<td>Conventional</td>
<td>Act of God</td>
<td>Exclude</td>
</tr>
<tr>
<td>21</td>
<td>RCL</td>
<td>Environmental, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>22</td>
<td>RCL</td>
<td>Safety Equipment not worn or in place, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>23</td>
<td>RCL</td>
<td>Procedures for operating/using equipment not followed, related to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>24</td>
<td>RCL</td>
<td>Equipment, related to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>25</td>
<td>RCL</td>
<td>Signal, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>26</td>
<td>RCL</td>
<td>Track, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>27</td>
<td>RCL</td>
<td>Impairment, substance use, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>28</td>
<td>RCL</td>
<td>Impairment, physical condition, e.g. fatigue, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>29</td>
<td>RCL</td>
<td>Human factors, related to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>31</td>
<td>RCL</td>
<td>Trespassing, related to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>32</td>
<td>RCL</td>
<td>Undetermined, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>33</td>
<td>RCL</td>
<td>Environmental, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>34</td>
<td>RCL</td>
<td>Safety equipment no worn or in place, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
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</table>
## Exhibit A-21: Probable injury cause (INJCAUS) data field

<table>
<thead>
<tr>
<th>INJCAUS</th>
<th>Environment</th>
<th>Circumstance</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>RCL</td>
<td>Procedures for operating/using equipment not followed, unrelated to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>44</td>
<td>RCL</td>
<td>Equipment, unrelated to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>45</td>
<td>RCL</td>
<td>Signal, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>46</td>
<td>RCL</td>
<td>Track, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>47</td>
<td>RCL</td>
<td>Impairment, substance use, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>48</td>
<td>RCL</td>
<td>Impairment, physical condition, e.g. fatigue, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>49</td>
<td>RCL</td>
<td>Human factors, unrelated to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>50</td>
<td>RCL</td>
<td>Trespassing, unrelated to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>59</td>
<td>RCL</td>
<td>Undetermined, unrelated to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>99</td>
<td>RCL</td>
<td>Undetermined</td>
<td>Exclude</td>
</tr>
<tr>
<td>R1</td>
<td>RCL</td>
<td>Object fouling track, related to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>R2</td>
<td>RCL</td>
<td>Outside caused (e.g., assaulted/attacked), related to RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>R3</td>
<td>RCL</td>
<td>Lack of communication, related to RCL</td>
<td>Include</td>
</tr>
<tr>
<td>R4</td>
<td>RCL</td>
<td>Slack adjustment during switching operation, related to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>R6</td>
<td>RCL</td>
<td>Failure to provide adequate space between equipment during switching operation, related to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>R7</td>
<td>RCL</td>
<td>Close or no clearance, related to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>R8</td>
<td>RCL</td>
<td>Act of God, related to using RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>U1</td>
<td>RCL</td>
<td>Object fouling track, unrelated to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>U2</td>
<td>RCL</td>
<td>Outside caused (e.g., assaulted/attacked), unrelated to RCL</td>
<td>Exclude</td>
</tr>
<tr>
<td>U3</td>
<td>RCL</td>
<td>Lack of communication, unrelated to RCL</td>
<td>Include</td>
</tr>
<tr>
<td>U4</td>
<td>RCL</td>
<td>Slack adjustment during switching operation, unrelated to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>U6</td>
<td>RCL</td>
<td>Failure to provide adequate space between equipment during switching operation, unrelated to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>U7</td>
<td>RCL</td>
<td>Close or no clearance, unrelated to using RCL</td>
<td>Include</td>
</tr>
<tr>
<td>U8</td>
<td>RCL</td>
<td>Act of God, unrelated to using RCL</td>
<td>Exclude</td>
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### Exhibit A-22: Location circumstance (LOCA) data field

<table>
<thead>
<tr>
<th>LOCA</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Main/branch</td>
<td>Include</td>
</tr>
<tr>
<td>B</td>
<td>Yard</td>
<td>Exclude</td>
</tr>
<tr>
<td>C</td>
<td>Siding</td>
<td>Include</td>
</tr>
<tr>
<td>D</td>
<td>Industry</td>
<td>Exclude</td>
</tr>
<tr>
<td>E</td>
<td>Repair</td>
<td>Exclude</td>
</tr>
<tr>
<td>F</td>
<td>Restroom</td>
<td>Exclude</td>
</tr>
<tr>
<td>G</td>
<td>Break/lunch room</td>
<td>Exclude</td>
</tr>
<tr>
<td>H</td>
<td>Freight terminal</td>
<td>Exclude</td>
</tr>
<tr>
<td>J</td>
<td>Highway/roadway</td>
<td>Exclude</td>
</tr>
<tr>
<td>K</td>
<td>Loading dock</td>
<td>Exclude</td>
</tr>
<tr>
<td>L</td>
<td>Lodging facility</td>
<td>Exclude</td>
</tr>
<tr>
<td>M</td>
<td>Office environment</td>
<td>Exclude</td>
</tr>
<tr>
<td>N</td>
<td>Parking lot</td>
<td>Exclude</td>
</tr>
<tr>
<td>P</td>
<td>Passenger terminal</td>
<td>Exclude</td>
</tr>
<tr>
<td>Q</td>
<td>Repair shop</td>
<td>Exclude</td>
</tr>
<tr>
<td>R</td>
<td>Storage facility</td>
<td>Exclude</td>
</tr>
<tr>
<td>S</td>
<td>Sidewalk/walkway</td>
<td>Exclude</td>
</tr>
<tr>
<td>T</td>
<td>Other, (off-site location)</td>
<td>Exclude</td>
</tr>
<tr>
<td>U</td>
<td>Airport/Plane</td>
<td>Exclude</td>
</tr>
<tr>
<td>V</td>
<td>Freight terminal</td>
<td>Exclude</td>
</tr>
<tr>
<td>W</td>
<td>Private property</td>
<td>Exclude</td>
</tr>
<tr>
<td>Y</td>
<td>Other track (explain in narrative)</td>
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</tr>
<tr>
<td>Z</td>
<td>Other location (describe in narrative)</td>
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</tr>
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### Exhibit A-23: Location circumstance (LOCC) data field

<table>
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<tr>
<th>LOCC</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Alongside of on-track equipment - on ground</td>
<td>Include</td>
</tr>
<tr>
<td>A2</td>
<td>At work station</td>
<td>Exclude</td>
</tr>
<tr>
<td>A3</td>
<td>Track, beside</td>
<td>Include</td>
</tr>
<tr>
<td>A4</td>
<td>Track, between</td>
<td>Include</td>
</tr>
<tr>
<td>A5</td>
<td>Between car/locomotive</td>
<td>Include</td>
</tr>
<tr>
<td>A6</td>
<td>Locomotive, in cab or on walkways</td>
<td>Include</td>
</tr>
<tr>
<td>A7</td>
<td>Car, in (rail car)</td>
<td>Include</td>
</tr>
<tr>
<td>A8</td>
<td>In elevator</td>
<td>Exclude</td>
</tr>
<tr>
<td>A9</td>
<td>In /operating vehicle</td>
<td>Exclude</td>
</tr>
<tr>
<td>AA</td>
<td>At freight terminal</td>
<td>Exclude</td>
</tr>
<tr>
<td>AB</td>
<td>On tower</td>
<td>Exclude</td>
</tr>
<tr>
<td>AC</td>
<td>In cafeteria/lunch room</td>
<td>Exclude</td>
</tr>
<tr>
<td>B1</td>
<td>In tower</td>
<td>Exclude</td>
</tr>
<tr>
<td>B2</td>
<td>In tunnel</td>
<td>Include</td>
</tr>
<tr>
<td>B3</td>
<td>On bridge/trestle</td>
<td>Include</td>
</tr>
<tr>
<td>B4</td>
<td>On highway-rail crossing</td>
<td>Exclude</td>
</tr>
<tr>
<td>B5</td>
<td>On other rail crossing</td>
<td>Exclude</td>
</tr>
<tr>
<td>B6</td>
<td>Car, on side of (rail car)</td>
<td>Include</td>
</tr>
<tr>
<td>B7</td>
<td>Track, on</td>
<td>Include</td>
</tr>
<tr>
<td>B8</td>
<td>Car, on end of (rail car)</td>
<td>Include</td>
</tr>
<tr>
<td>B9</td>
<td>On pole/signal mast</td>
<td>Exclude</td>
</tr>
<tr>
<td>C1</td>
<td>On scaffold</td>
<td>Exclude</td>
</tr>
<tr>
<td>C2</td>
<td>On platform</td>
<td>Include</td>
</tr>
<tr>
<td>C3</td>
<td>On escalator</td>
<td>Exclude</td>
</tr>
<tr>
<td>C4</td>
<td>On stairs</td>
<td>Include</td>
</tr>
<tr>
<td>C5</td>
<td>On ladder</td>
<td>Include</td>
</tr>
<tr>
<td>C6</td>
<td>Locomotive, other location</td>
<td>Include</td>
</tr>
<tr>
<td>C7</td>
<td>Car, under (rail car)</td>
<td>Include</td>
</tr>
<tr>
<td>C8</td>
<td>Locomotive, under</td>
<td>Include</td>
</tr>
<tr>
<td>C9</td>
<td>Locomotive, on top of</td>
<td>Include</td>
</tr>
<tr>
<td>CA</td>
<td>Car, on top of (rail car)</td>
<td>Include</td>
</tr>
<tr>
<td>CB</td>
<td>On top of equipment, other than on-track equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>CC</td>
<td>Depot</td>
<td>Exclude</td>
</tr>
<tr>
<td>CD</td>
<td>On elevated work station</td>
<td>Exclude</td>
</tr>
<tr>
<td>CE</td>
<td>On station platform</td>
<td>Exclude</td>
</tr>
<tr>
<td>D1</td>
<td>At lodging facility</td>
<td>Exclude</td>
</tr>
<tr>
<td>D2</td>
<td>On highway/street</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-23: Location circumstance (LOCC) data field

<table>
<thead>
<tr>
<th>LOCC</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>D3</td>
<td>On private property</td>
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<tr>
<td>D4</td>
<td>On sidewalk/walkway</td>
<td>Exclude</td>
</tr>
<tr>
<td>D5</td>
<td>In airport</td>
<td>Exclude</td>
</tr>
<tr>
<td>D6</td>
<td>In airplane</td>
<td>Exclude</td>
</tr>
<tr>
<td>D7</td>
<td>In hotel room</td>
<td>Exclude</td>
</tr>
<tr>
<td>E1</td>
<td>On parking lot</td>
<td>Exclude</td>
</tr>
<tr>
<td>E2</td>
<td>In building</td>
<td>Exclude</td>
</tr>
<tr>
<td>E3</td>
<td>In restroom</td>
<td>Exclude</td>
</tr>
<tr>
<td>G1</td>
<td>Rail Car Door Threshold Plate to Edge of Platform-GAP</td>
<td>Include</td>
</tr>
<tr>
<td>G2</td>
<td>Area between coupled car and platform</td>
<td>Include</td>
</tr>
<tr>
<td>G3</td>
<td>Area along car body, other than threshold plate and platform edge</td>
<td>Include</td>
</tr>
<tr>
<td>G4</td>
<td>Car in Vestibule</td>
<td>Include</td>
</tr>
<tr>
<td>X9</td>
<td>Other location (describe in narrative)</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-24: Event circumstance (EVENT) data field

<table>
<thead>
<tr>
<th>EVENT</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Aggravated pre-existing condition</td>
<td>Include</td>
</tr>
<tr>
<td>02</td>
<td>Apprehending/removing from property</td>
<td>Exclude</td>
</tr>
<tr>
<td>03</td>
<td>Assaulted by other</td>
<td>Exclude</td>
</tr>
<tr>
<td>04</td>
<td>Assaulted by co-worker</td>
<td>Exclude</td>
</tr>
<tr>
<td>05</td>
<td>Bitten/stung by bee, spider, other insect</td>
<td>Exclude</td>
</tr>
<tr>
<td>06</td>
<td>Bitten by animal</td>
<td>Exclude</td>
</tr>
<tr>
<td>07</td>
<td>Bodily function/sudden movement, e.g., sneezing, twisting</td>
<td>Exclude</td>
</tr>
<tr>
<td>08</td>
<td>Caught in or compressed by hand tools</td>
<td>Exclude</td>
</tr>
<tr>
<td>09</td>
<td>Caught in or compressed by other machinery</td>
<td>Exclude</td>
</tr>
<tr>
<td>10</td>
<td>Caught in or crushed by materials</td>
<td>Exclude</td>
</tr>
<tr>
<td>11</td>
<td>Caught in or crushed in excavation, land slide, cave-in, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>12</td>
<td>Caught in or compressed by powered hand tools</td>
<td>Exclude</td>
</tr>
<tr>
<td>13</td>
<td>Cave in, slide, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>14</td>
<td>Climatic conditions, other (e.g., high winds)</td>
<td>Exclude</td>
</tr>
<tr>
<td>15</td>
<td>Climatic condition, exposure to environmental heat</td>
<td>Exclude</td>
</tr>
<tr>
<td>16</td>
<td>Climatic condition, exposure to environmental cold</td>
<td>Exclude</td>
</tr>
<tr>
<td>17</td>
<td>Collision - between on track equipment</td>
<td>Include</td>
</tr>
<tr>
<td>18</td>
<td>Collision/impact - auto, truck, bus, van, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>19</td>
<td>Committing vandalism/theft</td>
<td>Exclude</td>
</tr>
<tr>
<td>20</td>
<td>Defective/malfunctioning equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>21</td>
<td>Derailment</td>
<td>Include</td>
</tr>
<tr>
<td>22</td>
<td>Electrical shock while operating welding equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>23</td>
<td>Electrical shock due to contact with 3rd rail, catenary, pantograph</td>
<td>Exclude</td>
</tr>
<tr>
<td>24</td>
<td>Electrical shock, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>25</td>
<td>Electrical shock from hand tool</td>
<td>Exclude</td>
</tr>
<tr>
<td>26</td>
<td>Exposure to fumes - inhalation</td>
<td>Exclude</td>
</tr>
<tr>
<td>27</td>
<td>Exposure to chemicals - external</td>
<td>Exclude</td>
</tr>
<tr>
<td>28</td>
<td>Exposure to poisonous plants</td>
<td>Exclude</td>
</tr>
<tr>
<td>29</td>
<td>Exposure to noise over time</td>
<td>Exclude</td>
</tr>
<tr>
<td>30</td>
<td>Exposure to noise - single incident</td>
<td>Exclude</td>
</tr>
<tr>
<td>31</td>
<td>Exposure to welding light</td>
<td>Exclude</td>
</tr>
<tr>
<td>32</td>
<td>Highway-rail collision/impact</td>
<td>Exclude</td>
</tr>
<tr>
<td>33</td>
<td>Horseplay-practical joke, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>34</td>
<td>Lost balance</td>
<td>Exclude</td>
</tr>
<tr>
<td>35</td>
<td>Missed handhold</td>
<td>Exclude</td>
</tr>
<tr>
<td>36</td>
<td>Need puncture/prick/stick</td>
<td>Exclude</td>
</tr>
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</table>
## Exhibit A-24: Event circumstance (EVENT) data field

<table>
<thead>
<tr>
<th>EVENT</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>Other impacts - on track equipment</td>
<td>Include</td>
</tr>
<tr>
<td>38</td>
<td>Overexertion</td>
<td>Exclude</td>
</tr>
<tr>
<td>39</td>
<td>Pushed/shoved into/against</td>
<td>Exclude</td>
</tr>
<tr>
<td>40</td>
<td>Pushed/shoved onto</td>
<td>Exclude</td>
</tr>
<tr>
<td>41</td>
<td>Pushed/shoved from</td>
<td>Exclude</td>
</tr>
<tr>
<td>42</td>
<td>Ran into on-track equipment</td>
<td>Include</td>
</tr>
<tr>
<td>43</td>
<td>Ran into object/equipment</td>
<td>Include</td>
</tr>
<tr>
<td>44</td>
<td>Repetitive motion - work processes</td>
<td>Exclude</td>
</tr>
<tr>
<td>45</td>
<td>Repetitive motion - typing, keyboard, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>46</td>
<td>Repetitive motion - tools</td>
<td>Exclude</td>
</tr>
<tr>
<td>47</td>
<td>Repetitive motion - other</td>
<td>Exclude</td>
</tr>
<tr>
<td>48</td>
<td>Rubbed, abraded, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>49</td>
<td>Shot</td>
<td>Exclude</td>
</tr>
<tr>
<td>50</td>
<td>Slack action, draft, compressive</td>
<td>Include</td>
</tr>
<tr>
<td>51</td>
<td>Slipped, fell, stumbled, etc. due to irregular surface, e.g. depression, slope, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>52</td>
<td>Slipped, fell, stumbled, etc. due to climatic condition (rain, snow, ice, etc.)</td>
<td>Exclude</td>
</tr>
<tr>
<td>53</td>
<td>Slipped, fell, stumbled, etc. on oil, grease, other slippery substance</td>
<td>Exclude</td>
</tr>
<tr>
<td>54</td>
<td>Slipped, fell, stumbled, etc. due to object, e.g. ballast, spike, material, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>55</td>
<td>Stabbing, knifing, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>56</td>
<td>Stepped on object</td>
<td>Exclude</td>
</tr>
<tr>
<td>57</td>
<td>Struck by thrown or propelled object</td>
<td>Include</td>
</tr>
<tr>
<td>58</td>
<td>Struck by object</td>
<td>Exclude</td>
</tr>
<tr>
<td>59</td>
<td>Struck by on-track equipment</td>
<td>Include</td>
</tr>
<tr>
<td>60</td>
<td>Struck by falling object</td>
<td>Exclude</td>
</tr>
<tr>
<td>61</td>
<td>Struck against object</td>
<td>Exclude</td>
</tr>
<tr>
<td>62</td>
<td>Sudden release of air</td>
<td>Include</td>
</tr>
<tr>
<td>63</td>
<td>Sudden/Unexpected Movement of material</td>
<td>Exclude</td>
</tr>
<tr>
<td>64</td>
<td>Sudden/unexpected movement of on-track equipment</td>
<td>Include</td>
</tr>
<tr>
<td>65</td>
<td>Sudden/unexpected movement of vehicle</td>
<td>Exclude</td>
</tr>
<tr>
<td>66</td>
<td>Sustained viewing</td>
<td>Exclude</td>
</tr>
<tr>
<td>67</td>
<td>Thrill seeking</td>
<td>Exclude</td>
</tr>
<tr>
<td>68</td>
<td>Caught, crushed, pinched, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>69</td>
<td>On track equipment, other incidents</td>
<td>Include</td>
</tr>
<tr>
<td>70</td>
<td>Slipped, fell, stumbled, other</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-24: Event circumstance (EVENT) data field

<table>
<thead>
<tr>
<th>EVENT</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>sudden, unexpected, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>72</td>
<td>Bumped</td>
<td>Exclude</td>
</tr>
<tr>
<td>73</td>
<td>Burned</td>
<td>Exclude</td>
</tr>
<tr>
<td>74</td>
<td>Blowing/falling debris</td>
<td>Exclude</td>
</tr>
<tr>
<td>75</td>
<td>Sudden/unexpected movement of tools</td>
<td>Exclude</td>
</tr>
<tr>
<td>76</td>
<td>Struck by own remote control locomotive - controlled equipment</td>
<td>Include</td>
</tr>
<tr>
<td>77</td>
<td>Struck by other remote control locomotive - controlled equipment</td>
<td>Include</td>
</tr>
<tr>
<td>79</td>
<td>Caught between machinery</td>
<td>Exclude</td>
</tr>
<tr>
<td>80</td>
<td>Slack adjustment during switching operation</td>
<td>Include</td>
</tr>
<tr>
<td>81</td>
<td>Caught between equipment</td>
<td>Include</td>
</tr>
<tr>
<td>82</td>
<td>Caught between material</td>
<td>Exclude</td>
</tr>
<tr>
<td>99</td>
<td>Other (describe in narrative)</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
## Exhibit A-25: Tools used (TOOLS) data field

<table>
<thead>
<tr>
<th>TOOLS</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Baggage</td>
<td>Include</td>
</tr>
<tr>
<td>02</td>
<td>Ballast, stones, etc.</td>
<td>Include</td>
</tr>
<tr>
<td>03</td>
<td>Boring tools</td>
<td>Exclude</td>
</tr>
<tr>
<td>04</td>
<td>Bridge/trestle</td>
<td>Include</td>
</tr>
<tr>
<td>05</td>
<td>Caboose</td>
<td>Include</td>
</tr>
<tr>
<td>06</td>
<td>Coupler</td>
<td>Include</td>
</tr>
<tr>
<td>07</td>
<td>Cutting tools</td>
<td>Exclude</td>
</tr>
<tr>
<td>08</td>
<td>Derail</td>
<td>Include</td>
</tr>
<tr>
<td>09</td>
<td>Door</td>
<td>Include</td>
</tr>
<tr>
<td>10</td>
<td>End of train device</td>
<td>Include</td>
</tr>
<tr>
<td>11</td>
<td>Floor</td>
<td>Include</td>
</tr>
<tr>
<td>12</td>
<td>Fusees/torpedoes</td>
<td>Exclude</td>
</tr>
<tr>
<td>13</td>
<td>Grab iron</td>
<td>Include</td>
</tr>
<tr>
<td>14</td>
<td>Ground</td>
<td>Include</td>
</tr>
<tr>
<td>15</td>
<td>Hand tools, digging, e.g., shovels, picks, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>16</td>
<td>Hand tools, gripping, e.g., pliers, tongs, clamps</td>
<td>Exclude</td>
</tr>
<tr>
<td>17</td>
<td>Hand tools, striking &amp; nailing, e.g., hammers, mallets</td>
<td>Exclude</td>
</tr>
<tr>
<td>18</td>
<td>Highway, street, road</td>
<td>Exclude</td>
</tr>
<tr>
<td>19</td>
<td>Hose</td>
<td>Include</td>
</tr>
<tr>
<td>20</td>
<td>Inspection Pit</td>
<td>Exclude</td>
</tr>
<tr>
<td>21</td>
<td>Jack</td>
<td>Exclude</td>
</tr>
<tr>
<td>22</td>
<td>Ladder</td>
<td>Include</td>
</tr>
<tr>
<td>23</td>
<td>Office equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>24</td>
<td>Power tools</td>
<td>Exclude</td>
</tr>
<tr>
<td>25</td>
<td>Pry bar</td>
<td>Exclude</td>
</tr>
<tr>
<td>26</td>
<td>Rail bike</td>
<td>Exclude</td>
</tr>
<tr>
<td>27</td>
<td>Stair</td>
<td>Include</td>
</tr>
<tr>
<td>28</td>
<td>Switch</td>
<td>Include</td>
</tr>
<tr>
<td>29</td>
<td>Tie</td>
<td>Include</td>
</tr>
<tr>
<td>30</td>
<td>Torch, acetylene, gas, etc</td>
<td>Exclude</td>
</tr>
<tr>
<td>31</td>
<td>Trailer/container on flat car (TOFC, COFC)</td>
<td>Include</td>
</tr>
<tr>
<td>32</td>
<td>Welder - electric</td>
<td>Exclude</td>
</tr>
<tr>
<td>33</td>
<td>Window</td>
<td>Include</td>
</tr>
<tr>
<td>34</td>
<td>Chair/seat</td>
<td>Include</td>
</tr>
<tr>
<td>35</td>
<td>Chock</td>
<td>Include</td>
</tr>
<tr>
<td>36</td>
<td>Step/stirrup, equipment</td>
<td>Include</td>
</tr>
<tr>
<td>37</td>
<td>Handbrake</td>
<td>Include</td>
</tr>
</tbody>
</table>
### Exhibit A-25: Tools used (TOOLS) data field

<table>
<thead>
<tr>
<th>TOOLS</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>Spike, tie plates, rail fasteners, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>39</td>
<td></td>
<td>Include</td>
</tr>
<tr>
<td>40</td>
<td>Lever</td>
<td>Include</td>
</tr>
<tr>
<td>41</td>
<td></td>
<td>Include</td>
</tr>
<tr>
<td>42</td>
<td></td>
<td>Include</td>
</tr>
<tr>
<td>43</td>
<td>Platform</td>
<td>Include</td>
</tr>
<tr>
<td>44</td>
<td>Cable</td>
<td>Include</td>
</tr>
<tr>
<td>45</td>
<td>Electrical connections, wiring, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>46</td>
<td>Chemicals, fumes, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>47</td>
<td>Locomotive horn</td>
<td>Exclude</td>
</tr>
<tr>
<td>48</td>
<td>Locomotive refrigerator</td>
<td>Exclude</td>
</tr>
<tr>
<td>49</td>
<td>Locomotive toilet</td>
<td>Exclude</td>
</tr>
<tr>
<td>50</td>
<td>Locomotive fire extinguisher</td>
<td>Exclude</td>
</tr>
<tr>
<td>51</td>
<td>Locomotive cab Door(s)</td>
<td>Include</td>
</tr>
<tr>
<td>52</td>
<td>Locomotive cab electric locker doors</td>
<td>Exclude</td>
</tr>
<tr>
<td>53</td>
<td>Locomotive car-body doors</td>
<td>Exclude</td>
</tr>
<tr>
<td>54</td>
<td>Locomotive radios</td>
<td>Exclude</td>
</tr>
<tr>
<td>56</td>
<td>Hose connections</td>
<td>Exclude</td>
</tr>
<tr>
<td>57</td>
<td>Soap</td>
<td>Exclude</td>
</tr>
<tr>
<td>58</td>
<td>Traction motor</td>
<td>Exclude</td>
</tr>
<tr>
<td>59</td>
<td>Anchor</td>
<td>Exclude</td>
</tr>
<tr>
<td>60</td>
<td>Signal equipment (gates, poles, gaffs, etc.)</td>
<td>Exclude</td>
</tr>
<tr>
<td>61</td>
<td>Bed</td>
<td>Exclude</td>
</tr>
<tr>
<td>62</td>
<td>Toilet</td>
<td>Exclude</td>
</tr>
<tr>
<td>63</td>
<td>Food</td>
<td>Exclude</td>
</tr>
<tr>
<td>64</td>
<td>Refrigerator</td>
<td>Exclude</td>
</tr>
<tr>
<td>65</td>
<td>Stove</td>
<td>Exclude</td>
</tr>
<tr>
<td>66</td>
<td>Motor</td>
<td>Exclude</td>
</tr>
<tr>
<td>67</td>
<td>Box</td>
<td>Exclude</td>
</tr>
<tr>
<td>80</td>
<td>Brake-shoe</td>
<td>Exclude</td>
</tr>
<tr>
<td>81</td>
<td>Track (Rail)</td>
<td>Include</td>
</tr>
<tr>
<td>82</td>
<td>Locomotive, other</td>
<td>Include</td>
</tr>
<tr>
<td>83</td>
<td>Crane</td>
<td>Exclude</td>
</tr>
<tr>
<td>84</td>
<td>MOW equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>85</td>
<td>Repair shop-locomotive</td>
<td>Exclude</td>
</tr>
<tr>
<td>86</td>
<td>Repair shop-Car</td>
<td>Exclude</td>
</tr>
<tr>
<td>87</td>
<td>Switch machine</td>
<td>Exclude</td>
</tr>
</tbody>
</table>
### Exhibit A-25: Tools used (TOOLS) data field

<table>
<thead>
<tr>
<th>TOOLS</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>88</td>
<td>Rock, other than ballast</td>
<td>Exclude</td>
</tr>
<tr>
<td>89</td>
<td>Locomotive cab floor</td>
<td>Include</td>
</tr>
<tr>
<td>90</td>
<td>Locomotive cab seat</td>
<td>Include</td>
</tr>
<tr>
<td>91</td>
<td>Repair shop - MOW</td>
<td>Exclude</td>
</tr>
<tr>
<td>99</td>
<td>Other (describe in narrative)</td>
<td>Include</td>
</tr>
<tr>
<td>1G</td>
<td>Door, End or Side-Passenger Train</td>
<td>Include</td>
</tr>
<tr>
<td>2G</td>
<td>Door, Trap-Passenger Train</td>
<td>Include</td>
</tr>
<tr>
<td>7A</td>
<td>Luggage</td>
<td>Include</td>
</tr>
<tr>
<td>7C</td>
<td>Computer equipment</td>
<td>Exclude</td>
</tr>
<tr>
<td>7E</td>
<td>Chains, straps, tie down devices.</td>
<td>Include</td>
</tr>
<tr>
<td>7F</td>
<td>Animal, insect, reptile</td>
<td>Exclude</td>
</tr>
<tr>
<td>7G</td>
<td>Plants, trees, foliage, etc.</td>
<td>Exclude</td>
</tr>
<tr>
<td>7H</td>
<td>Compressor</td>
<td>Exclude</td>
</tr>
<tr>
<td>7I</td>
<td>Step</td>
<td>Include</td>
</tr>
<tr>
<td>7J</td>
<td>Needle, syringe, sharps</td>
<td>Exclude</td>
</tr>
<tr>
<td>7K</td>
<td>Motor vehicle, non-rail</td>
<td>Exclude</td>
</tr>
<tr>
<td>7L</td>
<td>Weapon</td>
<td>Exclude</td>
</tr>
<tr>
<td>7M</td>
<td>Welder/torch, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>8F</td>
<td>Hand tools, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>8K</td>
<td>Knuckle</td>
<td>Include</td>
</tr>
<tr>
<td>8N</td>
<td>Remote control transmitter</td>
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## Exhibit A-26: Physical act (PHYSACT) data field

<table>
<thead>
<tr>
<th>PHYACT</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Adjusting coupler</td>
<td>Include</td>
</tr>
<tr>
<td>02</td>
<td>Adjusting drawbar</td>
<td>Include</td>
</tr>
<tr>
<td>03</td>
<td>Adjusting, other</td>
<td>Include</td>
</tr>
<tr>
<td>04</td>
<td>Applying rail anchor/fastener</td>
<td>Exclude</td>
</tr>
<tr>
<td>05</td>
<td>Bending/stooping</td>
<td>Include</td>
</tr>
<tr>
<td>06</td>
<td>Carrying</td>
<td>Exclude</td>
</tr>
<tr>
<td>07</td>
<td>Chaining, cabling car or locomotive</td>
<td>Exclude</td>
</tr>
<tr>
<td>08</td>
<td>Cleaning/scrubbing</td>
<td>Exclude</td>
</tr>
<tr>
<td>09</td>
<td>Climbing over/on</td>
<td>Include</td>
</tr>
<tr>
<td>10</td>
<td>Closing</td>
<td>Include</td>
</tr>
<tr>
<td>11</td>
<td>Coupling electric cables</td>
<td>Include</td>
</tr>
<tr>
<td>12</td>
<td>Coupling steam hose</td>
<td>Include</td>
</tr>
<tr>
<td>13</td>
<td>Coupling air hose</td>
<td>Include</td>
</tr>
<tr>
<td>14</td>
<td>Crossing over</td>
<td>Include</td>
</tr>
<tr>
<td>15</td>
<td>Crossing or crawling under</td>
<td>Include</td>
</tr>
<tr>
<td>16</td>
<td>Crossing between</td>
<td>Include</td>
</tr>
<tr>
<td>17</td>
<td>Cutting rail</td>
<td>Exclude</td>
</tr>
<tr>
<td>18</td>
<td>Cutting vegetation</td>
<td>Exclude</td>
</tr>
<tr>
<td>19</td>
<td>Cutting, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>20</td>
<td>Digging, excavating</td>
<td>Exclude</td>
</tr>
<tr>
<td>21</td>
<td>Driving (motor vehicle, forklift, etc.)</td>
<td>Exclude</td>
</tr>
<tr>
<td>22</td>
<td>Flagging</td>
<td>Include</td>
</tr>
<tr>
<td>23</td>
<td>Fueling</td>
<td>Include</td>
</tr>
<tr>
<td>24</td>
<td>Getting on</td>
<td>Include</td>
</tr>
<tr>
<td>25</td>
<td>Getting off</td>
<td>Include</td>
</tr>
<tr>
<td>26</td>
<td>Grinding</td>
<td>Exclude</td>
</tr>
<tr>
<td>27</td>
<td>Handling baggage</td>
<td>Exclude</td>
</tr>
<tr>
<td>28</td>
<td>Handling car parts</td>
<td>Exclude</td>
</tr>
<tr>
<td>29</td>
<td>handling material, general</td>
<td>Exclude</td>
</tr>
<tr>
<td>30</td>
<td>handling locomotive parts</td>
<td>Exclude</td>
</tr>
<tr>
<td>31</td>
<td>Handling wheels/trucks</td>
<td>Exclude</td>
</tr>
<tr>
<td>32</td>
<td>handling, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>33</td>
<td>Handling other track material/supplies</td>
<td>Exclude</td>
</tr>
<tr>
<td>34</td>
<td>Handling poles</td>
<td>Exclude</td>
</tr>
<tr>
<td>35</td>
<td>Handling tie plates</td>
<td>Exclude</td>
</tr>
<tr>
<td>36</td>
<td>Handling ties</td>
<td>Exclude</td>
</tr>
<tr>
<td>37</td>
<td>Handling rail</td>
<td>Exclude</td>
</tr>
</tbody>
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### Exhibit A-26: Physical act (PHYSACT) data field

<table>
<thead>
<tr>
<th>PHYSACT</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>Inspecting</td>
<td>Include</td>
</tr>
<tr>
<td>39</td>
<td>Installing</td>
<td>Exclude</td>
</tr>
<tr>
<td>40</td>
<td>Jumping from</td>
<td>Include</td>
</tr>
<tr>
<td>41</td>
<td>Jumping onto</td>
<td>Include</td>
</tr>
<tr>
<td>42</td>
<td>Laying</td>
<td>Include</td>
</tr>
<tr>
<td>43</td>
<td>Lifting other materials</td>
<td>Exclude</td>
</tr>
<tr>
<td>44</td>
<td>Lifting equipment (tools, parts, etc.)</td>
<td>Exclude</td>
</tr>
<tr>
<td>45</td>
<td>Lining switches</td>
<td>Include</td>
</tr>
<tr>
<td>46</td>
<td>Lining other</td>
<td>Include</td>
</tr>
<tr>
<td>47</td>
<td>Loading/unloading</td>
<td>Exclude</td>
</tr>
<tr>
<td>48</td>
<td>Maintaining/servicing</td>
<td>Exclude</td>
</tr>
<tr>
<td>49</td>
<td>Opening</td>
<td>Exclude</td>
</tr>
<tr>
<td>50</td>
<td>Opening/closing angle cock</td>
<td>Include</td>
</tr>
<tr>
<td>51</td>
<td>Operating</td>
<td>Include</td>
</tr>
<tr>
<td>52</td>
<td>Pulling pin lifter/operating uncoupling lever</td>
<td>Include</td>
</tr>
<tr>
<td>53</td>
<td>Pulling pin lifter/operating uncoupling lever</td>
<td>Include</td>
</tr>
<tr>
<td>54</td>
<td>Pushing</td>
<td>Include</td>
</tr>
<tr>
<td>55</td>
<td>Reaching</td>
<td>Include</td>
</tr>
<tr>
<td>56</td>
<td>Removing rail anchors/fasteners</td>
<td>Exclude</td>
</tr>
<tr>
<td>57</td>
<td>Repairing</td>
<td>Exclude</td>
</tr>
<tr>
<td>58</td>
<td>Riding</td>
<td>Include</td>
</tr>
<tr>
<td>59</td>
<td>Running</td>
<td>Include</td>
</tr>
<tr>
<td>60</td>
<td>Sitting</td>
<td>Include</td>
</tr>
<tr>
<td>61</td>
<td>Spiking</td>
<td>Exclude</td>
</tr>
<tr>
<td>62</td>
<td>Standing</td>
<td>Include</td>
</tr>
<tr>
<td>63</td>
<td>Stepping up</td>
<td>Include</td>
</tr>
<tr>
<td>64</td>
<td>Stepping down</td>
<td>Include</td>
</tr>
<tr>
<td>65</td>
<td>Stepping over</td>
<td>Include</td>
</tr>
<tr>
<td>66</td>
<td>Uncoupling air hose</td>
<td>Include</td>
</tr>
<tr>
<td>67</td>
<td>Uncoupling steam hose</td>
<td>Include</td>
</tr>
<tr>
<td>68</td>
<td>Uncoupling electric cable</td>
<td>Include</td>
</tr>
<tr>
<td>69</td>
<td>Using hand signals</td>
<td>Include</td>
</tr>
<tr>
<td>70</td>
<td>Using hand tool</td>
<td>Exclude</td>
</tr>
<tr>
<td>71</td>
<td>Using, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>72</td>
<td>Walking</td>
<td>Include</td>
</tr>
<tr>
<td>73</td>
<td>Welding (including field welding)</td>
<td>Exclude</td>
</tr>
<tr>
<td>74</td>
<td>Handbrakes, applying</td>
<td>Include</td>
</tr>
</tbody>
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### Exhibit A-26: Physical act (PHYSACT) data field

<table>
<thead>
<tr>
<th>PHYACT</th>
<th>Description</th>
<th>Status</th>
</tr>
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<tbody>
<tr>
<td>75</td>
<td>Handbrakes, releasing</td>
<td>Include</td>
</tr>
<tr>
<td>76</td>
<td>Handbrakes, other</td>
<td>Include</td>
</tr>
<tr>
<td>77</td>
<td>Derail, applying</td>
<td>Exclude</td>
</tr>
<tr>
<td>78</td>
<td>Derail, removing</td>
<td>Exclude</td>
</tr>
<tr>
<td>79</td>
<td>Derail, other</td>
<td>Exclude</td>
</tr>
<tr>
<td>80</td>
<td>Stepping across (passenger cars)</td>
<td>Include</td>
</tr>
<tr>
<td>99</td>
<td>Other (narrative must be provided)</td>
<td>Include</td>
</tr>
<tr>
<td>A1</td>
<td>Replacing</td>
<td>Exclude</td>
</tr>
<tr>
<td>A2</td>
<td>Ascending</td>
<td>Include</td>
</tr>
<tr>
<td>A3</td>
<td>Descending</td>
<td>Include</td>
</tr>
<tr>
<td>A4</td>
<td>Exercising</td>
<td>Exclude</td>
</tr>
<tr>
<td>A5</td>
<td>Getting in</td>
<td>Include</td>
</tr>
<tr>
<td>A6</td>
<td>Getting out</td>
<td>Include</td>
</tr>
<tr>
<td>A7</td>
<td>Hauling</td>
<td>Exclude</td>
</tr>
<tr>
<td>A8</td>
<td>Moving</td>
<td>Exclude</td>
</tr>
<tr>
<td>A9</td>
<td>Washing</td>
<td>Exclude</td>
</tr>
<tr>
<td>B1</td>
<td>Servicing</td>
<td>Exclude</td>
</tr>
<tr>
<td>B2</td>
<td>Sanding</td>
<td>Exclude</td>
</tr>
<tr>
<td>B3</td>
<td>Arresting/apprehending/subduing</td>
<td>Exclude</td>
</tr>
<tr>
<td>B4</td>
<td>Sleeping</td>
<td>Include</td>
</tr>
<tr>
<td>B5</td>
<td>Stepped on</td>
<td>Include</td>
</tr>
<tr>
<td>B6</td>
<td>Lying down</td>
<td>Include</td>
</tr>
</tbody>
</table>
Report qualifications/assumptions and limiting conditions

This report was prepared for the Oliver Wyman client named herein. There are no third party beneficiaries with respect to this report, and Oliver Wyman does not accept any liability to any third party.

Information furnished by others, upon which all or portions of this report are based, is believed to be reliable but has not been independently verified, unless otherwise expressly indicated. Public information and industry and statistical data are from sources we deem to be reliable; however, we make no representation as to the accuracy or completeness of such information. The findings contained in this report may contain predictions based on current data and historical trends. Any such predictions are subject to inherent risks and uncertainties. Oliver Wyman accepts no responsibility for actual results or future events.

The opinions expressed in this report are valid only for the purpose stated herein and as of the date of this report. No obligation is assumed to revise this report to reflect changes, events or conditions, which occur subsequent to the date hereof.

All decisions in connection with the implementation or use of advice or recommendations contained in this report are the sole responsibility of the client. This report does not represent investment advice nor does it provide an opinion regarding the fairness of any transaction to any and all parties.
BEFORE THE KANSAS DEPARTMENT OF TRANSPORTATION

K.A.R. 36-43-1. CREW REQUIREMENTS

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

EXHIBIT 2

Oliver Wyman, *Assessment of European Railways: Characteristics and Crew-Related Safety* (June 2016)
Expert Report Prepared for:
The Association of American Railroads

Assessment of European Railways:
Characteristics and Crew-Related Safety

By:

OLIVER WYMAN
1166 Avenue of the Americas
New York, NY 10036

June 15, 2016
Contents

I. Overview and Key Findings ........................................................................................................ 3
   A. Oliver Wyman Introduction .......................................................................................... 3
   B. Key Findings ................................................................................................................. 3

II. Comparison of US and European Railroads ....................................................................... 9
   A. Network Overview ........................................................................................................ 14
   B. Freight Characteristics ............................................................................................... 16
   C. Operating Complexity ................................................................................................. 20
   D. Country Profiles .......................................................................................................... 24
   E. Summary ...................................................................................................................... 38

III. European Rail Safety Analysis ............................................................................................ 41
   A. Safety Data Analyzed ................................................................................................. 45
   B. Overall Significant Accident Rates ........................................................................... 46
   C. Investment and Accident Rates .................................................................................. 49
   D. Recent Crew Transition and Accident Rates .............................................................. 52
   E. Eastern European Accident Rates .............................................................................. 52
   F. Summary ...................................................................................................................... 60

Appendix A. European Advanced Safety Technology ............................................................ 62
Appendix B. Safety Analysis Definitions and Reporting .......................................................... 69
Appendix C. Data Sources ........................................................................................................ 74
I. Overview and Key Findings

A. Oliver Wyman Introduction

With offices in 50+ cities across 27 countries, Oliver Wyman is a leading global management consulting firm that combines deep industry knowledge with specialized expertise in strategy, operations, risk management, organizational transformation, and leadership development. The firm’s 3,000 professionals help clients optimize their businesses, improve their operations and risk profile, and accelerate their organizational performance to seize the most attractive opportunities.

Oliver Wyman’s Rail Practice employs the largest and most experienced staff in the world dedicated to the rail industry and is widely recognized as the premier management consultancy to state-owned and private freight and passenger railroads. It has carried out major strategic, operational, and financial planning and evaluation assignments for major rail operators and infrastructure providers in Europe, as well as railroads in North America, South America, Africa, and the Pacific Rim. Oliver Wyman’s European rail experience includes work for public and private entities in Germany, France, Italy, UK, Poland, Finland, Hungary, and the Czech Republic, among others. Many of Oliver Wyman’s assignments for its rail clients include evaluating infrastructure, equipment, and operations activities for both passenger and freight railways. Oliver Wyman staff members are leading experts in safety and train crew management and network planning and operations.

B. Key Findings

On March 14, 2016, the Federal Railroad Administration (FRA) issued a Notice of Proposed Rulemaking (NPRM) (Docket # FRA-2014-0033), in which it proposes regulations establishing
minimum requirements for the size of train crews depending on the type of operation. A minimum requirement of two crew members is proposed for all freight railroad operations (with certain exceptions).

Oliver Wyman was asked to analyze the FRA’s approach with regard to data on European railroad operations in the February 18, 2016 Regulatory Impact Analysis (RIA) that the FRA prepared to support the NPRM. Specifically, Oliver Wyman 1) assessed the FRA’s assertions that European rail operations are not “comparable” to US rail operations; and 2) analyzed European safety data to determine if one-person crews are as safe as two-person crews – an analysis the FRA did not carry out.

Oliver Wyman’s key findings include the following:

▪ In the RIA, the FRA asserts that European railroads are neither relevant nor comparable to US railroads. ¹ Oliver Wyman’s analysis found however that the interconnected standard gauge European network serves an economy approximately as large as the United States in terms of GDP. The rail network is as large as or larger in terms of route-kilometers than that of the United States, and has a train density (daily trains operated per route-kilometer) approximately twice that of the United States. The European network also has a greater percentage of passenger trains, which are intermixed with and operate at higher speeds than freight trains, and multiple freight and passenger operators sharing infrastructure, making for a more operationally complex network. Freight traffic in Europe also has a level of diversity similar to that of freight traffic in the United States, including mix of commodities, mix of dangerous and non-dangerous goods, and mix of train types (unit train, mixed carload

merchandise, and intermodal) – including a significant number of retarder-equipped hump yards to handle carload traffic.

- The FRA asserts that: “It is also apparent that railroads in these countries can be considered to be industrial type railroads servicing one origin and one destination only.”\(^2\) The FRA’s conclusions, however, are based on a review of a small sample of European rail operators and thus these findings are skewed based on what is only a very small segment of European rail activity. Most of the legacy rail operators (i.e., national railroads prior to liberalization), as in the United States, operate a full range of unit train, intermodal trains, and carload manifest trains. Many of the smaller operators that have started service since liberalization do operate point-to-point unit trains, but have joined the legacy carriers and entered into the carload manifest and intermodal business as well. In Europe the ownership of the track is divorced from the operation of the trains and thus unlike the United States, one must look not at the individual operating companies, but at the full network to really grasp the operating environment. In Germany alone there are over 200 freight operators and over 100 passenger operators sharing a common network that accounts for nearly 25 percent of European train-kilometers.

- “FRA also found that most of these foreign operations would meet the requirement in one of the exceptions of the proposed rule (due to their size).”\(^3\) This assertion is only true if the FRA dismisses its own proposed rule that such trains must not exceed a maximum speed of 25 mph (42 kmh). If these operators were restricted to such speeds, the European network would grind to a halt. These varied operating companies primarily operate on the high-density

---

\(^2\) Ibid., p. 19.
\(^3\) Ibid., p. 21.
European mainline network, not, as implied by the FRA, only on the low-density branch line feeder network.

- Most European railroads operate with one-person crews. Countries with one-person crews account for 94.1 percent of European train activity (train-kilometers). Many railroads in Western Europe have operated with one-person crews since shortly after World War II. As the railroads were rebuilt and electrified, many countries implemented one-person crews to alleviate manpower shortages, take advantage of electric and diesel locomotive technology (no longer requiring a fireman), and to more economically compete in a shorter haul, truck-competitive marketplace. Implementation of advanced train control technology has not been a prerequisite for the adoption of one-person crews in Europe. Indeed, despite the predominance of one-person crews, the EU has no plans to install advanced train control technology (ERTMS) on 75 percent of its network. (By comparison, the US will install positive train control on at least 60 percent of its network.)

- There is no argument that European freight trains are shorter than those operated in the United States, in large part because of the high density of trains operated and the desire to keep block sizes shorter to better accommodate close spacing of freight and passenger trains and provide greater network fluidity. However, shorter block sizes and a greater number of interlockings mean that there are far more signals per route-kilometer, and Europe’s train density – double that of the US – means more traffic control transactions (signal indications and dispatcher communications) as well. Thus, in most European countries, a higher workload is handled safely and efficiently by a single person in an environment where the
tolerance for error is far less than in the United States (where larger slow-moving freight trains and limited passenger traffic are the norm).

- In the RIA, the FRA states that it is aware of international one-person crew operations, but asserts that “There are no safety data available to account for the safety record of one-person crews. …These data are not readily available.”\(^4\) We do not understand why the FRA was unable to secure this data, since it is publicly available, and we have included links to the data in this report (see Appendix C). Based on an analysis of this data, one-person crew operations typically experience lower levels of significant accidents than two-person crews in Europe.

  Additionally, Western European railways with one-person crews have lower accident rates than Eastern European railways (both one-person and two-person), which may reflect higher levels of investment in infrastructure. To adjust for the different accident rates observed between Eastern and Western Europe, and because five of the six remaining two-person crew operations are in Eastern Europe, Oliver Wyman also conducted an analysis comparing one-person versus two-person crews in Eastern Europe. For most types of accidents and overall significant accidents, there is no statistically significant difference between one-person and two-person crews in these Eastern European countries.

- The FRA asserts that “A second crew member could be instrumental in limiting the damages and injuries after an accident takes place.”\(^5\) Oliver Wyman examined the economic impact and the number of fatalities in Eastern Europe for one-person and two-person crews and

\(^4\) Ibid., p. 19.
\(^5\) Ibid., p. 6.
concluded that there was no discernible difference in the magnitude of accidents based on crew size. Furthermore, the number of employee fatalities appears to be significantly higher for two-person crews than for one-person crews, although statistically we could not confirm this. The FRA asserts that “In rare instances, having a second crew member aboard may result in an additional injury or fatality if a serious accident occurs,”6 but based on Oliver Wyman’s analysis of Eastern European data, exposing two crew members to a field operating environment may actually lead to greater fatalities.

In Oliver Wyman’s experience, safe train operations have more to do with what is in front of a locomotive, rather than what it is pulling. Most European railroads have used single-person crews on freight trains for decades, predating advanced train control technology. They use single-person crews despite the fact that Europe has twice the train density, far more passengers sharing the network with freight, and far more control transactions per route-kilometer – and yet suffers no reduction in crew-related safety.

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6 Ibid., p. 5.
II. Comparison of US and European Railroads

Trends in both the US and abroad are driving the increased use of single-person train crews. There is a long history of technological improvements in the rail industry that have led to productivity gains and set new standards for safety. The use of single-person crews is widespread internationally, for both freight and passenger trains, and on rail networks similar to the United States in size and complexity. The use of single-person crews on the majority of the European rail network is one such example.7

In the FRA’s “Train Crew Staffing: Notice of Proposed Rulemaking, Regulatory Impact Analysis” (RIA) of February 18, 2016, the FRA reviewed average train length and train weight for a small sample of European rail operators in Sweden, Norway, Denmark, and the UK. The review did not include large rail networks such as those of Germany and France, which account for a large share of total European rail traffic – and which have one-person crews (Exhibit II-1). In fact, 94.1 percent of all European rail traffic (train-kilometers) is moved by one-person crews.8

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7 Throughout this document, a “one-person crew” means one person in the cab of the locomotive, without regard to whether, in the case of passenger service, there is an additional rail employee in the passenger section of the train (i.e., a conductor).
8 Information on crew size is based on Oliver Wyman’s direct knowledge of rail operators, interviews, and public data, supplemented with a survey of 12 countries where crew size was unknown.
Based on this review of a small sampling of operators, the FRA concluded that “It is clear that US rail industry operations are different from the railroads that have one-person operations in Europe….For the most part, foreign train operations are not comparable as train lengths, territory, and infrastructure are not as heavy or complex. It is also apparent that railroads in these countries can be considered to be industrial type railroads servicing one origin and one destination only.”

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9 Eurostat and Oliver Wyman analysis.
Oliver Wyman undertook a much more extensive analysis of available and recent data on the overall European rail network and individual national networks, which provided a more detailed and accurate picture of both rail operations and rail safety performance. Because rail services in Europe freely operate across borders, a proper analysis will consider the European Economic Area (EEA) as a whole, and on this basis, the EEA is comparable to the US rail network in terms of network size and density. European railroads on the networks of the 28 EEA countries (Exhibit II-2) operate a wide variety of services, both within their national territories and internationally (cross-border). The latter can involve changes in safety systems, electrification, and operating rules, and requires the use of complex interoperable equipment and multiple train control systems.

Similar to US freight railroads, European railroads provide intermodal, unit train, and carload manifest services for an extensive array of commodities (including dangerous goods) and serve a wide range of origins and destinations over varying distances. And because operations in Europe are now decoupled from infrastructure ownership, dozens of small “new entrant” and large legacy freight operators (e.g., DB Schenker Rail, SNCF) run trains simultaneously on mixed passenger-freight corridors and offer high-frequency services, meaning that operations are higher density than is the case for much of the US rail network. On a per-kilometer basis, European rail networks also are more complex, with a greater number of junctions, interlockings, turnouts, and train movements.

---

11 The European Economic Area (EEA) includes all 28 European Union Member States (of which 26 have railroads) plus Norway. Switzerland, while not an EEA member, is accorded the same rights and is part of Europe’s international rail system. The European Railway Agency and Eurostat compile rail statistics for the EU, Norway, and Switzerland. Thus, “Europe” and “EEA” as used in this report refer to all 28 countries for which data has been compiled and analyzed.
The FRA also asserts that “Most of these foreign operations would meet the requirements in one of the exceptions of the proposed rule, (due to their size).” The FRA appears to be referring to its specific exceptions for “Class III” freight railroads, i.e., short lines with less than 400,000 employee work hours per year.

The Surface Transportation Board also defines a Class III railroad as generating less than $38.06 million per year in revenues. It is true that there are many small “new entrant” rail operators in Europe that would meet the definitions of a Class III railroad in terms of work hours and revenues (just as in the United States) but in terms of train-kilometers, the majority of traffic

---

is still handled by rail operations that are equivalent to Class I and Class II US railroads – just as in the United States (Exhibit II-3).

**Exhibit II-3: Incumbent versus New Entrant Rail Operators: Market Share in Freight Train-Kilometers, 2014**

Furthermore, small rail operators in Europe are not like Class II short lines, which generally maintain their own low-speed Class 2 track (under 25 mph), and operate over short distances – typically hauling traffic to/from specific customers for interchange with the Class I railroads. Small rail operators in Europe instead have access to and operate over the entire European rail network – both domestically and cross-border. And where the FRA would exempt Class III US railroads from the two-person crew requirement where a rail operation “would take place at speeds not exceeding 25 mph,” many small European rail operators run trains on mainline networks that exceed this speed limitation (and require operators to maintain strict schedules or

---

16 Proposed Rules,” Federal Register, op. cit. Note that heavy-grade operations (over steep mountains or hills) would not be exempted.
incurs penalties). Maximum running speeds for freight – no matter the size of the operator – can reach 90 to 120 kmh, equivalent to 56 to 75 mph.\(^{17}\) They also operate extensively on lines over which passenger trains run as well, which the FRA has identified as a factor (presumably negative) in considering future approvals of one-person crew operations.

All of these factors combine to create an agenda of operating work events and decision points for European train crews – regardless of rail operator size – far greater than those facing train crews in the United States. In addition, safety issues routinely impact thousands of more lives than in the US, due to the close proximity of freight and high-density passenger services on the European rail network.

**A. Network Overview**

As shown in Exhibit II-4, the interlinked EEA-28 rail network serves a market that in total generates a slightly larger GDP than the United States. Operators on the standard gauge portion of the network have slightly shorter lengths of haul (freight train-km) and train sizes are shorter, but the overall network as a whole has three times the density (in train-kilometers), due to large numbers of passenger trains.

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\(^{17}\) Troche, Gerhard, “High-speed rail freight: Sub-report in efficient train systems for freight transport,” Centre for Research and Education in Railway Engineering at the Royal Institute of Technology Stockholm (Railway Group KTH), 2005, p. 11.
Exhibit II-4: Overview of European and US Rail Networks, 2014

<table>
<thead>
<tr>
<th></th>
<th>Total Europe (EEA-28)</th>
<th>European Standard Gauge</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, US$ billions</td>
<td>19,541</td>
<td>17,064</td>
<td>17,419</td>
</tr>
<tr>
<td>Route-kilometers</td>
<td>231,370</td>
<td>201,470</td>
<td>151,399</td>
</tr>
<tr>
<td>Total train-km, millions</td>
<td>4,317</td>
<td>3,968</td>
<td>1,233</td>
</tr>
<tr>
<td>Total train density, trains per day</td>
<td>51.1</td>
<td>54</td>
<td>22.3</td>
</tr>
</tbody>
</table>

In addition, total train density on the rail networks of the EEA-28 is much higher on a daily basis than in the United States (Exhibit II-5). Freight train density is comparable in a number of countries as well, including large economies such as Germany, Austria, and Poland. Train density is a far more important metric than train size in relation to safety considerations, since what is in front of the train (e.g., signals, objects on track, presence of other trains) dictates the train crew’s safety decisions far more than what is behind the cab. It is important to recognize as well that in the US environment, in most cases the train crew cannot directly observe more than the first 30 or 40 cars, which is about the average length of European freight trains.

---

18 Note: European data covers all passenger, commuter, and freight operations on the regulated railway networks of each constituent nation. US data, with the exception of total train-km, covers Class I freight railroads only. Total train-km, derived from FRA operational data, covers all railway operations (Class I, passenger, commuter, regional, and short line) in the US. In order to remain consistent across the chart, total train-km was divided by Class I route km to yield a total train density of 22.3. If the total train-km figure were divided instead by 222,932 km, the length of the entire US railway network, the total train density would be 15.1 trains per day, 32 percent lower. Source: World Bank; European Railway Agency; European Commission (Eurostat); Independent Regulators’ Group, Fourth Annual Market Monitoring Report; Association of American Railroads, Analysis of Class I Railroads; Federal Railroad Administration, Operational Data Tables; Oliver Wyman analysis.
Exhibit II-5: Train Density per Day, 2014\textsuperscript{19}
Train-kilometer per line-kilometer

\textbf{B. Freight Characteristics}

In addition to the many passenger trains that run on the European network (which include commuter, regional, intercity, and high speed), freight trains carry a wide variety of cargo, including dangerous goods. Freight trains operated include local, general merchandise, and unit trains. Further, many large rail networks carry a substantial share of intermodal traffic (containers, swap bodies, road vehicles, semi-trailers), as shown in Exhibit II-6.

Evidence of the carload network in Europe is provided by a large number of retarder equipped hump yards in the European network. These facilities are not needed for handling unit train operations. Reported carload data (tonne-kilometers) is limited, but a number of countries report carload traffic to be a quarter or more of total traffic, including Germany, the largest rail freight market in Europe (Exhibit II-7).

---

20 Eurostat. Four EEA-28 countries do not report this data. Includes containers and trailers.
Many of the freight trains operating over the European railway network carry dangerous goods (hazardous materials), which make up a sizable portion of the freight handled. Whereas dangerous goods traffic comprises approximately six percent of all freight handled in the United States, it comprises 12 percent of total freight tonnage and 13 percent of total freight tonne-kilometers in Europe. In Europe (as in the US) rail is considered the safer mode of transport and shipment of dangerous goods by rail is often encouraged rather than truck shipment of these goods. And on nearly all networks, these dangerous goods are handled by one-person train crews.

---

21 Eurostat, all railroads reporting this data.
In addition, the amount of dangerous goods carried is particularly high in some European countries (Exhibit II-8). Thus, in some areas of the European railway network, the potential for an incident involving dangerous goods can be high.

Exhibit II-8: Dangerous Goods Moved by Rail and Percentage of Total Rail Freight\(^{23}\)
Million tonne-kilometers, 2014

There is no argument that European freight trains are shorter than those operated in the United States, in large part because of the high density of trains operated and the desire to keep block sizes shorter to better accommodate close spacing of freight and passenger trains and to provide greater network fluidity for the passenger trains on the network. However, the shorter block sizes and greater number of interlockings due to more double track and density of trackage create far more signals per route-kilometer. And twice the train density of the United States

---

\(^{23}\) Eurostat, Oliver Wyman analysis.
means that European rail operations require far more traffic control transactions (signal
indications and dispatcher communications) than is the case in the United States.

The FRA contends that this work should be done in the United States under the “supervision
and command of the conductor” due to workload concerns. Yet a far higher workload in Europe
is handled safely and efficiently by a single “train driver” in an environment where the tolerance
for error is far less than in the United States, given Europe’s high passenger volumes and fast
speeds, versus the larger slow-moving freight trains and low passenger train density commonly
found in the United States. The FRA lists three primary tasks for a locomotive engineer, and all
of these tasks are present in the European operating environment.24 Yet in a more complex, fast
moving operating environment, without assistance from a conductor, the engineer is able to
perform satisfactorily and as well as when there are two people in the train crew.

C. Operating Complexity

The European rail operating environment is also more challenging than that of the US, as a
far larger number of operators run on most networks. Unlike in the US, where most railroads are
shortlines serving a small territory and feeding a few large Class I’s, freight rail operators in
Europe can operate virtually anywhere on the network by obtaining the necessary certification as
a “railway undertaking” and applying to the relevant infrastructure managers for each country
network for train slots. Total active freight and rail operators for countries reporting data are
shown in Exhibit II-9.

24 Those three primary tasks are “1) coordinate with the conductor (or dispatcher) on information about the route, stops, delays,
or other operation details; 2) ensure that the locomotive is ready to operate by checking for mechanical problems and for
adequate levels of fuel, sand, water, and other supplies; and 3) under the conductor’s supervision and command, interpret train
p. 32.
Exhibit II-9: Active European Rail Operators, 2014

In addition, the European rail network handles higher numbers and types of trains on a daily basis:

- Europe has twice the daily train activity of North America (51.6 versus 22.3 trains per day), primarily due to much higher passenger train activity across the network.

- Shorter train mean shorter blocks and more signals per track-kilometer (Exhibit II-10), which increases the number of control communications required for each minute of operation.

- Because passenger trains account for 81 percent of train-kilometers on the network, average train speeds are faster than in the United States.

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26 World Bank; European Railway Agency; European Commission (Eurostat); Independent Regulators’ Group, Fourth Annual Market Monitoring Report; Association of American Railroads, Analysis of Class I Railroads; Federal Railroad Administration, Operational Data Tables; Oliver Wyman analysis.
A significant percentage of rail traffic also moves internationally (cross-border) (Exhibit II-11). Indeed, for fully half of the EEA-28 networks, international traffic makes up 50 percent or more of tonne-kilometers.

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Faster train speeds, shorter blocks, and more train activity mean that European freight train crews experience more challenges to safe operation every day than do US freight train crews. In addition, because trains are scheduled by slot on a mixed passenger-freight system, railway operators pay penalties for delays, putting additional pressure on crews to maintain schedules. Thus precision operations and higher speeds suggest that margins for error in Europe are far less than in the United States.

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28 Eurostat, all railroads reporting this data. International includes cross-border and transit.
D. Country Profiles

Oliver Wyman developed more detailed profiles of seven European countries to further demonstrate how these systems compare to the US in terms of variety and complexity of operations. Five are among the largest rail markets in Europe: Germany, France, Italy, UK, and Poland. In addition, two similarly sized Eastern European railroads, one with one-person crews (Lithuania) and one with two-person crews (Latvia), are profiled.

Far from being “industrial railroads,” freight rail operators in these countries haul a wide variety of commodities, serve a range of origins and destinations – including domestic, ports, and cross-border; and offer carload, unit train, and intermodal services. Furthermore, they face daily the increased complexity of operating freight on dense networks with high volumes of passenger trains and multiple above-rail operators.

1. Germany

Germany is the largest country in Europe on a GDP basis. Germany has one of the largest and densest rail networks in Western Europe. It is also the largest freight and passenger market in Europe in terms of tonnes/passenger-kilometers. With the exception of two dedicated high-speed passenger lines, the entire network runs mixed freight and passenger traffic. On some of the more heavily traveled double-track lines, train volume can exceed 400 trains per day. On a daily basis, the German rail network carries 1 million tonnes of freight and 7.38 million passengers.29

29 Eurostat.
Single-person crews were introduced in Germany with the abolishment of steam traction in the 1950s and 1960s. There are no limitations in Germany on freight train size, train weight, or carriage of hazardous materials when trains are operated by single-person crews.

**Exhibit II-12: Germany: Key Rail Statistics, 2014**

<table>
<thead>
<tr>
<th>Overall market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, US$ billions</td>
<td>$3,757</td>
</tr>
<tr>
<td>Standard locomotive crew size</td>
<td>1 person</td>
</tr>
<tr>
<td>Active rail operators</td>
<td>365</td>
</tr>
<tr>
<td>Network size (line-km)</td>
<td>33,483</td>
</tr>
<tr>
<td>Network intensity (train-km/line-km per day)</td>
<td>85.4</td>
</tr>
<tr>
<td>Share of total European rail activity (train-km)</td>
<td>24.1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freight rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight rail operators</td>
<td>230</td>
</tr>
<tr>
<td>Hump yards equipped with retarders</td>
<td>9</td>
</tr>
<tr>
<td>Freight density: tonne-km per line-km</td>
<td>3.36M</td>
</tr>
<tr>
<td>Freight intensity: train-km per line-km per day</td>
<td>20.8</td>
</tr>
<tr>
<td>Avg. freight load per train (tonnes)</td>
<td>442</td>
</tr>
<tr>
<td>Freight share of network usage (train-km)</td>
<td>24%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passenger rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger rail operators</td>
<td>135</td>
</tr>
<tr>
<td>Pass. density: pass-km per line-km</td>
<td>2.67M</td>
</tr>
<tr>
<td>Pass. intensity: train-km per line-km per day</td>
<td>64.1</td>
</tr>
<tr>
<td>Pass. share of network usage (train-km)</td>
<td>76%</td>
</tr>
</tbody>
</table>

On the freight side, some 230 rail operators actively competed for freight and share access to the rail network. German freight rail hauls 42,946 million tonnes-km per year of intermodal, and

---

27, 129 million tonnes-km per year of carload traffic. Freight accounts for 24 percent of total train-kilometers.

The top ten rail freight hauled commodities for Germany are shown in Exhibit II-13. German rail operators haul a wide range of goods, including chemicals, plastics, metal ores and products, and energy products.

**Exhibit II-13: Top Ten Rail-Hauled Commodities in Germany, 2014**

Million tonne-kilometers

2. France

France has the second longest rail network in Europe. It is the second largest freight market and third largest passenger market in terms of tonnes/passenger-kilometers. France uses predominantly one-person crews.

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31 Eurostat, Oliver Wyman analysis.
### Exhibit II-14: France: Key Rail Statistics, 2014

<table>
<thead>
<tr>
<th>Overall market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, US$ billions</td>
<td>$2,604</td>
</tr>
<tr>
<td>Standard locomotive crew size</td>
<td>1 person</td>
</tr>
<tr>
<td>Active rail operators</td>
<td>30</td>
</tr>
<tr>
<td>Network size (line-km)</td>
<td>36,831</td>
</tr>
<tr>
<td>Network intensity (train-km/line-km per day)</td>
<td>36.4</td>
</tr>
<tr>
<td>Share of total European rail activity (train-km)</td>
<td>11.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freight rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight rail operators</td>
<td>18</td>
</tr>
<tr>
<td>Hump yards equipped with retarders</td>
<td>5</td>
</tr>
<tr>
<td>Freight density: tonne-km per line-km</td>
<td>0.87M</td>
</tr>
<tr>
<td>Freight intensity: train-km per line-km per day</td>
<td>5.9</td>
</tr>
<tr>
<td>Avg. freight load per train (tonnes)</td>
<td>408</td>
</tr>
<tr>
<td>Freight share of network usage (train-km)</td>
<td>16%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passenger rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger rail operators</td>
<td>12</td>
</tr>
<tr>
<td>Pass. density: pass-km per line-km</td>
<td>2.19M</td>
</tr>
<tr>
<td>Pass. intensity: train-km per line-km per day</td>
<td>30.6</td>
</tr>
<tr>
<td>Pass. share of network usage (train-km)</td>
<td>84%</td>
</tr>
</tbody>
</table>

On the freight side, 18 different rail operators actively competed for freight and share access to the rail network. French freight rail hauls 9,071 million tonnes-km per year of intermodal traffic. Freight accounts for 16 percent of total train-kilometers.

---

The top ten rail freight hauled commodities for France are shown in Exhibit II-15. French rail operators haul a wide range of goods, including miscellaneous mixed goods (typically intermodal), metals, agricultural products, chemicals and plastics, and food products.

Exhibit II-15: Top Ten Rail-Hauled Commodities in France, 2014
Million tonne-kilometers

33 Eurostat, Oliver Wyman analysis.

3. Italy

Italy is the fourth largest freight and passenger market in terms of tonnes/passenger-kilometers. Similar to other European countries, most of the network is electrified and has mixed passenger and freight operations. Starting in 2003, a new state-of-the-art train control system was introduced and installed on the entire core network, as well as parts of the secondary network.
Freight trains are permitted to be operated with single-person crews. Passenger trains are generally operated with single-person crews and a minimum of one conductor present in the train, but not in the locomotive cab.

**Exhibit II-16: Italy: Key Rail Statistics, 2014**

<table>
<thead>
<tr>
<th>Overall market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, US$ billions</td>
<td>$2,156</td>
</tr>
<tr>
<td>Standard locomotive crew size</td>
<td>1 person</td>
</tr>
<tr>
<td>Active rail operators</td>
<td>44</td>
</tr>
<tr>
<td>Network size (line-km)</td>
<td>15,990</td>
</tr>
<tr>
<td>Network intensity (train-km/line-km per day)</td>
<td>56.6</td>
</tr>
<tr>
<td>Share of total European rail activity (train-km)</td>
<td>7.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freight rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight rail operators</td>
<td>25</td>
</tr>
<tr>
<td>Hump yards equipped with retarders</td>
<td>0</td>
</tr>
<tr>
<td>Freight density: tonne-km per line-km</td>
<td>1.33M</td>
</tr>
<tr>
<td>Freight intensity: train-km per line-km per day</td>
<td>7.7</td>
</tr>
<tr>
<td>Avg. freight load per train (tonnes)</td>
<td>475</td>
</tr>
<tr>
<td>Freight share of network usage (train-km)</td>
<td>14%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passenger rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger rail operators</td>
<td>19</td>
</tr>
<tr>
<td>Pass. density: pass-km per line-km</td>
<td>2.84M</td>
</tr>
<tr>
<td>Pass. intensity: train-km per line-km per day</td>
<td>48.8</td>
</tr>
<tr>
<td>Pass. share of network usage (train-km)</td>
<td>86%</td>
</tr>
</tbody>
</table>

---

34 Eurostat, European Railway Agency, Independent Regulators’ Group, World Bank, Oliver Wyman analysis.
On the freight side, some 25 rail operators actively compete for freight and share access to the rail network. Freight accounts for 14 percent of total train-kilometers.

The top ten rail freight hauled commodities for Italy are shown in Exhibit II-17. Data on rail-hauled goods for Italy is limited, but traffic includes metals, food products, agricultural products, and chemicals and plastics.

**Exhibit II-17: Top Ten Rail-Hauled Commodities in Italy, 2014**

Million tonne-kilometers

35 Eurostat, Oliver Wyman analysis.
4. Poland

Poland is the third largest freight market and eighth largest passenger market in terms of tonnes/passenger-kilometers. Rail operations predominantly use one-person crews.

**Exhibit II-18: Poland: Key Rail Statistics, 2014**

<table>
<thead>
<tr>
<th>Overall market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, US$ billions</td>
<td>$960</td>
</tr>
<tr>
<td>Standard locomotive crew size</td>
<td>1 person</td>
</tr>
<tr>
<td>Active rail operators</td>
<td>82</td>
</tr>
<tr>
<td>Network size (line-km)</td>
<td>19,265</td>
</tr>
<tr>
<td>Network intensity (train-km/line-km per day)</td>
<td>30.4</td>
</tr>
<tr>
<td>Share of total European rail activity (train-km)</td>
<td>4.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freight rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight rail operators</td>
<td>69</td>
</tr>
<tr>
<td>Hump yards (retarder and non-retarder)</td>
<td>24</td>
</tr>
<tr>
<td>Freight density: tonne-km per line-km</td>
<td>2.47M</td>
</tr>
<tr>
<td>Freight intensity: train-km per line-km per day</td>
<td>10.6</td>
</tr>
<tr>
<td>Avg. freight load per train (tonnes)</td>
<td>640</td>
</tr>
<tr>
<td>Freight share of network usage (train-km)</td>
<td>35%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passenger rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger rail operators</td>
<td>13</td>
</tr>
<tr>
<td>Pass. density: pass-km per line-km</td>
<td>0.83M</td>
</tr>
<tr>
<td>Pass. Intensity: train-km per line-km per day</td>
<td>19.1</td>
</tr>
<tr>
<td>Pass. share of network usage (train-km)</td>
<td>65%</td>
</tr>
</tbody>
</table>

---

On the freight side, some 69 rail operators actively compete for freight and share access to the rail network. Polish freight rail hauls 3,334 million tonnes-km per year of intermodal and 6,794 million tonnes-km of carload traffic. Freight accounts for 35 percent of total train-kilometers.

The top ten rail freight hauled commodities for Poland are shown in Exhibit II-119. Polish rail operators haul a wide range of goods, including energy products, metal ores, chemicals/plastics, and agricultural products.

Exhibit II-19: Top Ten Rail-Hauled Commodities in Poland, 2014

Million tonne-kilometers

37 Eurostat, Oliver Wyman analysis.
5. United Kingdom

The UK is the sixth largest freight market and second largest passenger market in Europe in terms of tonnes/passenger-kilometers. The Channel Tunnel provides seamless passenger and freight service to/from continental Europe. The UK uses predominantly one-person crews.

Exhibit II-20: UK: Key Rail Statistics, 2014

<table>
<thead>
<tr>
<th>Overall market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, US$ billions</td>
<td>$2,597</td>
</tr>
<tr>
<td>Standard locomotive crew size</td>
<td>1 person</td>
</tr>
<tr>
<td>Active rail operators</td>
<td>35</td>
</tr>
<tr>
<td>Network size (line-km)</td>
<td>16,086</td>
</tr>
<tr>
<td>Network intensity (train-km/line-km per day)</td>
<td>93.0</td>
</tr>
<tr>
<td>Share of total European rail activity (train-km)</td>
<td>12.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freight rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight rail operators</td>
<td>10</td>
</tr>
<tr>
<td>Hump yards equipped with retarders</td>
<td>0</td>
</tr>
<tr>
<td>Freight density: tonne-km per line-km</td>
<td>1.37M</td>
</tr>
<tr>
<td>Freight intensity: train-km per line-km per day</td>
<td>6.5</td>
</tr>
<tr>
<td>Avg. freight load per train (tonnes)</td>
<td>575</td>
</tr>
<tr>
<td>Freight share of network usage (train-km)</td>
<td>7%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passenger rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger rail operators</td>
<td>25</td>
</tr>
<tr>
<td>Pass. density: pass-km per line-km</td>
<td>4.02M</td>
</tr>
<tr>
<td>Pass. intensity: train-km per line-km per day</td>
<td>86.5</td>
</tr>
<tr>
<td>Pass. share of network usage (train-km)</td>
<td>93%</td>
</tr>
</tbody>
</table>

---

On the freight side, ten rail operators actively compete for freight and share access to the rail network. Freight accounts for 7 percent of total train-kilometers.

The top rail freight hauled commodities for the UK are shown in Exhibit II-21. UK rail operators haul a significant share of energy products, as well as minerals, metals, food products, and miscellaneous mixed goods.

Exhibit II-21: Top Ten Rail-Hauled Commodities in the UK, 2014
Million tonne-kilometers

6. Latvia

Latvia and Lithuania (below) represent smaller European markets with a high share of freight traffic. They are included in these country profiles largely because they are similar in size and function. Both are Baltic port countries and their railway networks serve as extensions of the Russian Railway network to the Baltic Sea ports. However, Latvia uses two-person crews and

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39 Eurostat, Oliver Wyman analysis.
Lithuania uses one-person train crews. Both networks have a similar distribution of commodities handled and more than 60 percent of their rail traffic is freight (among the highest percentages in Europe). Both handle heavier trains than is the case in most European countries.

**Exhibit II-22: Latvia: Key Rail Statistics, 2014**

<table>
<thead>
<tr>
<th>Overall market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, US$ billions</td>
<td>$47</td>
</tr>
<tr>
<td>Standard locomotive crew size</td>
<td>2 people</td>
</tr>
<tr>
<td>Active rail operators</td>
<td>5</td>
</tr>
<tr>
<td>Network size (line-km)</td>
<td>1,860</td>
</tr>
<tr>
<td>Network intensity (train-km/line-km per day)</td>
<td>28.12</td>
</tr>
<tr>
<td>Share of total European rail activity (train-km)</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freight rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight rail operators</td>
<td>3</td>
</tr>
<tr>
<td>Hump yards (retarder and non-retarder)</td>
<td>9</td>
</tr>
<tr>
<td>Freight density: tonne-km per line-km</td>
<td>10.45M</td>
</tr>
<tr>
<td>Freight intensity: train-km per line-km per day</td>
<td>17.0</td>
</tr>
<tr>
<td>Avg. freight load per train (tonnes)</td>
<td>1,686</td>
</tr>
<tr>
<td>Freight share of network usage (train-km)</td>
<td>60%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passenger rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger rail operators</td>
<td>2</td>
</tr>
<tr>
<td>Pass. density: pass-km per line-km</td>
<td>0.35M</td>
</tr>
<tr>
<td>Pass. intensity: train-km per line-km per day</td>
<td>9.0</td>
</tr>
<tr>
<td>Pass. share of network usage (train-km)</td>
<td>40%</td>
</tr>
</tbody>
</table>

40 Eurostat, European Railway Agency, Independent Regulators’ Group, World Bank, Oliver Wyman analysis.
On the freight side, three rail operators compete for freight and share access to the rail network. Freight accounts for 60 percent of total train-kilometers. Latvia freight railroads move 305 million tonne-kilometers per year of intermodal traffic.

The top rail freight hauled commodities for Latvia are shown in Exhibit II-23. Latvia freight rail primarily hauls energy products, but also chemicals/plastics, agricultural and food products, and metals, among other goods.

Exhibit II-23: Top Ten Rail-Hauled Commodities in Latvia, 2014\(^{41}\)

7. Lithuania

As noted above, Lithuania also represents a smaller European market with a high share of freight traffic. The most notable difference between Latvia and Lithuania is the number of operators on the network and the use of one-person versus two-person train crews.

\(^{41}\) Eurostat, Oliver Wyman analysis.
Exhibit II-24: Lithuania: Key Rail Statistics, 2014

<table>
<thead>
<tr>
<th>Overall market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, US billions</td>
<td>$81</td>
</tr>
<tr>
<td>Standard locomotive crew size</td>
<td>1 person</td>
</tr>
<tr>
<td>Active rail operators</td>
<td>35</td>
</tr>
<tr>
<td>Network size (line-km)</td>
<td>1,767</td>
</tr>
<tr>
<td>Network intensity (train-km/line-km per day)</td>
<td>22.17</td>
</tr>
<tr>
<td>Share of total European rail activity (train-km)</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freight rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight rail operators</td>
<td>35</td>
</tr>
<tr>
<td>Hump yards equipped with retarders</td>
<td>0</td>
</tr>
<tr>
<td>Freight density: tonne-km per line-km</td>
<td>8.10M</td>
</tr>
<tr>
<td>Freight intensity: train-km per line-km per day</td>
<td>13.7</td>
</tr>
<tr>
<td>Avg. freight load per train (tonnes)</td>
<td>1,623</td>
</tr>
<tr>
<td>Freight share of network usage (train-km)</td>
<td>62%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passenger rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger rail operators</td>
<td>4</td>
</tr>
<tr>
<td>Pass. density: pass-km per line-km</td>
<td>0.21M</td>
</tr>
<tr>
<td>Pass. intensity: train-km per line-km per day</td>
<td>8.2</td>
</tr>
<tr>
<td>Pass. share of network usage (train-km)</td>
<td>38%</td>
</tr>
</tbody>
</table>

On the freight side, some 35 rail operators actively compete for freight and share access to the rail network. Freight accounts for 62 percent of train-kilometers on the network.

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The top rail freight hauled commodities for Lithuania are shown in Exhibit II-25. Lithuanian railroads haul a wide variety of commodities, including chemicals/plastics, coke/refined petroleum, metal and metal ores, and agricultural and food products.

Exhibit II-25: Top Ten Rail-Hauled Commodities in Lithuania, 2014
Million tonne-kilometers

E. Summary

As the overall data on the EEA-28 and the individual country profiles above show, Europe’s rail system is highly diversified. Mixed freight and passenger systems are made more complex by the large number of operators and diversity of traffic, including carload, unit train, and intermodal on the freight side. Far from being single origin-destination industrial railroads, Europe’s freight railroads haul a large mix of commodities, just as do US railroads, serving both domestic (in-country) and international (cross-border) origins-destinations.

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43 Eurostat, Oliver Wyman analysis.
“The European operating environment is more complex than it is in the United States, with far more train movements; many of them passenger trains traveling at fast speeds. Train sizes and therefore block lengths are shorter, and there are many more interlockings in the network, meaning there are many more signals per track-mile than in the United States. The safety systems do not anticipate a red signal; ATP [Automatic Train Protection44] does not apply the brakes until you pass the red signal, so it does not offer as much protection as many believe it does. A far greater level of attentiveness is required in Europe, and the margin of error is much smaller than in the United States.” – Dave Brown, COO, Genesee & Wyoming

The above quote comes from someone with in-depth experience in both international and US rail operations. As COO of Genesee and Wyoming, Mr. Brown oversees an organization comprising not only the largest US shortline railroad operator but extensive operations in Europe (the UK, the Netherlands, and Poland) and Australia. Mr. Brown has extensive experience with US Class I railroading as well, having been the Chief Transportation Officer and then Chief Operating Officer of CSX, and working in the Operating Department at Norfolk Southern before going to CSX.

High complexity and train density mean that train crews in Europe face as many – if not more – decisions and work events every day than do US train crews and do not experience task overload; in addition, the technology deployed is not significantly different than that used in the United States.

“One-person crews have been used safely in Europe for decades in freight and passenger operations. Keolis having experience in both the US and European passenger environments, we have found that the task workload faced by a driver in the European environment is as great, or greater than, that experienced in North America,

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44 ATP provides either a continuous or regular update of speed monitoring for each train (using trackside equipment) and causes the brakes to apply if the driver fails to bring the speed within the required profile.
As signal system block lengths are shorter and more oriented to passenger trains, and the amount of interlockings and double track are greater, leading to a greater number of signal aspects per kilometer than in the United States. Also, the number of train movements on the network is greater and therefore the number of communications activities with dispatchers and towers is greater than in the United States.

“The entire network must be operated with a far greater level of precision and attentiveness to keep train activities fluid. Yet, this activity level has been safely accommodated using one-person crews since the 1980s in France, for example. Safety is a major concern in Europe as there are far more passenger trains on the network than in the United States, and to that end the European network is constantly being upgraded with new technology to automate operations to reduce driver task loads and to reduce the chance of human error.” – Bruno Auger, Rail Director, Keolis

The above quote also comes from someone with in-depth experience in both international and US rail operations. Keolis operates passenger trains on both the Virginia Railway Express (VRE) and the Massachusetts Bay Transportation Authority (MBTA) in the United States, and in Europe has operations in London, UK (Thameslink, London Midlands, Southeastern); Dusseldorf, Germany (Eurobahn); and Deventer, Netherlands (Syntus network). Keolis is a subsidiary of SNCF, France’s incumbent railroad, which operates both freight and passenger trains in Europe.
III. European Rail Safety Analysis

The FRA states that “In the absence of the proposed rulemaking, more higher-risk one-person operations could be implemented and impose larger risk on other trains, railroad employees, or society as a whole.”45 The evidence Oliver Wyman has obtained, based on publicly available European safety data, refutes this assertion. Indeed, as discussed later in this section, Eastern European countries, with similar economic histories and operating environments, include rail systems with both one- and two-person crew operations, and so can be directly compared with regard to resulting safety data.

In the prior section, Oliver Wyman demonstrated that European rail operations are relevant along many dimensions to US rail operations. Yet operations with one-person train crews account for 94.1 percent of all train-kilometers in Europe and have overall safety metrics as good as, or better than, operations with two-person crews. And according to the European Railway Agency (ERA), there has been a positive long-term trend of declining rail accident risk within the EU, despite significant reductions in overall railroad staff and the expansion of single-person operations over the same period.46

Oliver Wyman analyzed accident data for the 28 countries of the European Economic Area to determine the relative safety of European one-person and two-person crews. In the European Union, single-person crew operation has two preconditions:47

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47 Regulation promulgated at the national level, but consistent across the EU.
The presence of a working dead-man control system on the locomotive. This system involves a pedal or button that must be periodically pressed, thereby signaling that the train engineer is active and alert. If the device is not pressed when required, the train will come to a stop.

The locomotive is equipped with working Automatic Train Control/Automatic Train Protection (ATC/ATP)\(^4^8\) where such systems are installed on the main track. That is, ATC/ATP enables dispatchers to remotely operate signals and switches to ensure trains do not make conflicting movements.

One-person crews have been broadly implemented in many European countries as motive power and signal technology have changed. The example of Germany is shown in Exhibit III-1.

Exhibit III-1: Timeline for Single-person Crew Implementation in Germany\(^4^9\)

\(^4^8\) ATP provides either a continuous or regular update of speed monitoring for each train (using trackside equipment) and causes the brakes to apply if the driver fails to bring the speed within the required profile. ATC is an integrated signaling system that guarantees the secure movement of trains. It integrates various subsystems positioned on-board and wayside, including ATP.

\(^4^9\) Oliver Wyman research.
Germany’s mainlines were electrified starting in 1949 and continuing through the 1980’s. Diesel locomotives replaced steam in non-electrified corridors during the 1950’s and 1960’s. As one-person crews in Germany were implemented, they were first restricted to trains which traveled at a maximum speed of 140 kmh. When automatic train protection (ATP) signaling systems (the US equivalent of automatic train stop or ATS) were widely implemented in the 1980’s, the maximum speed for one-person crewed trains was raised to 200 kmh as of 1991. In 1996, all trains were allowed to operate with one-person crews in the locomotive cab. While Germany is installing ERTMS on its network, it expects to achieve deployment of 60 percent (comparable to the level of PTC deployment in the US) only by 2050.

Implementation of single-person crews in Europe was done prior to the adoption of open access rules in 1994. Freight and passenger train operations were largely provided by state-owned railroads prior to liberalization. Employees were unionized, but as the government was also the railway owner, national policy superseded the perpetuation of unproductive work rules. In particular, implementation of one-person crews helped stem operating losses from intense modal competition in a more truck competitive market place characterized by shorter lengths of haul. Implementation of advanced train control technology has not been a prerequisite for the adoption of one-person crews. Indeed, despite the predominance of one-person crews, the EU has no plans to install advanced train control technology (ERTMS) on 75 percent of its network. (By comparison, the US will install positive train control on at least 60 percent of its network.)

The FRA lists the following tasks for conductors:

50 ATP provides either a continuous or regular update of speed monitoring for each train (using trackside equipment) and causes the brakes to apply if the driver fails to bring the speed within the required profile. ATS is a system that works in conjunction with onboard and wayside equipment to apply brakes at designated restrictions or on a dispatcher's signal, should the operator not respond properly.
1. Managing the train consist
2. Coordinating with the locomotive engineer for safe and efficient en route operation
3. Interacting with dispatchers, roadway workers, and others outside the cab
4. Managing paperwork
5. Dealing with exceptional situations (e.g., diagnosing and responding to mechanical problems or conditions in the operating environment)

In Europe tasks 1, 4, and 5 are handled by lineside personnel and Tasks 2 and 3 are handled by the engineer.51 Further, the FRA states that “Conductors are the link between engineers and the dispatchers” and “responsible for providing reminders to the locomotive engineer of speed restrictions and limits of authority and ensuring compliance.”52 In Europe, these responsibilities are typically handled exclusively by the train driver, and there is no chance for misunderstanding, miscommunication, or distraction due to a second supervisory person in the locomotive cab.

In addition, European rail lines are traditionally equipped with lineside signaling and interlocking facilities, some of which have recently been centralized into larger control centers, similar to North American CTC, while others remain locally controlled. In most countries, ATC/ATP systems have been installed for decades on portions of the main track that see regular train activity. The EU is in the process of further upgrading ATC/ATP to next-generation ETCS/ERTMS (see Appendix A), which is similar to North American positive train control (PTC) on about 25 percent of the network.

52 Ibid., pp. 31-32.
Temporary slow orders and other exceptional circumstances along the train run are typically communicated to train crews in written or electronic form before departure; their transmission via radio is possible, but confined to exceptional situations such as lineside signal failures.

Dark territory and operating regimes in which safety depends on (radio) communication and/or the equivalent of track warrants exchanged between the train crew and a dispatcher are typically low-density lines with limited traffic. Such lines (like the rest of the network) are typically operated with single-person crews; however, there are instances where the single-person crew receives support from ground personnel, when needed.

A. Safety Data Analyzed

Oliver Wyman analyzed data on accidents for 2006 through 2014 from the European Railway Agency for the 28 EEA countries. We also used a combination of interviews and Oliver Wyman expertise to determine the policy of each country regarding crew size, along with any exceptions to that policy. Trains operated in a country use the default crew size except in cases of extraordinary circumstances, such as failure of the “deadman” system or cab signaling system.53 This is an important fact that allowed us to assume that the default crew size applied to all accidents within a country, as individual accident data is not available.

Oliver Wyman analyzed total “significant accident” data as well as six subcategories (see Appendix B for definitions): collisions, derailments, level crossings, accidents to persons, fires on rolling stock, and other accidents. Suicides and attempted suicides were not analyzed. In addition, we analyzed employee fatalities on the railroads, economic impact of accidents, and

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53 The only exception to standard crew size is Croatia, which uses both one-person and two-person crews depending on the locomotive type and the safety system with which the locomotive is equipped (dead-man control and/or cab-signaling for example). Each locomotive contains instructions on crew size. For this reason, Croatia was treated as “crew size undetermined” since we could not infer the crew size for an accident. See Appendix C for additional information on data sources for crew size.
signals passed at danger (SPADs – which are often a precursor to accidents). The data was used “as is,” without any attempts to clean or modify it or impute missing values. Also, unless otherwise stated, when a result is said to be “statistically significant” or “not statistically significant,” this is based on a two-tailed T-test using a 95 percent level of confidence.54

B. Overall Significant Accident Rates

Overall, the majority of European countries have less than one significant accident per million train-kilometers in Western Europe, and between one and two significant accidents per million train-kilometers in Eastern Europe (Exhibit III-2). In general, countries operating two-person crews are located along the eastern edge of Europe, where accident rates are higher as well (Exhibit III-3).

Passenger traffic accounts for more than 50 percent of train-kilometers in all countries other than Lithuania and Latvia. With the exception of Greece, the top ten countries with the highest levels of passenger traffic (which generally indicates higher complexity and density), all have one-person crews and the lower levels of significant accidents.

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54 The t-tests were run in Microsoft Excel using either “t-Test: Paired Two Sample for Means” or “t-Test: Two-Sample Assuming Unequal Variances.” When there were a sufficient number of observations (>30) then the “z-Test: Two Sample for Means” was used. In all cases the hypothesized mean difference = 0, alpha = 0.05, and the two-tailed test was used since it was unknown if one-person crews or two-person crews would have the lower value.
Exhibit III-2: EEA-28: Crew Size and Significant Accidents

Per million train-km, 2014

Predominant crew size
- One-person crews: White border
- Two-person crews: Red border
- Crew size undetermined: Yellow border

55 European Railway Agency, “Common Safety Indicators data reported by National Safety Authorities,” Table 0, Field N10; Oliver Wyman analysis and interviews.
Exhibit III-3: Significant Accidents per Million Train-Kilometers, 2014
Sorted by Western and Eastern Europe, then by crew size and accident rate

Statistical analysis of data from the past nine years found that countries with one-person crews have maintained a lower overall rate of significant accidents (Exhibit III-4). This is not to say that one-person crews are the cause of lower accident rates – Western European countries have lower accident rates due to a variety of reasons, including investments in infrastructure and safety, operating practices, technology, etc. But clearly one-person crews are as safe, if not safer, than two-person crews in Europe, and overall one-person crews in Europe have an impressive safety record. And contrary to the FRA’s speculation, there is no evidence to show that a second person in the crew has any positive effect on safety.

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56 European Railway Agency, “Common Safety Indicators data reported by National Safety Authorities,” Table 0, Field N10; Oliver Wyman interviews and analysis.
C. Investment and Accident Rates

One factor impacting overall accident rates that is worth examining in detail is that Western European countries with typically lower accident rates spend more per track-kilometer than Eastern European countries on rail infrastructure (Exhibit III-5).

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57 European Railway Agency, “Common Safety Indicators data reported by National Safety Authorities”; Oliver Wyman analysis.
The exhibit above shows that there is a fairly strong correlation (.55) between the amount of infrastructure investment and the accident rate, and this relationship appears to account for much of the difference in safety rates between Eastern and Western Europe. It should be noted however that these infrastructure investments include not only safety-related investments (e.g., track maintenance, removal of level crossings, signal system upgrades), but also large infrastructure expansion projects, such as Switzerland’s recently opened Gotthard Base Tunnel and new high-speed passenger lines in Spain (which is why investment figures for those two countries were the highest in Europe during our study period).

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Where infrastructure spending is comparable, crew size appears to have no impact on accident rates (Exhibit III-6). This would indicate that investments in rail infrastructure integrity and in technology are the keys to a safer rail network, rather than how many crew members are present on a train. Similar to the mature economies of Western Europe, freight railroads in the United States have spent tens of billions of dollars in recent years on improving track quality and on improving safety, such as the installation of positive train control (PTC) systems.

Exhibit III-6: Significant Accidents Compared to Investment and Crew Size

Average 2006-2014, per million train-km

From 2006-2014, the average annual spending on rail infrastructure in Western Europe was €175,000/track km, while in Eastern Europe it was €33,500/track km

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59 OECD (2016), Infrastructure investment (indicator). doi: 10.1787/b06ce3ad-en (Accessed on 04 May 2016). European Railway Agency, “Common Safety Indicators data reported by National Safety Authorities,” Table 7, Field R03 and Table 0, Field N10. Oliver Wyman interviews and analysis. Croatia was considered Eastern Europe and Slovenia Western Europe in the averages for infrastructure spending.
D. Recent Crew Transition and Accident Rates

Italy provides an example of a country that made a recent transition from two-person to one-person crews, while maintaining the same level of safety. Italy began implementing one-person crew operations when new railway undertakings entered the market, in 2001. As shown in Exhibit III-7, accidents relative to train-kilometers in Italy have remained on-par with other major Western European railway systems operating one-person crews.

E. Eastern European Accident Rates

As Eastern Europe accounts for the majority of countries in Europe that still use two-person crews, Oliver Wyman carried out a further analysis of accident rates for one-person versus two-person crews just in Eastern European countries.

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1. Significant Accidents

As shown in Exhibit III-8, Eastern European countries with one-person crews are similar to Eastern European countries with two-person crews with regard to accident rates, network size and percentage of freight trains.

<table>
<thead>
<tr>
<th>Country</th>
<th>Crew size policy</th>
<th>Significant accidents/train-km (2014)</th>
<th>Freight share of total train-km</th>
<th>Route-km</th>
<th>Exceptions to default crew size policy (if known)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hungary</td>
<td>One</td>
<td>1.879</td>
<td>18%</td>
<td>7,706 km</td>
<td>Use two-person only if safety or vision problem. Est. 1-2% of trains</td>
<td>Ministry of Transportation established crew size policy</td>
</tr>
<tr>
<td>Lithuania</td>
<td>One</td>
<td>1.119</td>
<td>62%</td>
<td>1,767 km</td>
<td>No exceptions</td>
<td>Established in 2005 by the Safety Dept. of Lithuanian Railways with the Ministry of Transportation</td>
</tr>
<tr>
<td>Poland</td>
<td>One</td>
<td>1.467</td>
<td>35%</td>
<td>19,265 km</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slovakia</td>
<td>One</td>
<td>2.404</td>
<td>30%</td>
<td>3,627 km</td>
<td>No exceptions</td>
<td>Ministry of Transportation established policy of one-person crews provided locomotive has deadman horn and brake (&quot;vigilance control.&quot;).</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>Two</td>
<td>2.014</td>
<td>24%</td>
<td>3,897 km</td>
<td>Use one-person for double traction and shunting. Est. 10% of all trains.</td>
<td>August 8, 2006 Ministry of Transport regulation requires two-person crews</td>
</tr>
<tr>
<td>Estonia</td>
<td>Two</td>
<td>2.003</td>
<td>34%</td>
<td>918 km</td>
<td>No exceptions</td>
<td>All freight trains use two-person crews. Passenger uses one-person.</td>
</tr>
<tr>
<td>Greece</td>
<td>Two</td>
<td>2.001</td>
<td>8%</td>
<td>2,238 km</td>
<td>One-person only used in sorting yards.</td>
<td>OSE (Hellenic Railways Organization, the infrastructure authority) established policy of two-person crews</td>
</tr>
<tr>
<td>Latvia</td>
<td>Two</td>
<td>1.156</td>
<td>61%</td>
<td>1,860 km</td>
<td>No exceptions</td>
<td>Latvian Railways (infrastructure provider) established crew size policy</td>
</tr>
<tr>
<td>Romania</td>
<td>Two</td>
<td>2.045</td>
<td>26%</td>
<td>17,028 km</td>
<td>No exceptions</td>
<td>Minister of Transportation established the crew size.</td>
</tr>
</tbody>
</table>

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61 European Railway Agency, “Common Safety Indicators data reported by National Safety Authorities,” Oliver Wyman research and interviews.
Both one-person and two-person crew Eastern European countries saw a significant decline in accident rates from 2006 to 2010. Since then accident rates have continued to improve, but at a slower rate, as shown in Exhibit III-9. In neither case are accident rates as low as for one-person crews in Western European countries.

Exhibit III-9: All Significant Accidents, One-Person versus Two-Person Crews, 2006-2014

Breaking down these statistics further into specific types of accidents, there are no statistically significant differences in the accident rates for Eastern European countries operating one-person and two-person crews for collisions and derailments (Exhibit III-10), fires on rolling stock and other accidents (Exhibit III-11), and level crossing accidents and accidents to persons (Exhibit III-12). (See Appendix B for accident definitions.)

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62 Ibid.
Exhibit III-10: Collisions and Derailments by Year and Crew Size, 2006-2014

Collisions by year and crew size
Median accident rate per million train-kilometers

Derailments by year and crew size
Median accident rate per million train-kilometers

Exhibit III-11: Fires on Rolling Stock and “Other” Accidents by Year and Crew Size, 2006-2014

Fires on rolling stock by year and crew size
Median accident rate per million train-kilometers

Other accidents by year and crew size
Median accident rate per million train-kilometers

Note: Values used are median accident rate for the countries within the same crew size group for each year. Median was used to prevent any unusually high accidents rates in a single country from overly influencing the rate for the entire group. Source: European Railway Agency, “Common Safety Indicators data reported by National Safety Authorities”; Oliver Wyman analysis.

Ibid.
2. Employee Fatalities and Economic Impacts

Eastern Europe and Portugal had the highest rates of employee fatalities during 2006-2014. In Eastern Europe, the average employee fatalities per accident for two-person crews (0.017) is almost double the average for one-person crews (0.009), perhaps reflecting the greater exposure rate for two-person crews when an accident occurs (Exhibit III-13).

The FRA states that “In rare instances, having a second crew member aboard may result in an additional injury or fatality if a serious accident occurs.”\textsuperscript{66} Based on Oliver Wyman’s analysis of the data from Eastern Europe, where nine different countries use different train crew sizes, there are more employee fatalities per accident when two-person crews are employed. Thus it

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\textsuperscript{65} Ibid.

appears that increasing the exposure to the field operating environment actually does lead to more fatalities when there is a significant accident.

**Exhibit III-13: Railroad Employee Fatalities in Eastern Europe, 2006-2014**

Employee fatalities per significant accident vs. significant accidents per million train-km

The FRA also asserts that “A second crew member could be instrumental in limiting the damages and injuries after an accident takes place.” Oliver Wyman’s analysis of Eastern European data suggests there is no statistically significant difference in the total economic impact of an accident between one and two-person crew operations.

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67 European Railway Agency, “Common Safety Indicators data reported by National Safety Authorities,” Table 2, Field SK00 divided by Table 0, Field N00.

In Europe, the average economic impact of accidents relative to train-kilometers is lower for one-person crews (€616,416) than two-person crews (€1,309,487) (Exhibit III-14). This difference is statistically significant.\(^69\) When focusing only on Eastern Europe, countries operating one-person crews still have a lower economic impact relative to train-kilometers (€1,138,000) than countries with two-person crews (€1,417,813), however this difference is not statistically significant.

Exhibit III-14: Economic Impact per Significant Accident\(^70\)
€ thousands, for 28 countries averaged for 2006-2014

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\(^69\) Based on the “z-Test: Two Sample for Means” in Microsoft Excel using a 95 percent level of confidence (alpha = 0.05). The null hypothesis of zero difference between the means is rejected.

\(^70\) Note: Both zeros and blanks were treated as missing values since an economic impact of zero when there were significant accidents appeared to be incorrect. To account for economic differences between countries for the value of a serious injury, the economic impact per significant accident was normalized by using the “Fall Back Value of Preventing a Serious Injury.” This fall back value was averaged from 2006-2014 for each country and for all the countries. The average for each country was divided by the overall average to obtain an index used for normalizing the data. The economic impact per significant accident was divided by the index. Source: European Railway Agency, “Common Safety Indicators data reported by National Safety Authorities,” Fields C10, N00, R17, Oliver Wyman analysis.
3. **Signals Passed at Danger**

Signals passed at danger (SPADs), known as red block violations in the US, are widely considered to be a precursor to accidents by the European Railway Agency. Many of the ATP systems in use in Europe do not stop the train until after the red signal is passed, similar to ATS (Automatic Train Stop) systems in the United States. More advanced ERTMS systems, which are similar to Amtrak’s ACSES system and positive train control (PTC) systems being widely installed in the US can actually prevent SPADs.

SPADs are generally regarded as being precursors to accidents and would appear to be a solid indicator of task overload and loss of situational awareness. The FRA argues that “Studies show that one-person train operations can increase risks by overloading the sole crew member with tasks. Task overload can lead to a loss of situational awareness, and thus… could be a contributing factor in some accidents.”⁷¹

Oliver Wyman’s analysis indicates there is no statistically significant difference in the rates of SPADs in Eastern European countries, whether or not they use one-person or two-person crews (Exhibit III-15). The rate of signals passed at danger relative to train-km for one-person crews (1.0075) is essentially equal to the rate for two-person crews (1.0035).⁷² Furthermore, there is almost zero correlation between crew size and SPADs (-0.0009), indicating that crew size does not appear to influence SPADs.

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⁷² The null hypothesis of zero difference between the means is not rejected based on the “z-Test: Two Sample for Means” in Microsoft Excel using a 95 percent level of confidence (alpha = 0.05).
Despite the greater number of traffic control transactions that are a consequence of higher train density and a greater number of signals and interlockings on the European network, there is no evidence that one-person crews are “overloaded,” resulting in a higher rate of SPADs and therefore a higher rate of accidents.

F. Summary

In Western Europe, where the use of one-person crews is nearly universal, the accident rate is significantly lower than in Eastern Europe, where countries are varied in crew size. Rather than being a function of crew size, however, lower accident rates in Western Europe appear to be driven by the kind of investments that mature economies make in infrastructure and technology –

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73 European Railway Agency, “Common Safety Indicators data reported by National Safety Authorities,” Table 3, Field I14; Oliver Wyman analysis. No 2014 data for Spain.
the same kind of investments that US railroads have made and continue to make, to the tune of billions of dollars in capital spending each year.

By isolating Eastern Europe, where countries vary in their policy regarding crew size, it is possible to directly compare concurrent experience with one-person and two-person crews across a range of accident types. In the case of significant accidents, analysis yielded no evidence that two-person crews provide any safety advantages over one-person crews. The European data also shows that the economic impact of accidents is not alleviated by having a second person in the cab, while employee fatality rates commonly go up in the case of two-person crews. Nor did Oliver Wyman’s analysis find a higher level of signals passed at danger for one-person crews, despite the increased transactional workload on the European network.

Looking at readily available and current data on European accident rates, it is difficult to support the FRA’s assertions that two-person crews should be the presumptive standard for the United States, when one-person crews have become the presumptive standard on the far busier European network. Further, when we specifically compare the five remaining Eastern European two-person crew countries with the four one-person crew countries, we cannot conclude that two-person crews provide any greater level of safety than one-person crews. And it is Oliver Wyman’s expectation that within the next decade, all remaining countries in Europe using two-person crews will convert to one-person crews.
Appendix A. European Advanced Safety Technology\textsuperscript{74}

The European Union is in the process of implementing the European Railway Traffic Management System (ERTMS). When completed, it will cover approximately 56,000 kilometers of track – equivalent to 25 percent of the network. ERTMS will replace national ATP/ATC\textsuperscript{75} systems with a European-wide system of automatic train protection and control, further enhancing interoperability. Deployment is currently planned through 2030.

European railways deal with at least 20 different train command and control systems (and locomotives might be equipped with up to seven different navigational systems). This multitude of systems impedes the EU’s goal of interoperability and adds significant cost and complexity. For this reason, starting in the early 1990s, the European Commission (EC) seated working groups to define new communication and signaling standards. At the end of 1993, the EU Council issued an Interoperability Directive and a decision was taken to create a structure to define the Technical Specification for Interoperability.

At the beginning of the 4th Framework Programme, in 1995, the EC defined a global strategy for the further development of ERTMS, with the aim to prepare for its future implementation on the European rail network. This strategy included a validation phase to perform full scale tests on-site in different countries (France, Germany and Italy).

In the summer of 1998, UNISIG, comprising the European signaling companies, was formed to finalize the specifications. The specifications were subsequently reviewed to include additional functionalities and better meet the needs of the railway companies and infrastructure

\textsuperscript{74} UNIFE, European Commission, UIC.
\textsuperscript{75} ATP provides either a continuous or regular update of speed monitoring for each train (using trackside equipment) and causes the brakes to apply if the driver fails to bring the speed within the required profile. ATC is an integrated signaling system that guarantees the secure movement of trains. It integrates various subsystems positioned on-board and wayside, including ATP.
managers. The specifications currently in force are contained in the SRS 2.3.0d, which was adopted by the European Commission in April 2008. To ensure that ERTMS is constantly adapted to the railways’ needs, technical specifications are maintained under the lead of the European Railway Agency in cooperation with the signaling industry and railway stakeholders.

In parallel to this specification work, a joint effort from the EU and the Member States to finance ERTMS/ETCS has been implemented. Three successive Memorandums of Understanding were signed in 2005, 2008 and 2012 by the EC and the railway stakeholders to further deploy ERTMS on Europe’s rail network. “Priority” corridors were identified for ERTMS deployment, while specially crafted financial incentives were designed to support both infrastructure and onboard installation.

In July 2009, retrofitting of ERTMS was required for a number of listed lines, with deadlines ranging from 2015 to 2020, depending on line section. All new infrastructure projects (and significant upgrades) also must include ERTMS. ERTMS consists of two subs-systems:

- ETCS (European Train Control System), a standardized automatic train protection system that continuously ensures that the train does not exceed the safe speed and distance.

- GSM-R (Global System for Mobile Communications - Railways), a dedicated radio communication system for voice and data services supporting railway operations and communications.

The European Commission is currently focusing on the implementation of ERTMS on selected high-density corridors that cross multiple countries, with six of nine total corridors as the immediate focus through 2020 (Exhibit A-1). All EEA-28 countries are expected to implement ERTMS along the portions of these corridors that cross their countries.
To date, 21 countries have begun implementing ERTMS. Switzerland and Germany have each deployed ERTMS on more than 1,000 km of track (Exhibit A-2).
ERTMS has multiple “levels” of deployment. Level s 0-2 are operational, Level 3 is a planned future development.78

- ERTMS level 0 consists of ETCS-compliant locomotives or rolling stock that interact with lineside equipment that is non-ETCS compliant. Frequently equipped with ATP/ATC (Automatic Train Protection/Automatic Train Control) systems.

   European Level 0 is similar to current operations across much of North America. A handful of North American lines have Automatic Train Stop.79 This system is equivalent to

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77 “ERTMS Deployment Statistics,” UNIFE.
78 “ERTMS Fact Sheet,” UNIFE.
79 ATS is a system that works in conjunction with onboard and wayside equipment to apply brakes at designated restrictions or on a dispatcher’s signal, should the operator not respond properly.

Oliver Wyman
European automatic train control/automatic train protection (ATC/ATP) systems and stops trains which run past stop signals and which do not slow for restricting signals.

- ERTMS level 1 is designed as an add-on to or overlays a conventional line already equipped with lineside signals and train detectors. Communication between the tracks and the train is ensured by dedicated transponders (known as “Eurobalises”) located on the trackside adjacent to the lineside signals at required intervals, and connected to the train control center. It is an intermittent system, as the signaling system transmits data to the train through the fixed-position transponders.

Receiving the movement authority through Eurobalises, the ETCS onboard equipment automatically calculates the maximum speed of the train and the next braking point if needed, taking into account the train braking characteristics and the track description data. This information is displayed to the driver through a dedicated screen in the cabin. The speed of the train is continuously supervised by the ETCS onboard equipment. Thus, the train will automatically brake if exceeding the maximum speed allowed under the movement authority.

The US equivalent of Level 1 appears to be Amtrak’s ACSES, because of its reliance on fixed transponders. ACSES provides the ability to bring a train to a full stop before passing a red signal, slow trains through speed restricted areas, prevent incursions into work zones, and prevent train movement through a main line switch in the improper position.

- ERTMS level 2 does not require lineside signals. The movement authority is communicated directly from a Radio Block Centre (RBC) to the onboard unit using GSM-R. The balises are only used to transmit “fixed messages” such as location, gradient, speed limit, etc. A continuous stream of data informs the driver of line specific data and signals status on the
route ahead, allowing the train to reach its maximum or optimal speed but still maintaining a safe braking distance factor.

PTC functionality being developed by the US freight railroads (see below) appears to be similar to ERTMS/ETCS Level 2, due to the direct and continuous transmission of authorities, position, aspects of lineside signals, switch positions, etc. between back offices, trains, and wayside equipment. In the US case, lineside signals will still be used for the most part. PTC also will be largely an overlay system, using many of the same blocks, signals, etc., used in the pre-PTC days.

- ERTMS Level 3, still in its conceptual phase, introduces a “moving block” technology. Under ERTMS level 1 and 2, movement authorities are determined using “fixed blocks” - section of tracks between two fixed points which cannot be used by two trains at the same time. With ERTMS level 3, accurate and continuous position data is supplied to the control center directly by the train, rather than by track based detection equipment. As the train continuously monitors its own position, there is no need for “fixed blocks” – rather the train itself will be considered as a moving block. There are no plans to implement an equivalent to ERTMS Level 3 in the United States.

The Rail Safety Improvement Act (2008) requires each Class I railroad carrier and each entity providing regularly scheduled intercity or commuter rail passenger transportation to implement positive train control (PTC) on all segments or routes of mainline railroad tracks that (a) carry intercity passenger or commuter rail service, or (b) carry more than five million gross tons of freight per year and also are used for transporting poison-by-inhalation hazardous
materials (PIH) (more commonly known as TIH – toxic inhalation hazard).\textsuperscript{80} This mandate is expected to apply to about 60,000 miles of railroad track – or approximately 60 percent of the network.

As per federal law, PTC it is a “system designed to prevent train-to-train collisions, over speed derailments, incursions into established work zone limits, and the movement of a train through a switch left in the wrong position.”\textsuperscript{81} The government has not imposed technical specifications for PTC systems, but all PTC systems share similar characteristics, and most importantly, from a safety perspective, “if the locomotive is violating a speed restriction or movement authority, onboard equipment will automatically slow or stop the train.”\textsuperscript{82}

\textsuperscript{80} P.L. 110-432, §104.
\textsuperscript{81} US Code of Federal Regulations, Title 49, Section §236.
Appendix B. Safety Analysis Definitions and Reporting

1. Safety Analysis Definitions

The following definitions apply to the analysis of European safety statistics in Section III:

- **Accidents to persons caused by rolling stock in motion:** one or more persons that are either hit by a railway vehicle or by an object attached to or that has become detached from the vehicle. Persons that fall from railway vehicles are included, as well as persons that fall or are hit by loose objects when travelling on-board vehicles.

- **Collisions:** covers both collisions of trains and collisions with obstacles within the clearance gauge. Includes front to front, front to end or a side collision between a part of a train and a part of another train, as well as with shunting rolling stock or fixed or temporarily present objects on or near the track (except at level crossings if lost by crossing vehicle/user).

- **Derailments:** any case in which at least one wheel of a train leaves the rails.

- **Economic impact of accidents:** The sum of the value of preventing a casualty (the willingness to pay for reductions in individual risk of injury or death plus the medical and rehabilitation cost of the individual, legal costs, investigative costs, emergency services, insurance, indirect costs of lost individual economic utility, and the like), cost of environmental damage, cost of rolling stock damage, cost of infrastructure damage, and the value of time (economic costs incurred by users of railway services).

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Employee fatalities: the immediate death (or death within 30 days) of any person whose employment is in connection with a railway and is at work at the time of the accident. This includes the crew of the train, persons handling rolling stock and infrastructure installations, and contractors. Employee suicides are not included.

Fires on rolling stock: fires and explosions that occur in railway vehicles (including their load) when they are running between the departure station and the destination, including when stopped at the departure station, the destination or intermediate stops, as well as during re-marshalling operations.

Level crossings: accidents at level crossings involving at least one railway vehicle and one or more crossing vehicles, other crossing users such as pedestrians or other objects temporarily present on or near the track if lost by a crossing vehicle/user.

Other accidents: all accidents other than train collisions, train derailments, at level crossing, to persons caused by rolling stock in motion, and fires in rolling stock.

Signals passed at danger: any time that a train, or part of a train, proceeds beyond its authority.

Significant accident: any accident involving at least one rail vehicle in motion, resulting in at least one killed or seriously injured person, or in significant damage to stock, track, other installations or environment, or extensive disruptions to traffic. Accidents in workshops, warehouses, and depots are excluded. Significant damage is damage that is equivalent to 150,000 euros or more.
2. Availability and Reporting Requirements

Data covering many different aspects of railroad incidents, accidents, and casualties is generated by railroads and tracked by rail regulatory authorities. Reporting categories for equipment and infrastructure incidents and accidents include collisions, derailments, fires, explosions, acts of god, and other events involving mechanical or infrastructure failure or human error that result in damage. Reporting categories for casualties include injuries resulting in medical treatment, loss of consciousness, time away from work, restricted work, job transfer, and death.

The FRA and ERA both collect incident data from the railroads and store the information in electronic databases that are available to the general public. Data collection is ongoing, and thus data is both current and supported by many years of history. Additionally, the incident, accident, and casualty reports provided by the railroads are required by federal law, and must therefore contain information that is accurate and complete to the highest degree possible.

- Under federal law, US railroads are required to report all fatalities, grade crossing collisions, grade crossing signal equipment failures, and rail traffic signal equipment failures to the FRA. In addition, railroads must report rail equipment incidents and personal injuries to the FRA subject to certain financial and medical treatment thresholds, respectively. Publicly available data is grouped into the following categories: rail equipment accidents, railroad casualties, highway-rail accidents, and signal equipment failures. The FRA also collects operational data from the various railroad companies concerning train-miles and employee hours to provide a basis of comparison for safety data.

In the European Union, member state railroad regulatory agencies are required to report safety-related incidents meeting certain specified thresholds to the ERA. Publically available data is grouped into the following categories: rail equipment accidents, railroad casualties, grade-crossing accidents, and signals passed at danger (SPADs). Like the FRA, the ERA also collects operational data for the purpose of providing a consistent basis for comparison of safety statistics.

For the purposes of comparison of FRA and ERA data, it should be noted that each organization has its own mandates detailing which data is to be collected and at what level of detail. These differences are largely due the agencies’ different purposes in collecting data:

- The FRA uses the data it collects to develop hazard elimination and risk reduction programs for the railroad industry that focus on preventing railroad injuries and accidents. To develop effective safety programs, the FRA must collect data concerning not only the “who, what, and where” of an incident, but also the “how and why.” Thus, the safety data collected by the FRA includes all of the basic information concerning an incident, as well as information on the underlying causes and circumstances.

- The ERA collects statistics based on agency-defined common safety indicators (CSIs) “to facilitate the assessment of the achievement of [common safety targets] and to provide for the monitoring of the general development of railroad safety.” CSIs are not expected to provide the same level of detail as the safety databases of individual railroads and infrastructure.

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85 According to the ERA, SPADs occur when any part of a train proceeds beyond its authorized movement.
management companies, which are tailored to specific company needs. Consequently, the available public data provides for limited analysis of underlying incident causes and circumstances.

Exhibit B-1 contains a summary of key differences between the FRA and ERA data.

### Exhibit B-1: Differences in FRA and ERA Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Item</th>
<th>FRA</th>
<th>ERA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment incidents</td>
<td>Minimum cost threshold for reporting</td>
<td>$10,500</td>
<td>€150,000</td>
</tr>
<tr>
<td>Serious injuries</td>
<td>Hospitalization</td>
<td>Hospital stays not reported</td>
<td>Only reported if there is a 24-hour minimum hospital stay</td>
</tr>
<tr>
<td>Fatalities</td>
<td>Length of time after accident</td>
<td>Any fatality occurring within 180 days of the accident is recorded</td>
<td>Any fatality occurring within 30 days of the accident is recorded</td>
</tr>
</tbody>
</table>

It should be noted that only certain data will be relevant to evaluating the effect of road train crew size on railroad safety; specifically, this includes data on incidents where the crew has some control, and where the presence of multiple persons versus one person in the cab could *arguably* make a difference in the outcome of the incident. Such incidents potentially could include equipment incidents (train derailments, collisions, fires, etc.) and casualties (injuries and fatalities).

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Appendix C. Data Sources

The safety data for the analyses contained in this report was obtained from the European Railway Agency’s European Railway Accident Information Links web page at https://erail.era.europa.eu/safety-indicators.aspx, and downloaded as an Excel spreadsheet (highlighted in red below).

This Excel spreadsheet contained data on a variety of safety statistics for 2006 through 2014 for 28 European countries and the Channel Tunnel. Additionally, the European Railway Agency’s 2014 Railway Safety Performance in the European Union report is available to download on the right hand side of the web page.

The data for infrastructure investment was obtained from the Organization for Economic Co-operation and Development (OECD) web page at https://data.oecd.org/transport/infrastructure-
investment.htm. Using the filter at the bottom of this web page, rail infrastructure investment was selected.

Finally, the information on crew size was based on Oliver Wyman knowledge, supplemented with a survey of 12 countries that were unknown:

- The survey identified two-person crews in Bulgaria, Greece, Latvia, Portugal and Romania. One-person crews were identified in the Czech Republic, Hungary, Lithuania, and Slovakia.
- Estonia uses two-person crews for freight trains and one-person crews for passenger trains, thus Estonia was classified as using two-person crews. Note that one person in the cab and other crew members aboard the train on passenger trains is consistent with US practices.89
- In Croatia the crew size varies with the type of locomotive and installed safety equipment, such as dead man controls and cab signaling, so crew size was listed as “undetermined.” We were unable to identify the crew size in Slovenia and so listed it as “undetermined” as well.

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89 As noted previously, a “one-person crew” means one person in the cab of the locomotive, without regard to whether, in the case of passenger service, there is an additional rail employee in the passenger section of the train (i.e., a conductor). Note that in Germany and possibly other countries, some passenger trains are operated with no additional rail employees in the passenger consist.
BEFORE THE KANSAS DEPARTMENT OF TRANSPORTATION

K.A.R. 36-43-1. CREW REQUIREMENTS

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

EXHIBIT 3

Oliver Wyman, Crew-Related Safety and Characteristic Comparison of European and US Railways (April 5, 2021)
Crew-Related Safety and Characteristic Comparison of European and US Railways

By:

OLIVER WYMAN
1166 Avenue of the Americas
New York, NY 10036

April 5, 2021
Contents

I. Executive Summary .................................................................................................................. 3

II. Comparison of US and European Railroads ........................................................................ 7
   A. Network Overview ............................................................................................................. 11
   B. Freight Characteristics ..................................................................................................... 13
   C. Operating Complexity ...................................................................................................... 16
   D. Country Profiles .............................................................................................................. 20
   E. Summary .......................................................................................................................... 35

III. US and European Rail Safety Analysis ............................................................................ 38
   A. Single-Person Crew Operations in Europe ..................................................................... 38
   B. Safety Data Used in the Analysis .................................................................................... 41
   C. Overall Rates of Significant Accidents ......................................................................... 46
   D. Investment and Accident Rates ...................................................................................... 50
   E. Analysis of Accident Rates By Category ....................................................................... 53
   F. Summary .......................................................................................................................... 66

Appendix A. European Advanced Safety Technology ............................................................... 68
Appendix B. Safety Analysis Definitions and Reporting ............................................................ 75
Appendix C. Data Sources ........................................................................................................ 81
Appendix D. T-Test Numerical Results ................................................................................... 83
I. Executive Summary

Although US rail freight trains continue to be operated primarily with two-person in-cab locomotive crews, other large, complex, and modern rail systems have a long history of safely operating trains with one-person in-cab crews. To evaluate the relative safety of two-person versus one-person crews, Oliver Wyman reviewed 2006-2019 accident reporting data for 28 railroads in Europe (the European Economic Area or EEA) and for the US Class I’s. More than 95 percent of European rail traffic (in train-kilometers) is moved by one-person crews. We found no evidence that railroads operating with two-person crews are statistically safer than railroads operating with one-person crews. Furthermore, an analysis of this data broken into multiple accident categories found no significant differences in safety statistics based on crew size.

The interconnected standard gauge European network serves an economy approximately as large as the United States in terms of GDP. The European rail network is larger in terms of route-kilometers, train-kilometers, and train density. The European rail network also has a greater percentage of passenger trains, which are intermixed with and operate at higher speeds than freight trains, and multiple freight and passenger operators share infrastructure, making for a more operationally complex network. Rail freight traffic in Europe has a level of diversity similar to that of US rail freight, including mix of commodities, mix of dangerous and non-dangerous goods, and mix of train types.

Many railroads in Western Europe have operated with one-person crews since the end of World War II. As the railroads were rebuilt and electrified, countries implemented one-person crews to alleviate manpower shortages, take advantage of electric and diesel locomotive

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1 Throughout this report, “one-person crew” and “two-person crew” refers to the number of persons in the locomotive cab exclusively.
technology (no longer requiring a fireman), and to compete more economically in a truck-
competitive marketplace. Implementation of advanced train control technology has not been a
prerequisite for the adoption of one-person crews in Europe. Indeed, despite the predominance of
one-person crews, current plans call for installing advanced train control technology (the
European Railway Traffic Management System or ERTMS) on only 22 percent of the network.
By comparison, the US has installed positive train control (PTC) on 62 percent of Class I route-
miles; PTC is equivalent to the most advanced form of ERTMS currently available (see
Appendix A for more detail). A key difference between ERTMS and PTC is the motivation for
developing and implementing each system. ERTMS was motivated by interoperability, as a train
crossing European country borders may have to be equipped with up to seven different
navigational systems and could face more than 20 different types of train control systems.² PTC
was motivated by safety concerns and was “designed to prevent train-to-train collisions, over
speed derailments, incursions into established work zone limits, and the movement of a train
through a switch left in the wrong position.”³

European freight trains are shorter than those operated in the United States, in large part
because of the high density of trains operated in Europe and the desire to keep block sizes
shorter, so as to better accommodate close spacing of freight and passenger trains and provide
greater network fluidity. However, shorter block sizes and a greater number of interlockings
mean that there are many more signals per route-kilometer, and Europe’s higher train density
means more traffic control transactions (signal indications and dispatcher communications) as
well. Thus, in most European countries, a higher workload is handled safely and efficiently by a

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³ US Code of Federal Regulations, Title 49, Section §236.
single person in an environment that often has less room for error – compared to a US environment (outside of urban hubs) of larger but slower freight trains and limited passenger traffic.

As shown in Exhibit I-1, Oliver Wyman grouped European railroads into categories based on region and crew size and compared them to one another and to US Class I railroads, to determine if there were differences in safety performance and whether those differences were related to crew size.

Exhibit I-1: All Significant Accidents, 2006-2019

Per million train-km

In total, 20 European countries use one-person crews and six use two-person crews (crew size could not be determined for two countries). Oliver Wyman also compared Western and Eastern Europe, to see if accident data aligns more closely with differences in infrastructure investment and operating characteristics. (Western Europe has much higher passenger train

4 “Common Safety Indicators data reported by National Safety Authorities” European Railway Agency (ERA); “Accident/Incident Report” US Federal Railroad Administration (FRA); Oliver Wyman analysis.
density and thus higher investment in infrastructure, while Eastern European railroads tend to run somewhat longer trains, carry relatively more freight, and have lower infrastructure investment.)

For all significant accidents, Western European one-person crews have shown the best safety record, while Eastern European railroads have seen improvement over time, regardless of crew size, and the US accident rate is fairly stable. Two-person crews do not appear to be safer than one-person crews according to this metric.

Furthermore, in looking at specific categories of accidents, Oliver Wyman did not find that crew size played a significant role in the number of collisions, derailments, accidents at grade crossings, accidents to persons, or employee fatalities. Having a second crew member also did not reduce economic damages for significant accidents. Finally, we found no evidence of higher rates of signals passed at danger for one-person crews, thus dispelling claims that one-person crews are “overloaded” with tasks.

In sum, most European rail operations use single-person crews, even though Europe has higher train density, more passenger trains sharing the network with freight trains, and more control transactions per route-kilometer. But European one-person crew operations appear to suffer no reduction in crew-related safety, despite a high level of activity and a busy environment.
II. Comparison of US and European Railroads

The use of single-person crews is widespread internationally, for both freight and passenger trains, on large, dense, and complex rail networks. In some cases, one-person crews have been in use since the end of World War II. In others, the use of one-person crews has come about due to innovation and automation, both in-cab and on-network. In 2018, for example, 95.3 percent of all European rail traffic (train-km) was moved by one-person crews, including the 13 largest railways, which accounted for 90 percent of network activity (Exhibit II-1). ⁵

Exhibit II-1: European Rail Network Activity by Crew Size ⁶

<table>
<thead>
<tr>
<th>Country</th>
<th>One-Person Crews</th>
<th>Two-Person Crews</th>
<th>Crew Size Undetermined</th>
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<tbody>
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<td>Lithuania</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Latvia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luxembourg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estonia</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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⁵ Throughout this document, a “one-person crew” means one person in the cab of the locomotive, without regard to whether, in the case of passenger service, there is an additional rail employee in the passenger section of the train (i.e., a conductor). “Two-person crew” means that two people are present in the locomotive cab.

⁶ Information on crew size is based on Oliver Wyman’s direct knowledge of rail operators, interviews, and public data. Train-km from EU Transport in Figures 2020 (2018 data), Oliver Wyman analysis. Note: Estonia’s legacy incumbent rail operator has since changed to one-person crews (November 2019), but this does not impact the data used in this study.
To understand how Europe compares to the United States in terms of rail operations and safety performance relative to crew size, Oliver Wyman originally conducted an in-depth review of the overall European rail network and the individual national networks of 28 European countries in 2016. In this 2021 report, we have again reviewed the latest available data on the European rail network and have updated our analysis to reflect this new information, along with incorporating US safety data available through the Federal Railroad Administration (FRA).

Because rail services in Europe freely operate across borders, a proper analysis requires consideration of rail operations within the entire European Economic Area (EEA), and on this basis, the EEA is comparable to the US rail network in terms of network size. European railroads on the networks of the 28 EEA countries (Exhibit II-2) operate both within their national territories and internationally (cross-border). The latter can involve changes in safety systems, electrification, and operating rules, and requires the use of complex interoperable equipment and multiple train control systems.

---

7 The European Economic Area (EEA) includes 26 European Union Member States with railroads, plus two European Free Trade Association (EFTA) Member States, Norway and Switzerland, that have railroads. The European Railway Agency and Eurostat compile rail statistics for the EU and the EFTA states. Thus, “Europe” and “EEA” as used in this report refer to all 28 countries for which rail data has been compiled and analyzed. (Data for the United Kingdom is included, as it did not leave the EU until 2021).
Rail operations in Europe have been “liberalized” since the mid-1990’s. This means that train operations have been decoupled from infrastructure ownership and control, and any qualified “rail undertaking” may now operate freight or passenger services on the network. This has led to the creation of a European rail industry with a level of diversity similar to that of the US rail industry.

In about three-quarters of European countries, the majority of traffic is still handled by large freight rail operators that are equivalent to Class I and Class II US railroads – the legacy or incumbent carriers that were once national railroads (Exhibit II-3). Similar to US freight railroads, these operations provide intermodal, unit train, and carload manifest services for an extensive array of commodities (including hazardous materials) and serve a wide range of origins and destinations over varying distances.
In addition, open access has led to the creation of dozens of smaller “new entrant” operators, somewhat similar to US Class III shortlines. Some provide point-to-point unit train services, while others compete in offering carload and intermodal alongside the legacy carriers. The key difference is that while US shortlines typically run on low-density, low-speed lines, small operators in Europe run on the same mainline corridors and at the same speeds as large freight rail operators and alongside high-frequency passenger train services. (Maximum running speeds for freight – no matter the size of the operator – can reach 90 to 120 kmh, equivalent to 56 to 75 mph.)

As a result, train operations are frequently higher density than is the case for much of the

---

8 EU Transport in Figures 2020 (2018 data). As a percentage of tonne-km, in some cases as a percentage of train-km (depending on available data). A railway undertaking in the EU is a licensed public or private transport operator which provides services for the transport of goods and/or passengers by rail.

9 “High-speed rail freight: Sub-report in efficient train systems for freight transport,” Gerhard Troche, Centre for Research and Education in Railway Engineering at the Royal Institute of Technology Stockholm (Railway Group KTH), 2005, p. 11.
US rail network. On a per-kilometer basis, European rail networks also are more complex, with a greater number of junctions, interlockings, turnouts, and train movements.

All of these factors combine to create an agenda of operating work events and decision points for European train crews greater than those typically facing train crews in the United States. In addition, safety issues have the potential to impact more people across a wider geographic area in Europe, due to the close proximity of freight and high-density passenger services on the rail network.

**A. Network Overview**

As shown in Exhibit II-4, the interlinked EEA-28 rail network serves a market that in total generates a GDP about equivalent to that of the United States. Operators on the standard gauge portion of the network have slightly shorter lengths of haul (freight train-km) and train sizes are shorter, but the overall network as a whole has much higher density (in train-km), due to large numbers of passenger trains.

### Exhibit II-4: Overview of European and US Rail Networks

<table>
<thead>
<tr>
<th></th>
<th>Total Europe (EEA-28)</th>
<th>Total US</th>
<th>US Class I</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019 GDP, US$ billions</td>
<td>19,590</td>
<td>21,433</td>
<td>NA</td>
</tr>
<tr>
<td>Route-km</td>
<td>225,616</td>
<td>218,991</td>
<td>148,513</td>
</tr>
<tr>
<td>Total train-km, millions</td>
<td>4,486</td>
<td>967.6</td>
<td>789.7</td>
</tr>
<tr>
<td>Total daily train density (train-km/route-km)</td>
<td>54.5 (10.4 freight)</td>
<td>12.1</td>
<td>14.6</td>
</tr>
</tbody>
</table>

In addition, total train density across most of the individual rail networks of the EEA-28 is higher on a daily basis than on the US Class I rail network (Exhibit II-5). Freight density is

---

comparable for some countries, but the majority of US rail freight does not run on mixed lines with high-frequency passenger services, unlike in Europe. Train density is a more important metric than train size in relation to safety considerations, since what is in front of the train (e.g., signals, objects on track, presence of other trains) dictates the train crew’s safety decisions far more than what is behind the cab. Other trains, on-track equipment (maintenance-of-way equipment, hi-rail vehicles, etc.), highway-rail grade crossing users, weather, and other operational factors are all constantly changing the environment ahead of the train. The train crew must focus on these other actors, their movements, and the signaling equipment protecting their movements to ensure that the train safely negotiates an ever-changing operational landscape.

What matters behind the train crew, from a safety standpoint, is the operational integrity of the train. In the US environment, the train crew generally cannot directly observe more than the first 40 cars, which is about the average length of European freight trains. Beyond that distance, the train crew relies on wayside equipment detectors, telemetry from end-of-train devices and distributed power locomotives, in-cab brake pipe pressure gauges, and train handling characteristics (such as sudden changes in train speed, higher throttle settings needed to maintain speed, changes in ride quality, etc.) to monitor train integrity.
B. Freight Characteristics

In addition to the many passenger trains that run on the European network (which include commuter, regional, intercity, and high speed), freight trains carry a wide variety of cargo, including dangerous goods. Freight trains operated include local, general merchandise, and unit trains. Further, similar to US railroads, many large rail networks carry a substantial share of intermodal traffic, as shown in Exhibit II-6.

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11Ibid.
Evidence of the carload network in Europe is provided by a large number of retarder-equipped hump yards on the European network. These facilities are not needed for handling unit train operations. Reported carload data (tonne-km) is limited, but a number of countries report carload traffic to be a quarter or more of total traffic, including Germany, the largest rail freight market in Europe (Exhibit II-7).

---

12 Eurostat, 2019 data. Four EEA-28 countries do not report this data. Includes containers and swap bodies.
Many of the freight trains operating over the European railway network carry dangerous goods (hazardous materials), which make up a sizable portion of the freight handled. Whereas dangerous goods traffic comprises approximately six percent of all freight handled in the United States, it comprises 15 percent of total freight tonne-km in Europe.\textsuperscript{14} In Europe (as in the US), rail is considered the safer mode of transport, and shipment of dangerous goods by rail is often preferred over truck shipment of these goods. One reason is that rail has fewer accidents than trucking. In the US, for example, rail accounted for 1.9 percent and highway for 90.4 percent of reportable hazardous materials incidents in 2019.\textsuperscript{15} And on most European networks, these dangerous goods are handled by one-person train crews.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Exhibit-II-7-Carload-Share-of-Total-Freight-Traffic.png}
\caption{Carload Share of Total Freight Traffic\textsuperscript{13}}
\end{figure}

\textsuperscript{13} Eurostat, 2019 data, all countries reporting this data.
In addition, the amount of dangerous goods carried is particularly high in some European countries (Exhibit II-8). Thus, in some areas of the European railway network, the potential for an incident involving dangerous goods can be high.

**Exhibit II-8: Dangerous Goods Share of Total Freight Traffic**

Dangerous goods tonne-km/total tonne-km

<table>
<thead>
<tr>
<th>Country</th>
<th>Dangerous Goods Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>10</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>6</td>
</tr>
<tr>
<td>Croatia</td>
<td>6</td>
</tr>
<tr>
<td>Czechia</td>
<td>6</td>
</tr>
<tr>
<td>Denmark</td>
<td>6</td>
</tr>
<tr>
<td>Estonia</td>
<td>11</td>
</tr>
<tr>
<td>Finland</td>
<td>6</td>
</tr>
<tr>
<td>France</td>
<td>4</td>
</tr>
<tr>
<td>Germany</td>
<td>3</td>
</tr>
<tr>
<td>Greece</td>
<td>1</td>
</tr>
<tr>
<td>Hungary</td>
<td>16</td>
</tr>
<tr>
<td>Ireland</td>
<td>1</td>
</tr>
<tr>
<td>Italy</td>
<td>1</td>
</tr>
<tr>
<td>Latvia</td>
<td>6</td>
</tr>
<tr>
<td>Lithuania</td>
<td>6</td>
</tr>
<tr>
<td>Netherlands</td>
<td>6</td>
</tr>
<tr>
<td>Norway</td>
<td>6</td>
</tr>
<tr>
<td>Poland</td>
<td>6</td>
</tr>
<tr>
<td>Portugal</td>
<td>6</td>
</tr>
<tr>
<td>Romania</td>
<td>6</td>
</tr>
<tr>
<td>Slovakia</td>
<td>6</td>
</tr>
<tr>
<td>Slovenia</td>
<td>6</td>
</tr>
<tr>
<td>Spain</td>
<td>6</td>
</tr>
<tr>
<td>Sweden</td>
<td>6</td>
</tr>
<tr>
<td>Switzerland</td>
<td>6</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>6</td>
</tr>
</tbody>
</table>

**C. Operating Complexity**

European freight trains do tend to be shorter than those operated in the United States, in large part because of high train density and the desire to keep block sizes shorter – so as to better accommodate close spacing of freight and passenger trains and to provide greater network fluidity for passenger trains. But the shorter average length of European freight trains actually creates significantly more operating complexity. Shorter block sizes and more interlockings, due to more double track and the density of trackage, create far more signals per route-kilometer.

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16 Eurostat, 2019 data, Oliver Wyman analysis.
And higher train density than in the United States means that European rail operations require far more traffic control transactions (signal indications and dispatcher communications).

The European rail operating environment also is more challenging in that a much larger number of operators run on most networks, compared to the US operating environment. In the US, most railroads are shortlines serving small, independent territories and feeding a few large Class I’s that run on their own private tracks (with only limited access rights for other operators). In Europe, freight rail operators can operate virtually anywhere on the network by obtaining certification as a “railway undertaking” and then applying to the relevant infrastructure manager for each country network to obtain train slots. Total active freight and passenger rail operators for countries reporting data are shown in Exhibit II-9.

Exhibit II-9: Active European Rail Operators

In addition, the European rail network handles higher numbers and types of trains on a daily basis:

- Europe has several times the daily train activity of North America, primarily due to much higher passenger train activity across the network.

- Shorter trains allow for shorter blocks, which then require more signals per track-km (Exhibit II-10), which increases the number of control communications required for each minute of operation.

- Because passenger trains account for the largest share of network activity, average train speeds are faster than in the United States – and freight trains operate at higher average speeds as well.

### Exhibit II-10: Average Signal Spacing

In kilometers

<table>
<thead>
<tr>
<th>Country</th>
<th>Average Signal Spacing (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>4.0</td>
</tr>
<tr>
<td>NL</td>
<td>1.5</td>
</tr>
<tr>
<td>DK</td>
<td>1.2</td>
</tr>
<tr>
<td>UK</td>
<td>1.2</td>
</tr>
<tr>
<td>DE</td>
<td>1.0</td>
</tr>
<tr>
<td>SE</td>
<td>1.0</td>
</tr>
</tbody>
</table>

---

18 World Bank; European Railway Agency; European Commission (Eurostat); Eighth Annual Market Monitoring Report, Independent Regulators’ Group; Analysis of Class I Railroads, Association of American Railroads; Operational Data Tables, FRA; Oliver Wyman analysis.

A significant percentage of rail traffic in Europe also moves “internationally,” i.e., cross-border between countries, which can require negotiating multiple signaling and traffic control systems, complying with different national operating rules programs, as well as changes to running gear to accommodate different track gauges (Exhibit II-11). Indeed, international traffic makes up 40 percent or more of tonne-km for about half of the countries in the EEA-28 rail network.

**Exhibit II-11: International Share of Total Freight Traffic**

International tonne-km/total tonne-km

Faster train speeds, shorter blocks, and more train activity mean that European freight train crews experience more challenges to safe operation, in terms of events per train-km, compared to US freight train crews. In addition, because trains are scheduled by slot on a mixed passenger-freight system, railway operators pay penalties for delays, putting additional pressure on crews to

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20 Eurostat, 2019 data. International includes cross-border and transit.
maintain schedules. Greater operating complexity thus requires a European train driver to process more activity than would be the case in the US (e.g., signals to be interpreted, junctions/crossings, dispatcher interactions).

D. Country Profiles

Oliver Wyman developed more detailed profiles of seven European countries to further demonstrate how these systems compare to the US in terms of variety and complexity of operations. Five are among the largest rail markets in Europe: Germany, France, Italy, United Kingdom, and Poland. In addition, two similarly sized Eastern European railroads, one with one-person crews (Lithuania) and one with two-person crews (Latvia), are profiled.

Freight rail operators in these countries haul a wide variety of commodities, serve a range of origins and destinations – including domestic, ports, and cross-border; and offer carload, unit train, and intermodal services. Furthermore, they face daily the increased complexity of operating freight on dense networks with high volumes of passenger trains and multiple above-rail operators.

1. Germany

Germany is the largest country in Europe on a GDP basis and has one of the largest and densest rail networks in Western Europe. It is also the largest freight and passenger market in the EEA-28 in terms of tonne-km/passenger-km (Exhibit II-12). With the exception of two dedicated high-speed passenger lines, the entire network runs mixed freight and passenger traffic. On some of the more heavily traveled double-track lines, train volume can exceed 400 trains per day. On a
daily basis, the German rail network carries nearly one million tonnes of freight and over eight million passengers.\textsuperscript{21}

There are no limitations in Germany on freight train size, train weight, or carriage of hazardous materials when trains are operated by single-person crews. Germany has the busiest rail network in Europe, with more than 300 active above-rail operators.

\textbf{Exhibit II-12: Germany: Key Rail Statistics}\textsuperscript{22}

<table>
<thead>
<tr>
<th>Overall market</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, PPP international $</td>
</tr>
<tr>
<td>Standard locomotive crew size</td>
</tr>
<tr>
<td>Active rail operators</td>
</tr>
<tr>
<td>Network size (line-km)</td>
</tr>
<tr>
<td>Network intensity (train-km/line-km per day)</td>
</tr>
<tr>
<td>Share of total European rail activity (train-km)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freight rail market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-incumbent (multi-operator) market share</td>
</tr>
<tr>
<td>Freight density: tonne-km per line-km</td>
</tr>
<tr>
<td>Freight intensity: train-km per line-km per day</td>
</tr>
<tr>
<td>Avg. freight load per train (tonnes)</td>
</tr>
<tr>
<td>Freight share of network usage (train-km)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passenger rail market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-incumbent (multi-operator) market share</td>
</tr>
<tr>
<td>Pass. density: pass-km per line-km</td>
</tr>
<tr>
<td>Pass. intensity: train-km per line-km per day</td>
</tr>
<tr>
<td>Pass. share of network usage (train-km)</td>
</tr>
</tbody>
</table>

\textsuperscript{21} Eurostat.  
On the freight side, 176 non-incumbent rail operators account for about half of market share. Similar to the US, the German freight market is diverse in types of traffic hauled. On a tonne-km basis, approximately 26 percent is intermodal and 23 percent is carload. Hazardous materials make up 19 percent and cross-border (international traffic) 38 percent.

The top rail-hauled freight commodities for Germany are shown in Exhibit II-13. As in the United States, German railroads haul chemicals, plastics, metal ores and products, energy products, and a wide range of other goods.

**Exhibit II-13: Top Rail-Hauled Commodities in Germany**

Single-person crews were introduced in Germany with the abolishment of steam traction in the 1950s and 1960s, and the second in-cab crew position was completely eliminated by 1996 (see Exhibit II-14).

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23 Railway Market Analysis, Germany 2019, Bundesnetzagentur.
24 Eurostat 2019 data, Oliver Wyman analysis.
Exhibit II-14: Timeline for Single-Person Crew Implementation in Germany

1960s: Diesel locomotives began replacing steam locomotives. 
1970s: Diesel locomotives were used in non-electrified corridors. 
1980s: Wide implementation of ATP signaling systems. 
1990s: Single-person cab crews permitted on trains traveling up to 200 km/h. 
2000s: By 2023: ERTMS/ETCS planned implementation on 2,100 km.

Germany’s mainlines were electrified starting in 1949 and continuing through the 1980’s. Diesel locomotives replaced steam in non-electrified corridors during the 1950’s and 1960’s. As one-person crews in Germany were implemented, they were first restricted to trains which traveled at a maximum speed of 140 kmh. When automatic train protection (ATP) signaling systems (the US equivalent of automatic train stop or ATS) were widely implemented in the 1980’s, the maximum speed for one-person crewed trains was raised to 200 kmh as of 1991. In 1996, all trains were allowed to operate with one-person locomotive cab crews. Germany currently has plans to install ERTMS on only 5.47 percent of its network through 2023.

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25 Oliver Wyman research. 
26 ATP provides either a continuous or regular update of speed monitoring for each train (using trackside equipment) and causes the brakes to apply if the driver fails to bring the speed within the required profile. ATS is a system that works in conjunction with onboard and wayside equipment to apply brakes at designated restrictions or on a dispatcher's signal, should the operator not respond properly. 
2. France

France has the second longest rail network in Europe and has the second largest freight and passenger market in terms of tonne-km/passenger-km in the EEA-28. France uses predominantly one-person crews. (Two-person crews may be used in a small number of instances, such as failure of a deadman switch.)

**Exhibit II-15: France: Key Rail Statistics**

<table>
<thead>
<tr>
<th>Overall market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, PPP international $</td>
<td>$3,315</td>
</tr>
<tr>
<td>Standard locomotive crew size</td>
<td>1 person</td>
</tr>
<tr>
<td>Active rail operators</td>
<td>27</td>
</tr>
<tr>
<td>Network size (line-km)</td>
<td>27,594</td>
</tr>
<tr>
<td>Network intensity (train-km/line-km per day)</td>
<td>42.4</td>
</tr>
<tr>
<td>Share of total European rail activity (train-km)</td>
<td>9.5%</td>
</tr>
</tbody>
</table>

**Freight rail market**

| Non-incumbent (multi-operator) market share         | 46%   |
| Freight density: tonne-km per line-km               | 1.15M |
| Freight intensity: train-km per line-km per day     | 6.3   |
| Avg. freight load per train (tonnes)                 | 503   |
| Freight share of network usage (train-km)           | 15%   |

**Passenger rail market**

| Non-incumbent (multi-operator) market share         | 5%    |
| Pass. density: pass-km per line-km                  | 3.56M |
| Pass. intensity: train-km per line-km per day       | 36.1  |
| Pass. share of network usage (train-km)             | 85%   |

---

On the freight side, non-incumbent rail operators who actively compete for freight and share access to the rail network now account for 46 percent of the market. About 24 percent of freight is intermodal, 17 percent hazmat, and 27 percent cross-border (on a tonne-km basis).

The top rail-hauled freight commodities for France are shown in Exhibit II-16. French rail operators haul significant miscellaneous mixed goods (typically intermodal), chemicals/plastics, food and agricultural products, and metals.

**Exhibit II-16: Top Rail-Hauled Commodities in France**

Million tonne-km

3. **Italy**

Italy is the fifth largest freight and fourth largest passenger market in terms of tonne-km/passenger-km. Similar to other European countries, most of the network is electrified and has mixed passenger and freight operations. Starting in 2003, a new state-of-the-art train control system was introduced and installed on the entire core network, as well as parts of the secondary

---

29 Eurostat 2019 data, Oliver Wyman analysis.
network. Freight trains are permitted to be operated with single-person crews. Passenger trains are generally operated with single-person crews and a minimum of one conductor present in the train, but not in the locomotive cab.

**Exhibit II-17: Italy: Key Rail Statistics**

<table>
<thead>
<tr>
<th>Overall market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, PPP international $</td>
<td>$2,665</td>
</tr>
<tr>
<td>Standard locomotive crew size</td>
<td>1 person</td>
</tr>
<tr>
<td>Active rail operators</td>
<td>35</td>
</tr>
<tr>
<td>Network size (line-km)</td>
<td>16,781</td>
</tr>
<tr>
<td>Network intensity (train-km/line-km per day)</td>
<td>63.4</td>
</tr>
<tr>
<td>Share of total European rail activity (train-km)</td>
<td>8.6%</td>
</tr>
<tr>
<td><strong>Freight rail market</strong></td>
<td></td>
</tr>
<tr>
<td>Non-incumbent (multi-operator) market share</td>
<td>57%</td>
</tr>
<tr>
<td>Freight density: tonne-km per line-km</td>
<td>1.27M</td>
</tr>
<tr>
<td>Freight intensity: train-km per line-km per day</td>
<td>7.4</td>
</tr>
<tr>
<td>Avg. freight load per train (tonnes)</td>
<td>467</td>
</tr>
<tr>
<td>Freight share of network usage (train-km)</td>
<td>12%</td>
</tr>
<tr>
<td><strong>Passenger rail market</strong></td>
<td></td>
</tr>
<tr>
<td>Non-incumbent (multi-operator) market share</td>
<td>27%</td>
</tr>
<tr>
<td>Pass. density: pass-km per line-km</td>
<td>3.37M</td>
</tr>
<tr>
<td>Pass. intensity: train-km per line-km per day</td>
<td>55.9</td>
</tr>
<tr>
<td>Pass. share of network usage (train-km)</td>
<td>88%</td>
</tr>
</tbody>
</table>

On the freight side, non-incumbents control 57 percent of market share. These companies actively compete with one another for freight and share access to the rail network. Nearly half of Italian rail traffic is intermodal. About half of traffic is international. The top rail-hauled freight

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commodities for Italy are shown in Exhibit II-18. Italian rail traffic includes metals, agriculture and food products, chemicals/plastics, and a wide range of other goods.

**Exhibit II-18: Top Rail-Hauled Commodities in Italy**

Million tonne-km

4. **Poland**

Poland is the third largest freight market and seventh largest passenger market in terms of tonne-km/passenger-km. Rail operations predominantly use one-person crews.

On the freight side, dozens of rail operators that actively compete for freight and share access to the rail network control about 46 percent of the market. On a tonne-km basis, intermodal and carload together account for 26 percent of Polish rail freight, 17 percent of traffic is hazmat, and a quarter is international (cross-border). Poland’s railroads run slightly heavier trains than is the norm for Western Europe, and freight accounts for about a third of network activity (train-km).

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31 Eurostat 2019 data, Oliver Wyman analysis.
Exhibit II-19: Poland: Key Rail Statistics\textsuperscript{32}

<table>
<thead>
<tr>
<th>Overall market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, PPP international $</td>
<td>$1,299</td>
</tr>
<tr>
<td>Standard locomotive crew size</td>
<td>1 person</td>
</tr>
<tr>
<td>Active rail operators</td>
<td>85</td>
</tr>
<tr>
<td>Network size (line-km)</td>
<td>19,235</td>
</tr>
<tr>
<td>Network intensity (train-km/line-km per day)</td>
<td>34.7</td>
</tr>
<tr>
<td>Share of total European rail activity (train-km)</td>
<td>5.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freight rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-incumbent (multi-operator) market share</td>
<td>46%</td>
</tr>
<tr>
<td>Freight density: tonne-km per line-km</td>
<td>2.84M</td>
</tr>
<tr>
<td>Freight intensity: train-km per line-km per day</td>
<td>11.8</td>
</tr>
<tr>
<td>Avg. freight load per train (tonnes)</td>
<td>661</td>
</tr>
<tr>
<td>Freight share of network usage (train-km)</td>
<td>34%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passenger rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-incumbent (multi-operator) market share</td>
<td>42%</td>
</tr>
<tr>
<td>Pass. density: pass-km per line-km</td>
<td>1.05M</td>
</tr>
<tr>
<td>Pass. Intensity: train-km per line-km per day</td>
<td>23</td>
</tr>
<tr>
<td>Pass. share of network usage (train-km)</td>
<td>66%</td>
</tr>
</tbody>
</table>

The top rail-hauled freight commodities for Poland are shown in Exhibit II-20. Polish rail operators haul significant bulk traffic, including energy products, ores, and chemicals.

5. United Kingdom

The UK is the sixth largest freight market and third largest passenger market in Europe in terms of tonne-km/passenger-km. The Channel Tunnel provides seamless passenger and freight service to/from continental Europe. The UK uses predominantly one-person crews.

The UK rail network is heavily utilized by passenger rail. On the freight side, about nine rail operators actively compete for freight and share access to the rail network, with non-incumbents accounting for 61 percent of market share. About half of freight tonne-km are intermodal.

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33 Eurostat 2019 data, Oliver Wyman analysis.
Exhibit II-21 United Kingdom: Key Rail Statistics

<table>
<thead>
<tr>
<th>Overall market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, PPP international $</td>
<td>$3,255</td>
</tr>
<tr>
<td>Standard locomotive crew size</td>
<td>1 person</td>
</tr>
<tr>
<td>Active rail operators</td>
<td>34</td>
</tr>
<tr>
<td>Network size (line-km)</td>
<td>16,289</td>
</tr>
<tr>
<td>Network intensity (train-km/line-km per day)</td>
<td>95.5</td>
</tr>
<tr>
<td>Share of total European rail activity (train-km)</td>
<td>12.7%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freight market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-incumbent (multi-operator) market share</td>
<td>61%</td>
</tr>
<tr>
<td>Freight density: tonne-km per line-km</td>
<td>1.04M</td>
</tr>
<tr>
<td>Freight intensity: train-km per line-km per day</td>
<td>5.6</td>
</tr>
<tr>
<td>Avg. freight load per train (tonnes)</td>
<td>504</td>
</tr>
<tr>
<td>Freight share of network usage (train-km)</td>
<td>6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passenger market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-incumbent (multi-operator) market share</td>
<td>87%</td>
</tr>
<tr>
<td>Pass. density: pass-km per line-km</td>
<td>4.41M</td>
</tr>
<tr>
<td>Pass. intensity: train-km per line-km per day</td>
<td>89.9</td>
</tr>
<tr>
<td>Pass. share of network usage (train-km)</td>
<td>94%</td>
</tr>
</tbody>
</table>

The top rail-hauled commodities for the UK are shown in Exhibit II-22. Similar to the US, UK rail operators have seen a significant decline in coal haulage, and instead now haul a wide variety of goods, including minerals, mixed goods (usually intermodal), metal ores, and chemicals/plastics.

---

6. Latvia

Latvia and Lithuania (below) represent smaller European markets with a high share of freight traffic. They are included in these country profiles largely because they are similar in size and function, but Latvia uses two-person crews (at all times) and Lithuania uses one-person crews. Both are Baltic port countries and their railway networks serve as extensions of the Russian Railway network to the Baltic Sea ports. Both networks have a similar distribution of commodities handled and more than 60 percent of their rail traffic is freight (among the highest percentages in Europe). Both handle much heavier trains and are more bulk commodity focused than is the case in Western European countries.

35 Eurostat 2019 data, Oliver Wyman analysis.
Exhibit II-23: Latvia: Key Rail Statistics\textsuperscript{36}

<table>
<thead>
<tr>
<th>Overall market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, PPP international $</td>
<td>$62</td>
</tr>
<tr>
<td>Standard locomotive crew size</td>
<td>2 persons</td>
</tr>
<tr>
<td>Active rail operators</td>
<td>7</td>
</tr>
<tr>
<td>Network size (line-km)</td>
<td>1,860</td>
</tr>
<tr>
<td>Network intensity (train-km/line-km per day)</td>
<td>23.1</td>
</tr>
<tr>
<td>Share of total European rail activity (train-km)</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freight rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-incumbent (multi-operator) market share</td>
<td>32%</td>
</tr>
<tr>
<td>Freight density: tonne-km per line-km</td>
<td>8.07M</td>
</tr>
<tr>
<td>Freight intensity: train-km per line-km per day</td>
<td>14.1</td>
</tr>
<tr>
<td>Avg. freight load per train (tonnes)</td>
<td>1,566</td>
</tr>
<tr>
<td>Freight share of network usage (train-km)</td>
<td>61%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passenger rail market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-incumbent (multi-operator) market share</td>
<td>7%</td>
</tr>
<tr>
<td>Pass. density: pass-km per line-km</td>
<td>0.35M</td>
</tr>
<tr>
<td>Pass. intensity: train-km per line-km per day</td>
<td>8.9</td>
</tr>
<tr>
<td>Pass. share of network usage (train-km)</td>
<td>39%</td>
</tr>
</tbody>
</table>

On the freight side, several rail operators compete for freight and share access to the rail network, with non-incumbents accounting for 32 percent of market share. Freight accounts for 61 percent of total train-km. Latvian freight railroads move 230 million tonne-km per year of intermodal traffic.

The top rail-hauled commodities for Latvia are shown in Exhibit II-24. Latvian freight rail primarily hauls energy products, but also chemicals/plastics, agricultural and food products, and other goods.

\textsuperscript{36} Eurostat, ERA, Independent Regulators’ Group, World Bank, Oliver Wyman analysis, 2018-2019 data (latest available).
7. Lithuania

As noted above, Lithuania also represents a smaller European market with a high share of freight traffic. The most notable difference between Latvia and Lithuania is the number of operators on the network and the use of one-person versus two-person train crews.

Lithuania has one primary active freight operator. Freight accounts for 61 percent of train-km on the network. About 17 percent of freight is hazmat and 59 percent international (on a tonne-km basis).

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37 Eurostat 2019 data, Oliver Wyman analysis.
Exhibit II-25: Lithuania: Key Rail Statistics

<table>
<thead>
<tr>
<th>Overall market</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP, PPP international $</td>
<td>$106</td>
</tr>
<tr>
<td>Standard locomotive crew size</td>
<td>1 person</td>
</tr>
<tr>
<td>Active rail operators</td>
<td>1</td>
</tr>
<tr>
<td>Network size (line-km)</td>
<td>1,911</td>
</tr>
<tr>
<td>Network intensity (train-km/line-km per day)</td>
<td>23.1</td>
</tr>
<tr>
<td>Share of total European rail activity (train-km)</td>
<td>0.4%</td>
</tr>
<tr>
<td>Freight rail market</td>
<td></td>
</tr>
<tr>
<td>Non-incumbent (multi-operator) market share</td>
<td>0%</td>
</tr>
<tr>
<td>Freight density: tonne-km per line-km</td>
<td>8.47M</td>
</tr>
<tr>
<td>Freight intensity: train-km per line-km per day</td>
<td>14.1</td>
</tr>
<tr>
<td>Avg. freight load per train (tonnes)</td>
<td>1,649</td>
</tr>
<tr>
<td>Freight share of network usage (train-km)</td>
<td>61%</td>
</tr>
<tr>
<td>Passenger rail market</td>
<td></td>
</tr>
<tr>
<td>Non-incumbent (multi-operator) market share</td>
<td>0%</td>
</tr>
<tr>
<td>Pass. density: pass-km per line-km</td>
<td>0.19M</td>
</tr>
<tr>
<td>Pass. intensity: train-km per line-km per day</td>
<td>9.1</td>
</tr>
<tr>
<td>Pass. share of network usage (train-km)</td>
<td>39%</td>
</tr>
</tbody>
</table>

The top rail freight hauled commodities for Lithuania are shown in Exhibit II-26. Lithuania’s railroad hauls a variety of commodities, including chemicals/plastics, energy products, ores, and agricultural and food products.

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E. Summary

As the overall data on the EEA-28 and the individual country profiles above show, Europe’s rail system is highly diversified. Mixed freight and passenger systems are made more complex by the large number of operators and diversity of traffic, including carload, unit train, and intermodal, and significant hazardous materials haulage. Far from being single origin-destination industrial railroads, Europe’s freight railroads haul a large mix of commodities, just as do US railroads, serving both domestic (in-country) and international (cross-border) origins and destinations. And yet, the majority of these systems operate with one-person crews.

Both Genesee & Wyoming, a freight train operator, and Keolis, a passenger train operator, provide rail transportation in both North American and Europe. Their senior management are

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39 Eurostat 2019 data, Oliver Wyman analysis.
therefore in a unique position to compare the safety of single-person versus two-person crew operations. The COO of Genesee & Wyoming and the Rail Director of Keolis have previously provided statements about the safety of single-person crews:

“The European operating environment is more complex than it is in the United States, with far more train movements; many of them passenger trains traveling at fast speeds. Train sizes and therefore block lengths are shorter, and there are many more interlockings in the network, meaning there are many more signals per track-mile than in the United States. The safety systems do not anticipate a red signal; ATP [Automatic Train Protection] does not apply the brakes until you pass the red signal, so it does not offer as much protection as many believe it does. A far greater level of attentiveness is required in Europe, and the margin of error is much smaller than in the United States.”

– Dave Brown, COO, Genesee & Wyoming

As COO of Genesee & Wyoming (2012-2020), Mr. Brown had in-depth experience in both international and US rail operations, and oversaw an organization comprising not only the largest US shortline railroad operator but extensive operations in Europe (the UK, the Netherlands, and Poland) and Australia. Mr. Brown had extensive experience with US Class I railroading as well, having been the Chief Transportation Officer and then Chief Operating Officer of CSX, and working in the Operating Department at Norfolk Southern before going to CSX.

High complexity and train density mean that train crews in Europe face as many – if not more – decisions and work events every day than do US train crews, yet they do not experience task overload; in addition, the technology deployed is not significantly different than that used in the United States.

“One-person crews have been used safely in Europe for decades in freight and passenger operations. Keolis having experience in both the US and European passenger environments, we have found that the task workload faced by a driver in the European environment is as great, or greater than, that experienced in North America, as signal
system block lengths are shorter and more oriented to passenger trains, and the amount of interlockings and double track are greater, leading to a greater number of signal aspects per kilometer than in the United States. Also, the number of train movements on the network is greater and therefore the number of communications activities with dispatchers and towers is greater than in the United States.

“The entire network must be operated with a far greater level of precision and attentiveness to keep train activities fluid. Yet, this activity level has been safely accommodated using one-person crews since the 1980s in France, for example. Safety is a major concern in Europe as there are far more passenger trains on the network than in the United States, and to that end the European network is constantly being upgraded with new technology to automate operations to reduce driver task loads and to reduce the chance of human error.” – Bruno Auger, Rail Director, Keolis

Mr. Auger, Director of the Railway Division at Keolis since 2006, has in-depth experience in both international and US rail operations. Keolis has operated passenger trains on both the Virginia Railway Express (VRE) and the Massachusetts Bay Transportation Authority (MBTA) in the United States. In Europe, Keolis has operated services in London, UK (Thameslink, London Midlands, Southeastern); Dusseldorf, Germany (Eurobahn); and Deventer, Netherlands (Syntus network). Keolis is a subsidiary of SNCF, France’s legacy national railroad, which operates both freight and passenger trains in Europe.
III. US and European Rail Safety Analysis

In the prior section, Oliver Wyman demonstrated that European rail operations are an appropriate basis for comparison to US rail operations along many dimensions. Yet operations with one-person train crews account for over 95 percent of all train-km in Europe and have overall safety metrics as good as, or better than, operations with two-person crews. According to the European Union Agency for Railways (ERA), “The railway safety level of the Union railway system remains high; it is one of the highest worldwide.”

In 2016, Oliver Wyman analyzed accident data for the EEA-28 countries and compared it to US Federal Railroad Administration (FRA) accident/incident data, based on nine years of available data. In this report, we have now updated our analysis to include 14 years of data. The European data was divided into Eastern and Western Europe and into countries operating one-person crews and those operating two-person crews. The analysis found no detectable differences in railway safety based on crew size.

A. Single-Person Crew Operations in Europe

In the European Union, single-person crew operation has two preconditions, both of which are met in the United States:

- A working deadman control system must be present on the locomotive. This system involves a pedal or button that must be periodically pressed, thereby signaling that the train engineer is active and alert. If the device is not pressed when required, the train will come to a stop.

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41 Regulation promulgated at the national level, but consistent across the EU.
The locomotive must be equipped with working Automatic Train Control/Automatic Train Protection (ATC/ATP),\footnote{ATP provides either a continuous or regular update of speed monitoring for each train (using trackside equipment) and causes the brakes to apply if the driver fails to bring the speed within the required profile. ATC is an integrated signaling system that guarantees the secure movement of trains; it integrates various subsystems positioned on-board and wayside, including ATP.} where such systems are installed on main track. That is, ATC/ATP enables dispatchers to remotely operate signals and switches to ensure trains do not make conflicting movements.

Implementation of single-person crews in Europe occurred decades ago on many railroads, prior to the regulatory overhaul of the mid-1990’s that separated rail operations from infrastructure ownership and control, and that mandated open access for any qualified rail operator. Freight and passenger train operations were originally largely provided by state-owned railroads. Employees were unionized, but as the government was also the railway owner, national policy superseded the perpetuation of unproductive work rules. In particular, implementation of one-person crews helped stem operating losses from intense modal competition in a truck-competitive marketplace characterized by shorter lengths of haul.

Implementation of advanced train control technology has not been a prerequisite for the adoption of one-person crews in Europe. Indeed, despite the predominance of one-person crews, the EU has no plans to install advanced train control technology (ERTMS) on 78 percent of its network.\footnote{European Commission Mobility and Transport website, Eurostat. Projected deployment by 2030 of ERTMS on 50,000 kilometers of 225,600 line-kilometers.} By comparison, the US has installed positive train control on 62 percent of its network.\footnote{“FRA: PTC operating on over 99 percent of required route miles,” Progressive Railroading, November 18, 2020; Analysis of Class I Railroads, 2019, AAR; Bureau of Transportation Statistics. PTC is installed on 57,536 of 92,282 Class I route-miles.}

The FRA has compiled the following list of tasks for conductors:\footnote{Train Crew Staffing: Notice of Proposed Rulemaking, Regulatory Impact Analysis, US Federal Railroad Administration, February 18, 2016, p. 31.}

1. Managing the train consist
2. Coordinating with the locomotive engineer for safe and efficient en route operation
3. Interacting with dispatchers, roadway workers, and others outside the cab
4. Managing paperwork
5. Dealing with exceptional situations (e.g., diagnosing and responding to mechanical problems or conditions in the operating environment)

In Europe tasks 1, 4, and 5 are handled by lineside personnel or has been fully automated into wireless devices, while tasks 2 and 3 are handled by the engineer. Further, the FRA has stated that “Conductors are the link between engineers and the dispatchers” and “responsible for providing reminders to the locomotive engineer of speed restrictions and limits of authority and ensuring compliance.” In Europe, these responsibilities are typically handled exclusively by the train driver, and there is no chance for misunderstanding, miscommunication, or distraction due to a second person in the locomotive cab.

In addition, European rail lines are traditionally equipped with lineside signaling and interlocking facilities, some of which have recently been centralized into larger control centers, similar to North American CTC, while others remain locally controlled. In most countries, ATC/ATP systems have been installed for decades on portions of the main track that see regular train activity. The EU is in the process of further upgrading ATC/ATP to next-generation ERTMS on key high-density corridors (see Appendix A), which at more advanced levels is similar to North American positive train control (PTC).

Temporary slow orders and other exceptional circumstances along the train run are typically communicated to train crews in written or electronic form before departure. While the train is

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moving, transmission via radio or directly to a wireless device on the train is possible under current operating practices.

Dark territory and operating regimes in which safety depends on (radio) communication and/or the equivalent of track warrants exchanged between the train crew and a dispatcher are typically low-density lines with limited traffic. Such lines (like the rest of the network) are typically operated with single-person crews; however, there are instances where the single-person crew receives support from ground personnel, when needed.

**B. Safety Data Used in the Analysis**

Data on rail accidents and incidents for 2006 through 2019 from the European Railway Agency (ERA) and the FRA were obtained and used by Oliver Wyman for this analysis. A combination of interviews and Oliver Wyman expertise was used to determine the policy of each European country regarding crew size, along with any exceptions to that policy. Trains operated in a country use the default crew size except in cases of extraordinary circumstances, such as failure of the deadman system or cab signaling system. This is an important fact that allowed the assumption that the default crew size applied to all accidents within a country, as individual accident data is not available from the ERA.

For purposes of the analysis, Europe was divided into “Western” and “Eastern” based on geography. Exhibit III-1 illustrates the geographic divide as well as the countries still operating two-person crews. The statistical analysis contained in this report subdivided Europe into four

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47 The only exception to standard crew size is Croatia, which uses both one-person and two-person crews depending on the locomotive type and the safety system with which the locomotive is equipped (deadman control and/or cab-signaling for example). Each locomotive contains instructions on crew size. For this reason, Croatia was treated as “crew size undetermined,” since we could not infer the crew size for an accident. See Appendix C for additional information on data sources for crew size.

48 There is no precise definition of “Eastern” vs. “Western” Europe. The UN uses statistical regions of eastern, southern, western and northern Europe. The CIA World Factbook includes a Central Europe. Oliver Wyman primarily followed the UN east/west divide, though Czechia was included in Western Europe, with which its spending on rail infrastructure is most closely aligned.
categories: Western one-person crews (16 countries); Western two-person crews (one country); Eastern one-person crews (four countries); and, Eastern two-person crews (five countries). Crew size could not be determined for two countries (Croatia and Slovenia). The comparative analysis of safety statistics uses averages based on the four categories, giving equal weight to each country so that countries with higher rail volumes (such as Germany) do not dominate the results. To test that equal weighting did not improperly bias the results, the analysis was repeated for All Significant Accidents where countries were weighted by train-kilometers, and the conclusions were unchanged (see Appendix D).

**Exhibit III-1: Eastern and Western Europe with Rail Crew Size**
Eastern Europe: light blue; Western Europe: dark blue; 2-person crews: yellow highlight

Oliver Wyman analyzed total “significant accident” data as well as five subcategories (see Appendix B for definitions): collisions, derailments, level crossings, accidents to persons, and
other accidents. In addition, we analyzed employee fatalities, economic impact of accidents, and signals passed at danger (SPADs – which are often a precursor to accidents) from the ERA data, but this information is not provided by the FRA, or in the case of employee fatalities, the FRA and ERA data could not be aligned. Suicides and attempted suicides were not analyzed. The ERA data was used “as is,” without any attempts to clean or modify it or impute missing values.

The FRA’s accident/incident data is more comprehensive than the ERA data, and therefore had to be filtered to provide an equal, “apples-to-apples” comparison. Exhibits III-2 and III-3 show the initial number of FRA data records, the categories of filters, the number of records eliminated from consideration by each filter, and the final number of filtered records for equipment incidents and injuries, respectively. For equipment incidents (Exhibit III-2), 8,980 FRA records were filtered out because the ERA data reporting threshold is €150,000 ($178,700) of damage versus a $10,700 threshold for 2019 in the FRA data. The other large category of equipment incident records filtered out from FRA data involved incidents occurring in a yard or at industrial sites, as this information does not exist in the ERA data. Overall, 13.9 percent of the FRA reported equipment incident data was retained for the analysis.

Categories of injuries filtered out of the FRA data to match the ERA data (Exhibit III-3) included injuries not occurring on mainlines or sidings, injuries involving stationary equipment and injuries not involving train movements. Line-haul movements of trains, the focus of this analysis, were retained. Overall, 9.5 percent of the injury data was retained from the FRA data after the filters were applied.
### Exhibit III-2: Filtering FRA Data to Match ERA Data: Equipment Incidents, 2006-2019

<table>
<thead>
<tr>
<th>Category</th>
<th>Initial records</th>
<th>Vandalism</th>
<th>No movement (speed is 0 MPH)</th>
<th>Yard and industry incidents</th>
<th>Damage less than 150,000 euros</th>
<th>Filtered records</th>
</tr>
</thead>
<tbody>
<tr>
<td>--------------------------------------</td>
<td>-----------------</td>
<td>-----------</td>
<td>------------------------------</td>
<td>-----------------------------</td>
<td>--------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Total</td>
<td>39,545</td>
<td>222</td>
<td>913</td>
<td>23,919</td>
<td>8,980</td>
<td>5,511</td>
</tr>
</tbody>
</table>

### Exhibit III-3: Filtering FRA Data to Match ERA Data: Injuries, 2006-2019

<table>
<thead>
<tr>
<th>Category</th>
<th>Initial records</th>
<th>General location not on mainline or siding</th>
<th>Stationary equipment and vehicles involved</th>
<th>Specific locations not involving railroad property and equipment</th>
<th>Event causing injury not involving railroad equipment or train movement</th>
<th>Items causing injury not involving railroad equipment or train movement</th>
<th>Injury not caused by railroad equip. or train movement</th>
<th>Highway-rail incidents and injuries following OSHA definition</th>
<th>Filtered records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>133,306</td>
<td>66,780</td>
<td>27,438</td>
<td>1,471</td>
<td>22,717</td>
<td>1,134</td>
<td>1,047</td>
<td>7</td>
<td>12,712</td>
</tr>
</tbody>
</table>

---

49 Accident/Incident Data, 2006-2019, FRA; Oliver Wyman analysis.
50 Ibid.
In 2019, the number of significant accidents for the combined 28 countries in the ERA data was 1,614, compared to 2,341 in the filtered FRA data for US Class I railroads. The number of significant accidents for EEA-28 countries (including rail systems with both one-person and two-person crews) has been declining at a rate of 8.1 percent per year since 2006, slowing slightly to 5.7 percent over the past five years. The US Class I railroads also have seen a reduction in total accidents over time, but at a slower rate of decline than in Europe (Exhibit III-4).

**Exhibit III-4: Total Number of Significant Rail Accidents**

US Class I vs. combined total for EEA-28; 2006 through 2019

Comparing the total number of accidents does not provide the best indication of trends, however, since traffic volumes and operations change over time. As would be expected, there is a strong correlation between the number of train accidents and number of train-miles (Exhibit III-5, left exhibit). The US Class I railroads also have been running longer trains the past few years by increasing the number of cars per train, which would lead to fewer train-miles to move.

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the same volume. The number of significant accidents reported in the FRA data, however, shows no difference in accidents based on the number of cars in the train (Exhibit III-5, right exhibit).

**Exhibit III-5: US Class I Accidents vs. Train-Miles and Average Cars per Train**

<table>
<thead>
<tr>
<th>Train-Miles</th>
<th>Average Cars per Train</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correlation Coefficient</strong> = +0.82</td>
<td><strong>Correlation Coefficient</strong> = -0.26</td>
</tr>
</tbody>
</table>

The statistical analysis in the following sections normalizes both European and US safety data by using accidents/incidents per million train-kilometers, to allow for a more equal comparison of safety records.

### C. Overall Rates of Significant Accidents

Significant accidents are defined as any accident involving at least one rail vehicle in motion, resulting in at least one killed or seriously injured person, or involving significant damage to rolling stock, track, other installations or environment, or extensive disruptions to traffic.

Accidents in workshops, warehouses, and depots are not relevant to our study of the impact of crew size on safety. Significant damage exceeds a threshold of €150,000 in the ERA safety data, and has been filtered to the same level in the FRA safety data.
Overall, the majority of European countries have less than 0.5 significant accidents per million train-km in Western Europe, and between 0.5 and 1.5 significant accidents per million train-km in Eastern Europe (Exhibit III-6). In general, countries operating two-person crews are located along the eastern edge of Europe, where accident rates are higher as well.

Passenger traffic accounts for more than 50 percent of train-km in all countries other than Lithuania and Latvia. With the exception of Greece, the top ten countries with the highest levels of passenger traffic (which generally indicates higher complexity and density), all have one-person crews and lower levels of significant accidents.

**Exhibit III-6: EEA-28: Crew Size and Significant Accidents**

Per million train-km; 2019

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52 “Common Safety Indicators,” ERA, Table 0, Field N10, 2019; Oliver Wyman analysis and interviews.
Statistical analysis of data from the ERA and FRA for the past 14 years found that countries with one-person crews have maintained a lower overall rate of significant accidents (Exhibit III-7). This is not to suggest that one-person crews are the cause of lower accident rates; Western European countries have lower accident rates due to a variety of reasons, including investments in infrastructure and safety, operating practices, technology, etc. But clearly, available accident data provides no basis for concluding that two-person crews are safer than one-person crews. And overall, one-person crews in Europe have an impressive safety record. The available accident data, compared among and between European and US rail carriers, establishes no safety-based justification for staffing a second crew member in the locomotive cab.

**Exhibit III-7: All Significant Accidents, 2006-2019**

<table>
<thead>
<tr>
<th>Year</th>
<th>Western Europe 1-Person</th>
<th>Eastern Europe 1-Person</th>
<th>Eastern Europe 2-Person</th>
<th>Western Europe 2-Person</th>
<th>US Class 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>0.45</td>
<td>0.45</td>
<td>0.45</td>
<td>0.45</td>
<td>0.45</td>
</tr>
<tr>
<td>2007</td>
<td>0.40</td>
<td>0.40</td>
<td>0.40</td>
<td>0.40</td>
<td>0.40</td>
</tr>
<tr>
<td>2008</td>
<td>0.35</td>
<td>0.35</td>
<td>0.35</td>
<td>0.35</td>
<td>0.35</td>
</tr>
<tr>
<td>2009</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
</tr>
<tr>
<td>2010</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>2011</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>2012</td>
<td>0.15</td>
<td>0.15</td>
<td>0.15</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>2013</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>2014</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>2015</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2016</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2017</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2018</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2019</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Although Exhibit III-7 appears to indicate one-person crews are equally safe, if not safer, than two-person crews, a series of statistical tests were performed to validate this appearance. A

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53 “Common Safety Indicators,” ERA; “Accident/Incident Report,” FRA; Oliver Wyman analysis.
“t-test” determines whether the difference in two data sets is “statistically significant” or whether there is no statistically significant difference in the data at a specified level of confidence. The result of this analysis is shown in Exhibit III-8.

**Exhibit III-8: T-Test Results for All Significant Accidents, 2006-2019**

<table>
<thead>
<tr>
<th>Read across row</th>
<th>US Class I</th>
<th>W Eur 1-Person</th>
<th>W Eur 2-Person</th>
<th>E Eur 1-Person</th>
<th>E Eur 2-Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Class I</td>
<td>NA</td>
<td>Worse</td>
<td>Worse</td>
<td>Worse</td>
<td>Worse</td>
</tr>
<tr>
<td>Western Europe 1-Person</td>
<td>Better</td>
<td>NA</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Western Europe 2-Person</td>
<td>Better</td>
<td>Worse</td>
<td>NA</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Eastern Europe 1-Person</td>
<td>Better</td>
<td>Worse</td>
<td>Worse</td>
<td>NA</td>
<td>No Sig Dif</td>
</tr>
<tr>
<td>Eastern Europe 2-Person</td>
<td>Better</td>
<td>Worse</td>
<td>Worse</td>
<td>No Sig Dif</td>
<td>NA</td>
</tr>
</tbody>
</table>

Each row in Exhibit III-8 shows how the railroad category represented by that row compares to the other railroad categories (i.e., columns). For example, the row labeled “US Class I” shows that the US Class I railroads have a statistically significant worse safety record than the four categories of European railroads for all significant accidents – both one-person and two-person – indicating that crew size is not the reason for this difference.

Equally, the large group of Western European one-person operations showed fewer significant accidents than all other one-person and two-person crews, indicating that the reasons are not related to crew size. The Eastern European one-person and two-person crews showed no statistically significant difference – these had about the same accident rates regardless of crew size. The results in Exhibit III-8 appear to be consistent with the line chart in Exhibit III-7, the

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54 The t-tests were run in Microsoft Excel using the “T.TEST” function, which assumes a difference in the hypothesized mean = 0 and a level of confidence (alpha) = 0.05. The parameters were set for a two-tailed test, since it was unknown if one-person crews or two-person crews would have the lower value and for unequal variances in the data. For a cell to show “Better,” the t-test must indicate a greater than 95 percent confidence that there is a difference in the means of the two groups, and the group represented by the row must have a lower mean (better safety record) than the group represented by the column.

55 “Common Safety Indicators data,” ERA; “Accident/Incident Report,” FRA; Microsoft Excel, “T-TEST” function; Oliver Wyman analysis. Numerical results of the t-test are contained in Appendix D.

56 Class I railroads include BNSF, Canadian National, Canadian Pacific, CSX, Kansas City Southern, Norfolk Southern, and Union Pacific. Class I subsidiaries were including with the Class I (e.g., Gateway Eastern and Texas Mexican with KCS).

57 “No significant difference” indicates the t-test returned less than a 95 percent confidence level that these data were different.
key takeaway being that the rate of all significant accidents, while it may vary by geography, is unrelated to crew size.

D. Investment and Accident Rates

One factor impacting overall accident rates that is worth examining further is that Western European countries with typically lower accident rates spend more on rail infrastructure (per track-km) than Eastern European countries (Exhibit III-9).

**Exhibit III-9: Comparison of Annual Infrastructure Investments and Significant Accident Rates**

The exhibit above shows that there is a fairly strong correlation between the amount of infrastructure investment and the accident rate, and this relationship appears to account for much of the difference in safety rates between Eastern and Western Europe. It should be noted

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however that these infrastructure investments include not only safety-related investments (e.g., track maintenance, removal of level crossings, signal system upgrades), but also large infrastructure expansion projects, such as Switzerland’s Gotthard Base Tunnel and new high-speed passenger lines. The countries with the highest spending on infrastructure tend to be those with the highest-density passenger rail services.

Where infrastructure spending is comparable, crew size appears to have no impact on accident rates (Exhibit III-10). This indicates that investments in rail infrastructure integrity and in technology are the keys to a safer rail network, rather than the number of crew members.

**Exhibit III-10: Significant Accidents Compared to Investment and Crew Size**

Average 2006-2019, per million train-km

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To better quantify the impact of investments on accident rates, Exhibit III-11 provides a plot of infrastructure investment per track-km versus significant accidents per million train-km. The data follows a logarithmic trendline (in red), which logically demonstrates that increasing investments at lower investment levels results in a greater impact on safety than similar increases at higher investment levels. For example, a doubling of investment from 10,000 to 20,000 euros per track-km reduces significant accidents per million train-km from 2.47 to 2.01 (a reduction of 0.46), while an increase of 10,000 euros from 200,000 to 210,000 per track-km reduces significant accidents per million train-km from 0.48 to 0.45 (a reduction of only 0.03).

Exhibit III-11: Relationship Between Annual Infrastructure Investments and Significant Accident Rates^60
Note: Switzerland excluded due to the high expense of the Gotthard Tunnel construction

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While the values above are indicative of the relationship between infrastructure spending and accident rates, there are several additional factors which would need to be considered to fully quantify the relationship, including adjustments for large investments in new construction and maintenance spending levels for rolling stock.

Similar to the mature economies of Western Europe, freight railroads in the United States have spent tens of billions of dollars in recent years on improving track quality and safety, such as the installation of PTC systems on the primary mainlines. Across the entire 118,500 miles of trackage operating by the US Class I railroads, the average capex spend equates to €31,831 per track-km, which is between the Eastern Europe and Western Europe averages. The US Class I railroad average capex spend is even higher on the 57,500 miles where PTC is installed. This is partially due to the billions invested in PTC, but also because these routes represent the highest-density rail corridors in the US, including freight-pASenger shared use corridors and routes used to transport hazardous materials.

E. Analysis of Accident Rates By Category

The following sections provide further breakdowns of ERA and FRA safety data by examining collisions, derailments, grade/level crossings, accidents to persons, and other accidents. Employee fatalities, signals passed at danger (SPADs) and the economic impact of accidents also are assessed, but only for Europe, since the FRA does not report this information, or in the case of fatalities, the FRA and ERA data could not be aligned.

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61 R-1 Annual Reports for 2019, Schedule 700, Total track miles minus Class 5 (trackage rights) track miles, US Surface Transportation Board; Analysis of Class I Railroads, line 378, AAR; US$ to Euros conversion, YCharts.com.
1. Collisions and Derailments

**Collisions** cover both collisions of trains and collisions with obstacles within the track clearance. This safety category includes front to front, front to end, or a side collision between a part of a train and a part of another train, as well as with shunting rolling stock or fixed or temporarily present objects on or near the track. The exception is at grade/level crossings involving a crossing vehicle/user, which are recorded under grade/level crossing accidents.

Exhibit III-12 shows that on an annual basis, collisions rates for European one-person crews and US Class I’s have followed a roughly similar pattern over the past decade, and that the rate of collisions across these railroads is small, between 0.02 and 0.04 per million train-km in 2019.

**Exhibit III-12: Collisions by Geography and Crew Size, 2006-2019**

As shown by the results of the statistical test in Exhibit III-13, the US Class I railroads have a statistically significant better record with regard to collisions than some European one-person and two-person crews but not others, indicating that any differences in collision rates are not

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62 “Common Safety Indicators,” ERA; “Accident/Incident Report,” FRA; Oliver Wyman analysis.
related to crew size. In the case of European one-person versus two-person crews, there was no significant difference in collisions, regardless of crew size.

**Exhibit III-13: T-Test Results for Collisions, 2006-2019**

<table>
<thead>
<tr>
<th>Read across row</th>
<th>US Class I</th>
<th>W Eur 1-Person</th>
<th>W Eur 2-Person</th>
<th>E Eur 1-Person</th>
<th>E Eur 2-Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Class I</td>
<td>NA</td>
<td>Better</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
<td>Better</td>
</tr>
<tr>
<td>Western Europe 1-Person</td>
<td>Worse</td>
<td>NA</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
</tr>
<tr>
<td>Western Europe 2-Person</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
<td>NA</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
</tr>
<tr>
<td>Eastern Europe 1-Person</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
<td>NA</td>
<td>No Sig Dif</td>
</tr>
<tr>
<td>Eastern Europe 2-Person</td>
<td>Worse</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Derailments** involve any case in which at least one wheel of a train leaves the rails. Exhibit III-14 shows that over the past decade, US Class I’s have had a consistently higher level of derailments than most European rail operators, regardless of their crew size. This is confirmed by the results of the statistical test in Exhibit III-15, which shows that US Class I railroads have a statistically significant worse record than both European one-person and two-person crews, indicating that any differences in derailment rates are not related to crew size. Within Europe, there are differences by geography, but no relationship between overall crew size and derailment rates.

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61 “Common Safety Indicators,” ERA; “Accident/Incident Report,” FRA; Microsoft Excel, “T-TEST” function; Oliver Wyman analysis. Numerical results of the t-test are contained in Appendix D.
Exhibit III-14: Derailments by Geography and Crew Size, 2006-2019\textsuperscript{64}

Per million train-km

Exhibit III-15: T-Test Results for Derailments, 2006-2019\textsuperscript{65}

<table>
<thead>
<tr>
<th>Read across row</th>
<th>US Class I</th>
<th>W Eur 1-Person</th>
<th>W Eur 2-Person</th>
<th>E Eur 1-Person</th>
<th>E Eur 2-Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Class I</td>
<td>NA</td>
<td>Worse</td>
<td>Worse</td>
<td>No Sig Dif</td>
<td>Worse</td>
</tr>
<tr>
<td>Western Europe 1-Person</td>
<td>Better</td>
<td>NA</td>
<td>Better</td>
<td>No Sig Dif</td>
<td>Better</td>
</tr>
<tr>
<td>Western Europe 2-Person</td>
<td>Better</td>
<td>Worse</td>
<td>NA</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
</tr>
<tr>
<td>Eastern Europe 1-Person</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
<td>NA</td>
<td>No Sig Dif</td>
</tr>
<tr>
<td>Eastern Europe 2-Person</td>
<td>Better</td>
<td>Worse</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
<td>NA</td>
</tr>
</tbody>
</table>

2. Grade/Level Crossings

Accidents at grade crossings (US terminology) or level crossings (European terminology) involve at least one railway vehicle and one or more crossing vehicles, other crossing users such as pedestrians, or other objects temporarily present on or near the track if lost by a crossing vehicle/user.

\textsuperscript{64} “Common Safety Indicators,” ERA; “Accident/Incident Report,” FRA; Oliver Wyman analysis.

\textsuperscript{65} “Common Safety Indicators,” ERA; “Accident/Incident Report,” FRA; Microsoft Excel, “T-TEST” function; Oliver Wyman analysis. Numerical results of the t-test are contained in Appendix D.
It is clear from Exhibit III-16 that the US Class Is have consistently higher accident rates at grade/level crossings than European rail operators with either one-person or two-person crews. This is confirmed by the statistical test in Exhibit III-17, indicating that the rate of grade/level crossing accidents is unrelated to crew size. Within Europe, grade/level crossing accident rates vary by geography but are unrelated to overall crew size.

Exhibit III-16: Grade/Level Crossing Accidents by Geography/Crew Size, 2006-2019

Exhibit III-17: T-Test Results for Grade/Level Crossing Accidents, 2006-2019

Read across row

<table>
<thead>
<tr>
<th>US Class I</th>
<th>W Eur 1-Person</th>
<th>W Eur 2-Person</th>
<th>E Eur 1-Person</th>
<th>E Eur 2-Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Class I</td>
<td>NA</td>
<td>Worse</td>
<td>Worse</td>
<td>Worse</td>
</tr>
<tr>
<td>Western Europe 1-Person</td>
<td>Better</td>
<td>NA</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Western Europe 2-Person</td>
<td>Better</td>
<td>Worse</td>
<td>NA</td>
<td>No Sig Dif</td>
</tr>
<tr>
<td>Eastern Europe 1-Person</td>
<td>Better</td>
<td>Worse</td>
<td>No Sig Dif</td>
<td>NA</td>
</tr>
<tr>
<td>Eastern Europe 2-Person</td>
<td>Better</td>
<td>Worse</td>
<td>Worse</td>
<td>No Sig Dif</td>
</tr>
</tbody>
</table>

66 “Common Safety Indicators,” ERA; “Accident/Incident Report,” FRA; Oliver Wyman analysis.
67 “Common Safety Indicators,” ERA; “Accident/Incident Report,” FRA; Microsoft Excel, “T-TEST” function; Oliver Wyman analysis. Numerical results of the t-test are contained in Appendix D.
One could speculate that a higher rate of grade/level crossing accidents in the US might be due to more grade/level crossings per route-km, but Exhibit III-18 indicates that there are seven European countries with higher levels of crossings. Differences in deployment of safety technology at crossings could be another reason, but that is beyond the scope of this analysis. The key takeaway is that while the difference between US and European safety records for grade/level crossings cannot be determined from this data, it is not due to crew size.

Exhibit III-18: Number of Grade/Level Crossing Per Track-Kilometer by Country, 2019

3. Accidents to Persons and Other Accidents

Accidents to persons caused by rolling stock in motion is defined as when one or more persons are either hit by a railway vehicle or by an object attached to or that has become detached from the vehicle. Persons that fall from railway vehicles are included, as well as persons that fall or are hit by loose objects when traveling onboard vehicles.

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68 *Total open, at-grade public and private highway grade crossings as of 7 February 2021 divided by 2019 track-kilometers. “Common Safety Indicators,” TO4, Total number of active and passive level crossings relative to track-km, ERA; 2019 R-1 Annual Reports, Schedule 700, STB; Crossing Inventory by State and ID, FRA; Oliver Wyman analysis.
Rates of accidents to persons have been consistent for US Class I’s and Western European operations with one-person crews over time, while accident rates for Eastern Europe regardless of crew size have improved over time (Exhibit III-19).

The statistical test in Exhibit III-20 shows that US Class I’s had lower rates of accidents to persons than some European one-person and two-person rail operations, while within Europe rates varied by geography only. In either case, rates of accidents to persons is unrelated to crew size.

69 “Common Safety Indicators,” ERA; “Accident/Incident Report,” FRA; Oliver Wyman analysis.
Exhibit III-20: T-Test Results for Accidents to Persons, 2006-2019

<table>
<thead>
<tr>
<th>Read across row</th>
<th>US Class I</th>
<th>W Eur 1-Person</th>
<th>W Eur 2-Person</th>
<th>E Eur 1-Person</th>
<th>E Eur 2-Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Class I</td>
<td>NA</td>
<td>Worse</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Western Europe 1-Person</td>
<td>Better</td>
<td>NA</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Western Europe 2-Person</td>
<td>Worse</td>
<td>Worse</td>
<td>NA</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Eastern Europe 1-Person</td>
<td>Worse</td>
<td>Worse</td>
<td>Worse</td>
<td>NA</td>
<td>No Sig Dif</td>
</tr>
<tr>
<td>Eastern Europe 2-Person</td>
<td>Worse</td>
<td>Worse</td>
<td>Worse</td>
<td>No Sig Dif</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Other accidents** are defined as all accidents except for train collisions, train derailments, accidents at level crossings, to persons caused by rolling stock in motion, and fires in rolling stock. Examples of other accidents include:

- Collisions/derailments due to applying safety procedures in an emergency
- Dangerous goods release during transport
- Objects projected by trains, like ballast, ice, etc.
- Electrocution related to rolling stock in motion

The US has a consistently low rate of other accidents and the lowest average rate (0.012 per million train-km) among the geographic regions analyzed. Most European operations have had a relatively low rate of occurrence over the past decade as well, which can lead to what appear to be large fluctuations, as demonstrated by Western Europe two-person, which had zero occurrences from 2013 through 2018, followed by the second highest rate in 2019 (Exhibit III-21).

As confirmed by the statistical test in Exhibit III-22, the rate of other accidents is unrelated to crew size, since the US Class I’s had a better rate than both other one-person and two-person operations, and European rates varied by geography but not crew size.

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70 “Common Safety Indicators,” ERA; “Accident/Incident Report,” FRA; Microsoft Excel, “T-TEST” function; Oliver Wyman analysis. Numerical results of the t-test are contained in Appendix D.
Assessment of European and US Railways

Exhibit III-21: Other Accidents in Rolling Stock by Geography/Crew Size, 2006-2019

Per million train-km

Exhibit III-22: T-Test Results for Other Accidents, 2006-2019

<table>
<thead>
<tr>
<th>Read across row</th>
<th>US Class I</th>
<th>W Eur 1-Person</th>
<th>W Eur 2-Person</th>
<th>E Eur 1-Person</th>
<th>E Eur 2-Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Class I</td>
<td>NA</td>
<td>Better</td>
<td>No Sig Dif</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Western Europe 1-Person</td>
<td>Worse</td>
<td>NA</td>
<td>No Sig Dif</td>
<td>Better</td>
<td>No Sig Dif</td>
</tr>
<tr>
<td>Western Europe 2-Person</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
<td>NA</td>
<td>Better</td>
<td>No Sig Dif</td>
</tr>
<tr>
<td>Eastern Europe 1-Person</td>
<td>Worse</td>
<td>Worse</td>
<td>Worse</td>
<td>NA</td>
<td>No Sig Dif</td>
</tr>
<tr>
<td>Eastern Europe 2-Person</td>
<td>Worse</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
<td>NA</td>
</tr>
</tbody>
</table>

4. Employee Fatalities

Employee fatalities include the immediate death (or death within 30 days) of any person whose employment is in connection with a railway and is at work at the time of the accident.

This includes the crew of the train, persons handling rolling stock and infrastructure installations, and contractors. Employee suicides are not included. FRA data could not be aligned with ERA data; thus the comparison excludes US Class I railroads.

71 “Common Safety Indicators,” ERA; “Accident/Incident Report,” FRA; Oliver Wyman analysis.
72 “Common Safety Indicators,” ERA; “Accident/Incident Report,” FRA; Microsoft Excel, “T-TEST” function; Oliver Wyman analysis. Numerical results of the t-test are contained in Appendix D.
Western Europe one-person operations have had the lowest consistent rate of employee fatalities, while Eastern Europe regardless of crew size has shown higher rates and greater variability (Exhibit III-23). Western Europe two-person (Portugal) had zero fatalities between 2011 and 2017 but a higher rate in other years.

The FRA has opined that “In rare instances, having a second crew member aboard may result in an additional injury or fatality if a serious accident occurs.” Based on Oliver Wyman’s analysis, it may be true in Europe that a second crew member on board leads to a higher fatality rate, based on the performance of one-person operations in Western Europe. However, there is no statistically significant difference in employee fatality rates in Eastern Europe based on crew size. The spikes seen in Exhibit III-23 are more prominent for European two-person crew operations and could be the result of an additional crew fatality in an accident, or it could be the result of additional accidents. The ERA data, unfortunately, does not have the necessary level of detail to examine individual accidents.

The statistical test in Exhibit III-24 shows that Western Europe one-person operations have a better record for employee fatalities than Eastern Europe, and that within Eastern Europe fatality rates are unrelated to crew size.

Exhibit III-23: Railroad Employee Fatalities by Geography and Crew Size, 2006-2019

Exhibit III-24: T-Test Results for Railroad Employee Fatalities, 2006-2019

5. Economic Impact and Signals Passed at Danger

The economic impact of accidents is determined in Europe by the sum of the value of preventing a casualty, the cost of environmental, rolling stock, and infrastructure damage; and the value of time (economic costs incurred by users of railway services). This information is not provided in available FRA data, so this section will focus solely on the ERA data.

74 “Common Safety Indicators,” ERA; Oliver Wyman analysis.
75 “Common Safety Indicators,” ERA; Microsoft Excel, “T-TEST” function; Oliver Wyman analysis. Numerical results of the t-test are contained in Appendix D.
76 The willingness to pay for reductions in individual risk of injury or death plus the medical and rehabilitation cost of the individual, legal costs, investigative costs, emergency services, insurance, indirect costs of lost individual economic utility, and the like.
As shown in Exhibit III-25, more variable rates of economic impact for Eastern Europe have declined over time and economic impacts for both European one-person and two-person operations now fall within roughly the same range.

**Exhibit III-25: Economic Impact per Significant Accident, by Geography/Crew Size**

Thousands of euros, 2006-2019, US data not available

The statistical test in Exhibit III-26 indicates that there is no statistically significant difference in the total economic impact of an accident between one-person and two-person crew operations. While Western Europe one-person operations do show a lower economic impact per accident than the other categories, which suggests that these accidents may be less severe, this appears to be unrelated to crew size and is likely related to higher capital expenditure per track-km, as previously discussed.

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77 “Common Safety Indicators,” ERA.
### Exhibit III-26: T-Test Results for Economic Impact per Significant Accident, 2006-2019

<table>
<thead>
<tr>
<th>Read across row</th>
<th>W Eur 1-Person</th>
<th>W Eur 2-Person</th>
<th>E Eur 1-Person</th>
<th>E Eur 2-Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Europe 1-Person</td>
<td>NA</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Western Europe 2-Person</td>
<td>Worse</td>
<td>NA</td>
<td>No Sig Dif</td>
<td>Better</td>
</tr>
<tr>
<td>Eastern Europe 1-Person</td>
<td>Worse</td>
<td>No Sig Dif</td>
<td>NA</td>
<td>No Sig Dif</td>
</tr>
<tr>
<td>Eastern Europe 2-Person</td>
<td>Worse</td>
<td>Worse</td>
<td>No Sig Dif</td>
<td>NA</td>
</tr>
</tbody>
</table>

Signals passed at danger (SPADs) occur any time a train, or part of a train, proceeds beyond its authority. Also known as red-block violations in the US, SPADs are widely considered to be a precursor to accidents. As such, SPADs would appear to be an indicator of task overload and loss of situational awareness. Many of the automatic train protection (ATP) systems in use in Europe and ATS (Automatic Train Stop) used in the US do not stop the train until after the red signal is passed. More advanced ERTMS systems and PTC can actually prevent SPADs.

Exhibit III-27 illustrates SPAD rates for Europe since 2006. Across the entire 14 years of data, Western Europe has shown a lower average incident rate of SPADS compared to Eastern Europe, regardless of crew size.

Oliver Wyman’s analysis however indicates there is no statistically significant difference in the rates of SPADs in European countries, whether or not they use one-person or two-person crews (Exhibit III-28). Thus, there is no evidence that one-person crews are “overloaded,” resulting in a higher rate of SPADs and therefore a higher rate of accidents.

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78 “Common Safety Indicators,” ERA; Microsoft Excel, “T-TEST” function; Oliver Wyman analysis. Numerical results of the t-test are contained in Appendix D.
Assessment of European and US Railways

Exhibit III-27: Signals Passed at Danger, Average for 2006-2019

Per million train-km, US data not available

Exhibit III-28: T-Test Results for Signals Passed at Danger, 2006-2019

<table>
<thead>
<tr>
<th>Read across row</th>
<th>W Eur 1-Person</th>
<th>W Eur 2-Person</th>
<th>E Eur 1-Person</th>
<th>E Eur 2-Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Europe 1-Person</td>
<td>NA</td>
<td>Worse</td>
<td>No Sig Dif</td>
<td>Better</td>
</tr>
<tr>
<td>Western Europe 2-Person</td>
<td>Better</td>
<td>NA</td>
<td>No Sig Dif</td>
<td>Better</td>
</tr>
<tr>
<td>Eastern Europe 1-Person</td>
<td>No Sig Dif</td>
<td>No Sig Dif</td>
<td>NA</td>
<td>No Sig Dif</td>
</tr>
<tr>
<td>Eastern Europe 2-Person</td>
<td>Worse</td>
<td>Worse</td>
<td>No Sig Dif</td>
<td>NA</td>
</tr>
</tbody>
</table>

F. Summary

In Western Europe, where the use of one-person crews is nearly universal (excepting Portugal), accident rates are significantly lower than in Eastern Europe, where countries vary more in crew size. Rather than being a function of crew size, however, lower accident rates in Western Europe appear to be driven by the kind of investments that mature economies make in infrastructure and technology – the same kind of investments that US railroads have made and

79 “Common Safety Indicators,” ERA.
80 “Common Safety Indicators,” ERA; Microsoft Excel, “T-TEST” function; Oliver Wyman analysis. Numerical results of the t-test are contained in Appendix D.
continue to make, to the tune of billions of dollars in capital spending each year. Differences in infrastructure spending between Western Europe and the United States reflect variations in infrastructure usage. In particular, higher-density, faster multi-modal operations on main lines, and much more expansive passenger services in Western Europe necessitate much higher levels of infrastructure spend.

In Eastern Europe, where countries vary more in their policy regarding crew size, it is possible to more directly compare concurrent experience with one-person and two-person crews across a range of accident types. In the case of significant accidents, analysis yielded no evidence that two-person crews provide any safety advantages over one-person crews. The European data also shows that the economic impact of accidents is not alleviated by having a second person in the cab. Nor did Oliver Wyman’s analysis find a higher level of signals passed at danger for one-person crews, despite the increased transactional workload on the European network.

Looking at readily available and current data on European and US accident rates, it is difficult to see why two-person crews should be the presumptive standard for the United States, when one-person crews have been the longstanding presumptive standard on the far busier European network. Further, when we specifically compare countries operating with one-person crews against those operating with two-person crews, we cannot conclude that two-person crews provide any greater level of safety. And it is Oliver Wyman’s expectation that within the next decade, all remaining countries in Europe using two-person crews will convert to one-person crews.  

---

Appendix A. European Advanced Safety Technology\textsuperscript{82}

The European Union is in the process of implementing the European Railway Traffic Management System (ERTMS) to increase rail safety. The ERTMS system enforces compliance with speed restrictions and signals by trains. By 2030, it is expected to cover nearly 50,000 kilometers of track. ERTMS will replace national ATP/ATC\textsuperscript{83} systems with a European-wide system of automatic train protection and control, further enhancing interoperability. ERTMS consists of two subs-systems:

\begin{itemize}
  \item ETCS (European Train Control System), a standardized automatic train protection system that continuously ensures that the train does not exceed the safe speed and distance.
  \item GSM-R (Global System for Mobile Communications - Railways), a dedicated radio communication system for voice and data services supporting railway operations and communications.
\end{itemize}

ERTMS will replace more than 20 different train command and control systems (and locomotives might be equipped with up to seven different navigational systems). This multitude of systems has impeded the EU’s goal of interoperability and added significant cost and complexity. For this reason, starting in the early 1990s, the European Commission (EC) seated working groups to define new communication and signaling standards. At the end of 1993, the EU Council issued an Interoperability Directive and a decision was taken to create a structure to define the Technical Specification for Interoperability.

\footnotesize
\textsuperscript{82} UNIFE, European Commission, UIC.
\textsuperscript{83} ATP provides either a continuous or regular update of speed monitoring for each train (using trackside equipment) and causes the brakes to apply if the driver fails to bring the speed within the required profile. ATC is an integrated signaling system that guarantees the secure movement of trains. It integrates various subsystems positioned on-board and wayside, including ATP.
At the beginning of the 4th Framework Programme, in 1995, the EC defined a global strategy for the further development of ERTMS, with the aim to prepare for its future implementation on the European rail network. This strategy included a validation phase to perform full-scale tests on-site in different countries (France, Germany, and Italy).

In the summer of 1998, UNISIG, comprising the European signaling companies, was formed to finalize specifications. The specifications continue to be subsequently reviewed to include additional functionalities and to better meet the needs of railway companies and infrastructure managers. To ensure that ERTMS is constantly adapted to railways’ needs, technical specifications are maintained under the lead of the European Railway Agency, in cooperation with the signaling industry and railway stakeholders.

In parallel to this specification work, a joint effort from the EU and the Member States to finance ERTMS/ETCS was implemented. Four successive Memoranda of Understanding have been signed between 2005 and 2016 by the EC and the railway stakeholders to further deploy ERTMS on Europe’s rail network. “Priority” corridors were identified for ERTMS deployment, while specially crafted financial incentives were designed to support both infrastructure and onboard installation.

The European Commission is currently focusing on the implementation of ERTMS on six of nine “Core Network Corridors” (CNC), which are high-density corridors that cross multiple countries and carry both passenger and freight traffic (Exhibit A-1).
All EEA-28 countries are expected to implement ERTMS along the portions of these corridors that cross their countries. In addition, new infrastructure projects (or significant upgrades) are to include ERTMS. The current “European Deployment Plan” (EDP), implemented into regulation in January 2017, sets deadlines for the implementation of ERTMS on the CNCs for 2017-2023. To date, 24 countries have begun implementing ERTMS, led by Belgium, Spain, and France (Exhibit A-2).

ERTMS has multiple “levels” of deployment. Levels 0-2 are operational. Level 3 is a planned future development:

- **ERTMS Level 0** consists of ETCS-compliant locomotives or rolling stock that interact with lineside equipment that is non-ETCS compliant. Frequently equipped with ATP/ATC (Automatic Train Protection/Automatic Train Control) systems. European Level 0 is similar to non-PTC-equipped operations in much of North America. This system is equivalent to European automatic train control/automatic train protection (ATC/ATP) systems and stops trains which run past stop signals and which do not slow for restricting signals.

- **ERTMS Level 1** is designed as an add-on or overlays a conventional line already equipped with lineside signals and train detectors. Communication between the tracks and the train is
ensured by dedicated transponders (known as “Eurobalises”) located on the trackside adjacent to the lineside signals at required intervals and connected to the train control center. It is an intermittent system, as the signaling system transmits data to the train through the fixed-position transponders.

Receiving movement authority through the Eurobalises, the ETCS onboard equipment automatically calculates the maximum speed of the train and the next braking point if needed, taking into account train braking characteristics and track description data. This information is displayed to the driver through a dedicated screen in the cabin. The speed of the train is continuously supervised by the ETCS onboard equipment. Thus, the train will automatically brake if exceeding the maximum speed allowed under the movement authority.

The US equivalent of Level 1 appears to be Amtrak’s ACSES, because of its reliance on fixed transponders. ACSES provides the ability to bring a train to a full stop before passing a red signal, slow trains through speed restricted areas, prevent incursions into work zones, and prevent train movement through a main line switch in the improper position.

- **ERTMS Level 2** does not require lineside signals. The movement authority is communicated directly from a Radio Block Centre (RBC) to the onboard unit using GSM-R. The balises are only used to transmit “fixed messages” such as location, gradient, speed limit, etc. A continuous stream of data informs the driver of line-specific data and signals status on the route ahead, allowing the train to reach its maximum or optimal speed but still maintaining a safe braking distance factor.

PTC functionality developed and deployed by US freight railroads appears to be similar to ERTMS/ETCS Level 2, due to the direct and continuous transmission of authorities, position, aspects of lineside signals, switch positions, etc. between back offices, trains, and wayside
equipment. In the US case, lineside signals will still be used for the most part. PTC also is largely an overlay system, using many of the same blocks, signals, etc., used in the pre-PTC days.

- **ERTMS Level 3**, still in its conceptual phase, introduces a “moving block” technology.

Under ERTMS level 1 and 2, movement authorities are determined using “fixed blocks” – a section of tracks between two fixed points which cannot be used by two trains at the same time. With ERTMS level 3, accurate and continuous position data is supplied to the control center directly by the train, rather than by track-based detection equipment. As the train continuously monitors its own position, there is no need for “fixed blocks” – rather, the train itself will be considered as a moving block. There are no immediate plans to implement an equivalent to ERTMS Level 3 in the United States, although research is being done on moving block technologies.

The Rail Safety Improvement Act (2008) required each Class I railroad carrier and each entity providing regularly scheduled intercity or commuter rail passenger transportation to implement positive train control (PTC) on all segments or routes of mainline railroad tracks that (a) carry intercity passenger or commuter rail service, or (b) carry more than five million gross tons of freight per year and also are used for transporting poison-by-inhalation hazardous materials (PIH) (more commonly known as TIH – toxic inhalation hazard). PTC has been implemented on 57,536 miles of railroad track, equal to 62 percent of the Class I route network and over 99 percent of the designated PTC required route-miles.

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86 P.L. 110-432, §104.
As per federal law, PTC it is a “system designed to prevent train-to-train collisions, over speed derailments, incursions into established work zone limits, and the movement of a train through a switch left in the wrong position.” The government has not imposed technical specifications for PTC systems, but all PTC systems share similar characteristics, and most importantly, from a safety perspective, “if the locomotive is violating a speed restriction or movement authority, onboard equipment will automatically slow or stop the train.”

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88 US Code of Federal Regulations, Title 49, Section §236.
Appendix B. Safety Analysis Definitions and Reporting

1. Safety Analysis Definitions

The following definitions apply to the analysis of the European Union Agency for Railway safety statistics in Section III:

- **Accidents to persons caused by rolling stock in motion:** one or more persons that are either hit by a railway vehicle or by an object attached to or that has become detached from the vehicle. Persons that fall from railway vehicles are included, as well as persons that fall or are hit by loose objects when travelling on-board vehicles.

- **Collisions:** covers both collisions of trains and collisions with obstacles within the clearance gauge. Includes front to front, front to end or a side collision between a part of a train and a part of another train, as well as with shunting rolling stock or fixed or temporarily present objects on or near the track (except at level crossings if the object was lost by a crossing vehicle/user)

- **Derailments:** any case in which at least one wheel of a train leaves the rails.

- **Economic impact of accidents:** The sum of the value of preventing a casualty (payment for reductions in individual risk of injury or death plus the medical and rehabilitation cost of the individual, legal costs, investigative costs, emergency services, insurance, indirect costs of lost individual economic utility, and the like), cost of environmental damage, cost of rolling stock damage, cost of infrastructure damage, and the value of time (economic costs incurred by users of railway services).

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- **Employee fatalities**: the immediate death (or death within 30 days) of any person whose employment is in connection with a railway and is at work at the time of the accident. This includes the crew of the train, persons handling rolling stock and infrastructure installations, and contractors. Employee suicides are not included.

- **Level crossings**: accidents at level crossings involving at least one railway vehicle and one or more crossing vehicles, other crossing users such as pedestrians or other objects temporarily present on or near the track that were lost by a crossing vehicle/user.

- **Other accidents**: all accidents other than train collisions, train derailments, at level crossings, to persons caused by rolling stock in motion, and fires in rolling stock.

- **Signals passed at danger**: any time that a train, or part of a train, proceeds beyond its authority.

- **Significant accident**: any accident involving at least one rail vehicle in motion, resulting in at least one killed or seriously injured person, or in significant damage to stock, track, other installations or environment, or extensive disruptions to traffic. Accidents in workshops, warehouses, and depots are excluded. Significant damage is damage that is equivalent to €150,000 or more.

### 2. Availability and Reporting Requirements

Data covering many different aspects of railroad incidents, accidents, and casualties is generated by railroads and tracked by rail regulatory authorities. Reporting categories for equipment and infrastructure incidents and accidents include collisions, derailments, fires, explosions, acts of god, and other events involving mechanical or infrastructure failure or human error that result in damage. Reporting categories for casualties include injuries resulting in
medical treatment, loss of consciousness, time away from work, restricted work, job transfer, and death.

The FRA and ERA both collect incident data from the railroads and store the information in electronic databases that are available to the general public.\(^{91}\) Data collection is ongoing, and thus data is both current and supported by many years of history. Additionally, the incident, accident, and casualty reports provided by the railroads are required by US and EU laws and regulations, and must therefore contain information that is accurate and complete to the highest degree possible.

- Under US federal law, railroads are required to report all fatalities, grade crossing collisions, grade crossing signal equipment failures, and rail traffic signal equipment failures to the FRA. In addition, railroads must report rail equipment incidents and personal injuries to the FRA subject to certain financial and medical treatment thresholds, respectively. Publicly available data is grouped into the following categories: rail equipment accidents, railroad casualties, highway-rail accidents, and signal equipment failures. The FRA also collects operational data from the various railroad companies concerning train-miles and employee hours to provide a basis of comparison for safety data.

- In the European Union, member state railroad regulatory agencies are required to report safety-related incidents meeting certain specified thresholds to the ERA. Publicly available data is grouped into the following categories: rail equipment accidents, railroad casualties, grade-crossing accidents, and signals passed at danger (SPADs).\(^ {92}\) Like the FRA, the ERA


\(^{92}\) According to the ERA, SPADs occur when any part of a train proceeds beyond its authorized movement.
also collects operational data for the purpose of providing a consistent basis for comparison of safety statistics.

For the purposes of comparison of FRA and ERA data, it should be noted that each organization has its own mandates detailing which data is to be collected and at what level of detail. These differences are largely due the agencies’ different purposes in collecting data:

- The FRA uses the data it collects to develop hazard elimination and risk reduction programs for the railroad industry that focus on preventing railroad injuries and accidents.\(^{93}\) To develop effective safety programs, the FRA must collect data concerning not only the “who, what, and where” of an incident, but also the “how and why.” Thus, the safety data collected by the FRA includes all of the basic information concerning an incident, as well as information on the underlying causes and circumstances.

- The ERA collects statistics based on agency-defined common safety indicators (CSIs) “to facilitate the assessment of the achievement of [common safety targets] and to provide for the monitoring of the general development of railroad safety.”\(^{94}\) CSIs are not expected to provide the same level of detail as the safety databases of individual railroads and infrastructure management companies, which are tailored to specific company needs.\(^{95}\) Consequently, the available public data provides for limited analysis of underlying incident causes and circumstances.

Exhibit B-1 contains a summary of key differences between the FRA and ERA data.

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Exhibit B-1: Differences in FRA and ERA Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Item</th>
<th>FRA</th>
<th>ERA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serious injuries</td>
<td>Hospitalization</td>
<td>Hospital stays not reported</td>
<td>Only reported if there is a 24-hour minimum hospital stay</td>
</tr>
<tr>
<td>Fatalities</td>
<td>Length of time after accident</td>
<td>Any fatality occurring within 180 days of the accident is recorded</td>
<td>Any fatality occurring within 30 days of the accident is recorded</td>
</tr>
</tbody>
</table>

It should be noted that only certain data will be relevant to evaluating the effect of road train crew size on railroad safety; specifically, this includes data on incidents where the crew has some control, and where the presence of multiple persons versus one person in the cab could arguably make a difference in the outcome of the incident. Such incidents potentially could include equipment incidents (train derailments, collisions, etc.) and casualties (injuries and fatalities).

3. US Class I versus Other US Railroads

The FRA Accident/Incident data includes separate reporting for some subsidiaries of the US Class I railroads. Exhibit B-2 contains the full list of railroads included in US Class I data.

Exhibit B-2: US Class I Railroads in the FRA Accident/Incident Data

<table>
<thead>
<tr>
<th>Group</th>
<th>System</th>
<th>Railroad</th>
<th>Name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>BNSF</td>
<td>BNSF</td>
<td>BNSF Railway Company</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>BLE</td>
<td>Bessemer &amp; Lake Erie Railroad Company</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>CC</td>
<td>Chicago, Central &amp; Pacific Railroad Company</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>CEDR</td>
<td>Cedar River Railroad Company</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>CN</td>
<td>Canadian National</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>DWP</td>
<td>Duluth, Winnipeg &amp; Pacific Railway</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>EJE</td>
<td>Elgin, Joliet &amp; Eastern Railway Company</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>GTW</td>
<td>Grand Trunk Western Railroad Incorporated</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>IC</td>
<td>Illinois Central Railroad Company</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>MMR</td>
<td>Minnesota &amp; Manitoba Railroad</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>PI</td>
<td>Paducah &amp; Illinois Railroad Company</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>CN</td>
<td>WC</td>
<td>Wisconsin Central Ltd. (also Railway)</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>CP</td>
<td>CP</td>
<td>Canadian Pacific</td>
<td></td>
</tr>
</tbody>
</table>
### Assessment of European and US Railways

<table>
<thead>
<tr>
<th>Group</th>
<th>System</th>
<th>Railroad</th>
<th>Name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>CP</td>
<td>DH</td>
<td>Delaware &amp; Hudson Railway Company</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>CP</td>
<td>DME</td>
<td>Dakota, Minnesota &amp; Eastern Railroad</td>
<td>Include starting November 2008</td>
</tr>
<tr>
<td>Class I</td>
<td>CP</td>
<td>ICE</td>
<td>Iowa Chicago and Eastern Railroad Corporation</td>
<td>Include starting November 2008</td>
</tr>
<tr>
<td>Class I</td>
<td>CP</td>
<td>SOO</td>
<td>SOO Line Railroad Company</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>CSX</td>
<td>CSX</td>
<td>CSX Transportation</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>KCS</td>
<td>GWWE</td>
<td>Gateway Eastern Railroad Company</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>KCS</td>
<td>KCS</td>
<td>Kansas City Southern Railway Company</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>KCS</td>
<td>TM</td>
<td>Texas Mexican Railway Company</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>NS</td>
<td>NS</td>
<td>Norfolk Southern Corporation</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>UP</td>
<td>UP</td>
<td>Union Pacific Railroad Company</td>
<td></td>
</tr>
</tbody>
</table>
Appendix C. Data Sources

The safety data for the analyses contained in this report was obtained from the European Railway Agency’s European Railway Accident Information Links web page at https://erail.era.europa.eu/safety-indicators.aspx, and downloaded as an Excel spreadsheet. This Excel spreadsheet contained data on a variety of safety statistics for 2006 through 2019 for 28 European countries and the Channel Tunnel. Additionally, the European Railway Agency’s “Report on Railway Safety and Interoperability in the EU, 2020” is also available on the web page.

The data for infrastructure investment was obtained from the Organization for Economic Co-operation and Development (OECD) web page at https://data.oecd.org/transport/infrastructure-investment.htm. Using the filters on this web page, rail infrastructure investment was selected.


Finally, the information on crew size was based on Oliver Wyman knowledge, supplemented with a survey of countries were crew size data was unknown.

- The survey identified two-person crews in Bulgaria, Greece, Latvia, Portugal, and Romania. One-person crews were identified in Czechia, Hungary, Lithuania, and Slovakia.
- Estonia uses two-person crews for freight trains and one-person crews for passenger trains, thus Estonia was classified as using two-person crews. Note that one person in the cab and other crew members aboard the train on passenger trains is consistent with US practices.96

96 As noted previously, a “one-person crew” means one person in the cab of the locomotive, without regard to whether, in the case of passenger service, there is an additional rail employee in the passenger section of the train (i.e., a conductor). Note that in Germany and possibly other countries, some passenger trains are operated with no additional rail employees in the passenger consist.
In Croatia, crew size varies with the type of locomotive and installed safety equipment, such as deadman controls and cab signaling, so crew size was listed as “undetermined.” We were unable to identify the crew size in Slovenia and so listed it as “undetermined” as well.
Appendix D. T-Test Numerical Results

The following series of tables contain the details of the t-test run in Microsoft Excel. A t-test is used to determine whether two samples are likely to have the same mean and to have come from the same data population. This is used in hypothesis testing, for example, in a clinical trial where a group receiving a new drug is compared to a control group receiving a placebo to test whether there is a statically significant difference in the mean of a monitored outcome. The analysis in the report, however, was based on observational data and did not have a control group like a clinical trial. Therefore, the results can identify statistical differences in the data categories but cannot prove causation.

The null hypothesis was that there is no difference in means between two different data categories. The null is rejected if the result of the t-test is less than 0.05, which is equivalent to a 95 percent chance the two means are different. A two-tailed test assuming unequal variances was used in all cases. The column labeled “Mean” contains the arithmetic mean of accident rates for each year between 2006 and 2019, inclusive.

For the table “all significant accidents,” the t-test returned 0.0227 for US Class I versus Eastern Europe one-person. This value is below 0.05, indicating the hypothesis of zero difference in means should be rejected, i.e., there is a statistically significant difference between the mean of US Class Is (2.918 significant accidents per million train km) and the mean of Eastern Europe one-person (2.153). Since the mean of the US Class Is is higher than Eastern Europe one-person, the accident rate for US Class Is is considered “worse” based on this data. Conversely, the results of the t-test for Eastern Europe one-person and Eastern Europe two-person is 0.8809, which is greater than 0.05, indicating the hypothesis is accepted that there is no difference in means.
The t-tests above were conducted by giving equal weight to each country, so that countries with significantly more train activity, such as Germany, did not dominate countries with less train activity. To determine whether this equal weighting introduced any unplanned biases in the results,
t-tests were performed on the “All Significant Accidents” category, with the countries weighted by track-kilometers. The following results were obtained:

While there are differences in the values from weighted t-tests compared to those from unweighted t-tests, no values crossed the 0.05 threshold between tests. In other words, the conclusions stated in Exhibit III-8 (shown below) apply to both the unweighted and weighted datasets of all significant accidents, as the weighted t-tests did not change any crew/region comparisons from not statistically significant to statistically significant or vice versa.

### T-Test Results for All Significant Accidents, 2006-2019

<table>
<thead>
<tr>
<th>Read across row</th>
<th>US Class I</th>
<th>W Eur 1-Person</th>
<th>W Eur 2-Person</th>
<th>E Eur 1-Person</th>
<th>E Eur 2-Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Class I</td>
<td>NA</td>
<td>Worse</td>
<td>Worse</td>
<td>Worse</td>
<td>Worse</td>
</tr>
<tr>
<td>Western Europe 1-Person</td>
<td>Better</td>
<td>NA</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Western Europe 2-Person</td>
<td>Better</td>
<td>Worse</td>
<td>NA</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Eastern Europe 1-Person</td>
<td>Better</td>
<td>Worse</td>
<td>Worse</td>
<td>NA</td>
<td>No Sig Dif</td>
</tr>
<tr>
<td>Eastern Europe 2-Person</td>
<td>Better</td>
<td>Worse</td>
<td>Worse</td>
<td>No Sig Dif</td>
<td>NA</td>
</tr>
</tbody>
</table>

The European Railway Agency and the FRA use different reporting thresholds for recording employee fatalities, therefore only the ERA data was used for consistency.

<table>
<thead>
<tr>
<th>Employee fatalities</th>
<th>Mean</th>
<th># Countries</th>
<th>W Eur 1-Person</th>
<th>W Eur 2-Person</th>
<th>E Eur 1-Person</th>
<th>E Eur 2-Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Europe 1-Person</td>
<td>0.007</td>
<td>16</td>
<td>NA</td>
<td>0.1515</td>
<td>0.0036</td>
<td>0.0007</td>
</tr>
<tr>
<td>Western Europe 2-Person</td>
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<td>0.1515</td>
<td>NA</td>
<td>0.8294</td>
<td>0.1471</td>
</tr>
<tr>
<td>Eastern Europe 1-Person</td>
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<td>4</td>
<td>0.0036</td>
<td>0.8294</td>
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<td>0.0876</td>
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<tr>
<td>Eastern Europe 2-Person</td>
<td>0.036</td>
<td>5</td>
<td>0.0007</td>
<td>0.1471</td>
<td>0.0876</td>
<td>NA</td>
</tr>
</tbody>
</table>

97 “Common Safety Indicators data,” ERA; “Accident/Incident Report,” FRA; Microsoft Excel, “T-TEST” function; Oliver Wyman analysis.
The FRA does not report signals passed at danger, therefore only the ERA data was used.

<table>
<thead>
<tr>
<th>Country</th>
<th>Mean</th>
<th># Countries</th>
<th>W Eur 1-Person</th>
<th>W Eur 2-Person</th>
<th>E Eur 1-Person</th>
<th>E Eur 2-Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Europe 1-Person</td>
<td>0.857</td>
<td>16</td>
<td>NA</td>
<td>0.0004</td>
<td>0.5521</td>
<td>0.0259</td>
</tr>
<tr>
<td>Western Europe 2-Person</td>
<td>0.531</td>
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<td>NA</td>
<td>0.2195</td>
<td>0.0007</td>
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<td>0.2195</td>
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<td>Eastern Europe 2-Person</td>
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<td>5</td>
<td>0.0259</td>
<td>0.0007</td>
<td>0.7439</td>
<td>NA</td>
</tr>
</tbody>
</table>

The FRA does not report economic damage, therefore only the ERA data was used.

Economic damage is in thousands of euros.

<table>
<thead>
<tr>
<th>Country</th>
<th>Mean</th>
<th># Countries</th>
<th>W Eur 1-Person</th>
<th>W Eur 2-Person</th>
<th>E Eur 1-Person</th>
<th>E Eur 2-Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Europe 1-Person</td>
<td>410,329 €</td>
<td>16</td>
<td>NA</td>
<td>0.0060</td>
<td>0.0186</td>
<td>0.0043</td>
</tr>
<tr>
<td>Western Europe 2-Person</td>
<td>700,445 €</td>
<td>1</td>
<td>0.0060</td>
<td>NA</td>
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<td>0.0438</td>
</tr>
<tr>
<td>Eastern Europe 1-Person</td>
<td>1,119,030 €</td>
<td>4</td>
<td>0.0186</td>
<td>0.1397</td>
<td>NA</td>
<td>0.6528</td>
</tr>
<tr>
<td>Eastern Europe 2-Person</td>
<td>1,281,625 €</td>
<td>5</td>
<td>0.0043</td>
<td>0.0438</td>
<td>0.6528</td>
<td>NA</td>
</tr>
</tbody>
</table>
BEFORE THE KANSAS DEPARTMENT OF TRANSPORTATION

K.A.R. 36-43-1. CREW REQUIREMENTS

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

EXHIBIT 4

Oliver Wyman, Assessment of Conductor and Engineer In-Cab Work Activities (May 14, 2021)
Expert Report Prepared for:
The National Railway Labor Conference

Assessment of Conductor and Engineer
In-Cab Work Activities

By:

OLIVER WYMAN
1166 Avenue of the Americas
New York, NY 10036

May 14, 2021
Contents

I. Executive Summary ............................................................................................................. 3
   A. Study Purpose and Scope ............................................................................................ 3
   B. Oliver Wyman Overview ............................................................................................ 3
   C. Key Findings .............................................................................................................. 4

II. Background: Locomotive Cab Systems and PTC Technology ...................................... 10
   A. Engineer and Conductor In-Cab Locomotive Controls ............................................ 10
   B. Positive Train Control Technology ......................................................................... 16

III. Traditional Conductor In-Cab Tasks ........................................................................... 18
   A. Routine In-Cab Conductor Tasks .............................................................................. 18
   B. In-Cab Conductor Tasks in Special Situations ......................................................... 20

IV. Conductor Tasks in PTC-Equipped Locomotives ......................................................... 22
   A. Replacement of Routine In-Cab Conductor Tasks by PTC ....................................... 22
   B. Validation of PTC Replacing Conductor Activities ................................................. 27
   C. In-Cab Conductor Tasks in Special Situations with PTC ....................................... 29

V. Analysis of Engineer Workload in PTC-Equipped Locomotives ................................... 33
   A. Human Factors Analysis of Engineer-Only Train Operation .................................. 33
   B. Impact of Energy Management Systems on Engineer-Only Train Operation .......... 37

Appendix A. Study Methodology ...................................................................................... 39
I. Executive Summary

A. Study Purpose and Scope

Oliver Wyman was asked to conduct an assessment of in-cab only engineer and conductor work activities on Class I freight trains, where locomotives are equipped with positive train control (PTC) and operating in PTC territory. The goal of this assessment was twofold: 1) to ascertain whether and to what extent PTC alters or eliminates the need for specific conductor roles and responsibilities in the locomotive cab, and 2) to determine whether engineers can safely operate a through-freight train in PTC territory without an onboard conductor.

B. Oliver Wyman Overview

Oliver Wyman is a leading general management consulting firm with 60+ offices in 31 countries. It maintains one of the largest practices in the world dedicated to serving the rail industry. The practice provides a comprehensive set of services and capabilities to rail carriers across all modes and to the users and regulators of rail services. Oliver Wyman rail experts involved in the development of this report include:

- Rodney Case, an emeritus Oliver Wyman Partner, with 30 years of rail operational and consulting experience. Mr. Case is an international expert in rail operations planning, the application of emerging technology to rail operations, rail infrastructure design, strategy development, and performance management. Mr. Case was employed for 17 years at a Class I in varying roles, from engineering maintenance, field operations management, and labor negotiations to network planning. Mr. Case also was formerly an executive at SNCF, a major European freight railway using one-person crews.

- William J. Rennicke, an Oliver Wyman Partner, with more than four decades of experience as a railroad executive and consultant. Mr. Rennicke has worked with railroads on six
continents and specializes in railroad strategic planning and operations. He has held rail operational positions at the Southern Pacific (now Union Pacific) and New Haven (now CSX) railroads and was a vice president of the Boston & Maine Railroad.

- David Hunt, an Oliver Wyman Vice President, with more than 30 years of experience in rail operations and strategic planning, transportation policy, and rail technology. Mr. Hunt is a member of the Transportation Research Board's Railroad Operating Technologies Committee and a former Chair of the Railway Applications Section of the Institute for Operations Research and the Management Sciences (INFORMS).

C. Key Findings

Oliver Wyman’s overall finding is that for freight trains with PTC-equipped locomotives and operating in PTC territory, there is no continuing need for a second in-cab train crew member. This finding is based on Oliver Wyman’s experience observing in-cab operations and the successful operation of trains by engineer-only crews on high-density lines in North America and worldwide.

This report applies Oliver Wyman’s expertise in train operations, interviews with rail operations and technology experts, and a review of Class I crew duty tours in PTC-equipped locomotives (via in-cab videos) to confirm that there is no longer a meaningful or productive in-cab role for conductors on trains in PTC territory, and that such trains can be safely operated by an engineer only.

Key findings detailed in this report include the following:

- Locomotive design and control technology has evolved so that only the engineer has operational controls that impact the train. The engineer is fully and uniquely responsible for
starting, stopping, and controlling the speed of the train, and for interacting with the PTC system. The conductor does not interact with the PTC system.

- PTC is a fully integrated computerized system, supplemented by satellite and GPS technology, that has been implemented on the most heavily used rail routes in the United States – more than 60 percent of the total network – to enhance the safe operations of trains. PTC’s primary function is to stop a train if it exceeds its authority for a signal indication (i.e., misses a signal) and to monitor train speeds against allowed track speeds. PTC also enables remotely located dispatchers to communicate critical information for the safe operation of the train to a cab display unit (CDU) directly in front of the locomotive engineer. Class I railroads report consistent reliability rates in excess of 98 percent for PTC, and reliability is continually improving as the system matures.

- In-cab work requirements for conductors have changed due to the implementation of PTC. Prior to PTC, routine conductor in-cab activities consisted of communicating with dispatchers, advising the engineer, and record-keeping. Now, where PTC has been installed, it has by design removed the need for conductors to perform these tasks. PTC enables communications to be displayed in the locomotive, monitors and validates signal aspects, receives mandatory directives from dispatchers, and advises the engineer on speed restrictions. All of this information is provided via an interactive cab display unit (CDU) located directly in front of the engineer.
  - Conductors have only one control that can directly impact train operation – a train stop “button” that can be applied in an emergency situation. This stop button is fully redundant, as the conductor is no longer needed to perform emergency train stops – this being one of the primary safety features of PTC.
Oliver Wyman originally developed its finding that safety-critical conductor tasks have been replaced by PTC from locomotive cab rides and a detailed analysis of locomotive operations with one-person crews in other industrialized countries. To confirm and validate this finding, Oliver Wyman analyzed a random sample of more than 100 hours of in-cab videos of freight duty tours in PTC territory that were provided by Class I railroads. On average across these tour videos, conductors engaged in a train operations-related task for less than five minutes per hour. Video observation confirmed that there are no routine conductor activities required for safe train operations.

- The majority of conductor activities observed were related to either: 1) conductors observing railroad policies or processes that have not yet been eliminated, despite the newer technology in use on duty tours, or 2) to keep conductors active and engaged during the tour as a result of the elimination of critical tasks.

- Conductors’ amount of activity per tour was observed to be mostly related to which railroad they work for – confirming that policy differences are ultimately shaping the tasks conductors complete onboard during tours in PTC territory – rather than the work being necessary to the safe operation of the train.

Oliver Wyman’s assessment confirmed that the remaining in-cab duties of conductors center around the safety of trains in infrequent special circumstances. In the short term, some special situations may continue to require conductors, while others could be handled through PTC or the use of ground-based employees instead. Some example considered by Oliver Wyman include:

- Managing the movement of dimensional loads: For excessively large/heavy loads, conductors currently monitor speed restrictions unique to the load and clearances around
trackside structures that are within the loading profile for the load. Speed restrictions for dimensional loads are not currently being entered into PTC, although this is expected to be resolved in the near term. Assigned ground employees could more effectively monitor clearance restrictions in cases where technology does not yet automatically provide this information.

– Poison and toxic inhalation hazard (PIH/TIH) trains: Directives or speed restrictions involving PIH/TIH trains are entered into PTC and communicated to the engineer via the CDU. It is Oliver Wyman’s understanding that at present speed restrictions on PIH/TIH trains operating in high-threat urban areas are not fully integrated into PTC at all of the railroads.

– Standby for emergency situations: A conductor has no specific in-cab tasks related to emergency situations in PTC territory that could not be performed by the engineer. An engineer can change the operation of the train and contact a dispatcher in an emergency. It is the dispatcher who initiates processes to alert first responders and other railroad personnel and to restrict other train movements in the area of the emergency. Out-of-cab repairs/mitigation are not the responsibility of train crews.

– Belief that the conductor is responsible for identifying objects on track: Oliver Wyman observes that there is still an assumption that having a “second set of eyes” might provide earlier warnings of objects on the track, enabling trains to slow or stop faster and lessen accident severity. Real-world braking tests however have found this expectation to be unrealistic, given extremely long stopping distances for trains and limitations on unobstructed lines of sight.
Oliver Wyman also conducted a human factors review (i.e., an assessment of human capabilities and limitations in relation to workload). This review confirmed that a solo engineer can fully manage train operating requirements in PTC territory within acceptable human factors parameters. Past human factor concerns for engineer-only operations – specifically cognitive overload and fatigue/boredom – have been lessened with advanced PTC design that incorporates human factor principles:

- With PTC now widely installed, it is clear that PTC actually reduces an engineer’s “cognitive load”; that is, there is a reduction in multiple-source attention and communication requirements, short-term working memory load, and potential distractions.

- While the level of fatigue/boredom could increase with one person in the cab, federal hours-of-service rules and railroad crew management practices are designed to ensure that train crews only work a set number of hours and are well rested. Engineers have multiple backup safety systems to ensure they are alert and awake: an “alerter” button they must activate regularly (which has been in place for decades), and PTC directives via the CDU that they must accept. If the alerter button is not pressed or PTC system directives are not acknowledged, train controls are taken over by PTC to bring the train to a safe stop.

The engineer’s workload has been further reduced by the implementation of locomotive energy management systems, which maximize fuel efficiency and improve train handling by calculating optimal speeds in all conditions. These systems automatically handle the throttle, brake, and train whistle above 12 mph (similar to cruise control in a car). Enhancements to these systems in the future, known as “zero to zero,” are expected to govern train movement
from start to stop, reducing the engineer’s workload to monitoring systems and communicating with dispatching for the majority of their work period.

- Oliver Wyman’s evaluation thus concludes that there are no significant or empirically justified concerns about the engineer not having the information needed to safely operate the train, about the engineer’s safety or the safe operation of the train, or about the engineer becoming overloaded with simultaneous tasks for engineer-only operations in PTC-equipped trains.
II. Background: Locomotive Cab Systems and PTC Technology

Part A of this section provides an overview of the controls available to the engineer and the conductor while they are in the cab of a locomotive. Part B provides a summary of positive train control (PTC) technology.

A. Engineer and Conductor In-Cab Locomotive Controls

The standard locomotive design has the engineer on the right-hand side of the cab and the conductor on the left-hand side. All controls for operating the train are located on the engineer side of the cab (Exhibit II-1).

Exhibit II-1: Interior of a locomotive showing engineer at controls

The engineer is responsible for starting, stopping, and controlling the speed of the train. The engineer also is responsible for interacting with items on the control panel to enter information into the PTC monitor (including accepting or rejecting directives and entering track information),

1 Image provided by Union Pacific Railroad and used with permission.
monitoring any alerts or warnings on the control panel, and sounding the horn as a warning at some grade crossings and in other situations.

One important item on the engineer side of the train is the “alerter.” This is typically a button that the engineer must press periodically to indicate that the engineer is alert and in control of the train. If the engineer fails to acknowledge the alerter when it flashes and/or makes a sound, then the alerter will increase the intensity of the noise and eventually engage the PTC system to override any manual or automatic controls, and PTC will stop the train as a safety precaution. The faster the train’s speed, the more frequently the alerter must be pressed. A formula used by one railroad is that the alerter must be pressed based on 2400/speed of train. For example, at 40 mph, the alerter must be pressed every 60 seconds (2400/40 mph).

Selected items on the engineer’s control panel are shown in Exhibit II-2. These include:

- **PTC cab display unit (CDU):** an interactive screen that provides information on train speed, speed limits, signal status, etc.
- **Diagnostic display:** provides alerts to monitor the health of the locomotive
- **Independent brake:** controls brakes on the locomotive only
- **Automatic brake:** controls the air brakes that run the length of the train. When engaged, applies pressure to the wheels of each railcar
- **Throttle:** controls the speed of the train
- **Reverse (or reverser):** causes the locomotive to reverse direction when engaged
By contrast, the conductor side of the cab, shown in Exhibit II-3, has limited functionality, with only one control that can directly impact train operation – a train stop “button,” which is a brake valve handle the conductor can apply in an emergency situation to stop the train. Specific items available on the conductor side include:

- **PTC cab display unit (CDU):** a read-only version of the PTC display the engineer uses. The conductor CDU is an image of the screen being viewed by the engineer. The conductor screen cannot be used to enter any data or change the display.
- **Radio:** for communicating with the dispatcher, work crew foremen, and other trains.

---

2 Image provided by Union Pacific Railroad and used with permission.
- **Items the conductor brings (forms, laptop, tablet, rule book, etc.):** any reference items or forms brought into the cab by the conductor; can be electronic or paper (Exhibits II-4 and II-5)

- **Emergency stop button:** a brake valve handle that allows the conductor to stop the train if the engineer cannot or does not apply the brake when necessary.

Exhibit II-3: Conductor work station with non-interactive cab display unit

---

3 Image provided by Union Pacific Railroad and used with permission.
Exhibit II-4: Conductor monitoring paper forms in the locomotive

Exhibit II-5: Conductor on laptop computer in the locomotive

The conductor side of a locomotive cab is intentionally designed without controls to prevent the conductor and engineer from entering conflicting information and to avoid situations where if

---

4 Image provided by Union Pacific Railroad and used with permission.
5 Image provided by Union Pacific Railroad and used with permission.
the conductor were using the PTC display, the ability of the engineer to read or write critical information would be reduced.

Compare the design of a locomotive cab to the controls provided to a pilot and copilot in an airplane cockpit (Exhibit II-6). In a cockpit, the copilot has nearly identical controls as the pilot, along with shared overhead and center console controls. The copilot can alternate operating the flight with the pilot on a fully equal basis, provide the pilot with breaks, and take control of the plane in an emergency situation. In a locomotive, only the engineer can operate the train. And in a PTC-enabled locomotive, should the engineer be unable to operate the train, the train will simply come to a stop on the tracks.

**Exhibit II-6: Example of an airplane cockpit with pilot and copilot controls**

---

^6 Public domain image.
B. Positive Train Control Technology

After more than 20 years of development and testing, PTC has been implemented on the most heavily used rail routes in the United States for the purpose of enhancing the safe operations of trains. PTC’s primary functions are to automate train stops if a train exceeds its authority (e.g., exceeds a signal) and to monitor train speeds against the allowable speed on the line. PTC provides further benefits by communicating critical information for the safe operation of the train directly in front of the engineer to the CDU.

The Railroad Safety Improvement Act of 2008 mandated that all Class I railroads install PTC on all routes where trains carry passengers or hazardous substances.7 This goal was fully met in December 2020, with PTC implemented on 57,500 miles of rail trackage (62 percent of the Class I rail network).8 Different versions of PTC exist in North America, yet each PTC system is fully interoperable with all other PTC systems and provides the same safety features and information, increasing the safety of the freight network as a whole.

PTC is not a single component; instead, it is an integrated computerized system composed of various integrated electronic components, ranging from central computers that control the network, wayside detectors that monitor train movements, in-cab computer screens that provide the engineer with critical information, and locomotive controls that can automatically stop the train for safety reasons.

The central computers in terminals and rail offices send route-specific information to trains before they begin their tours, such as speed restrictions and work zone locations. These guidelines are transmitted via radio towers to locomotives, which have train management

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7 Positive Train Control (PTC) | FRA (dot.gov).
8 Positive Train Control (PTC) | FRA (dot.gov). PTC is installed on 57,536 of 92,282 Class I route-miles.
computers to receive and enforce necessary restrictions en route. Therefore, if the engineer misses a work zone signal, for example, the train management computer will slow down the train automatically. The train management computer is connected to the CDU to allow the engineer and conductor to observe the train’s speed and movement. As noted previously, while engineers have CDUs that are interactive and enable them to communicate with dispatchers, yardmasters, and the central PTC computers, conductors only have non-interactive CDUs at their stations (Exhibit II-3 above).

To further ensure safety, PTC uses satellite and GPS technology to track the locations of trains and send updates of their movements to the central computers. In addition, wayside signaling units along rail tracks monitor trains’ movements and can transmit updates and signals to train management computers and central computers via radio waves.

Through its central computers, train management computers, CDUs, radio network, satellites, GPS signals, and wayside units, the interconnected PTC system increases the safety of train operations.\(^9\) Class I railroads report consistent reliability rates in excess of 98 percent for the PTC system and its various components, and reliability is continually improving as the system matures.\(^{10}\)


\(^{10}\) Based on Oliver Wyman experience and interviews with railroad PTC experts.
III. Traditional Conductor In-Cab Tasks

Prior to the adoption of PTC technology, the conductor was necessarily responsible for a range of in-cab tasks to prevent the engineer from becoming overloaded or to ensure a common understanding of situations that would require changes in train operation during a tour. These routine duties are described in Part A, while Part B describes conductor in-cab activities and expectations for special situations.

A. Routine In-Cab Conductor Tasks

The official duties of a railroad conductor in freight operations are broadly consistent across the US freight rail industry, so when speaking of a “conductor job,” it is possible to speak on behalf of the railroad industry without addressing each railroad individually. The traditional responsibilities of conductors can be subdivided into five functional categories:11

1. **Crew supervision (advising the engineer):** tasks associated with the oversight of railroad personnel, e.g., briefing train crew members on work to be done, movements to be made, and any safety hazards

2. **Dispatcher/crew communication:** tasks related to communication with dispatchers, the train crew, and other personnel, e.g., receiving directives and calling out signals as they are encountered when operating in signal territory

3. **Form and record management:** tasks having to do with the organization and management of forms and records, e.g., updating signal awareness forms

---

11 Note: Oliver Wyman did not review conductor tasks outside of the cab for this study. Federal Railroad Administration, “A Job Analysis Design for the Rail Industry: Description and Model Analysis of the Job of Freight Conductor,” October 2013, pp. 15-16.
4. **Train inspection, troubleshooting, and repair**: tasks related to train inspection and maintenance, e.g., location, inspection, and reporting defects identified by a defect detector.

5. **Train makeup and handling**: tasks pertaining to preparing the train for a trip and general handling of the train, e.g., inspecting and lining switches as required.

Since Oliver Wyman was asked to specifically assess changes to conductors’ in-cab duties, tasks involving briefings prior to the train departure, inspections and troubleshooting outside the cab, and work events involving train makeup or switch inspections that also occur outside the cab are not included in this report. What remains are tasks associated with dispatcher/crew communication (radio correspondence), crew supervision (advising the engineer), and form and record management (completing forms during the trip and referencing rules and bulletins).

It should be noted in regard to “crew supervision” that railroad rule books often state that the conductor is “in charge of the train” but that the engineer is “in control of the train.” In practice, the conductor traditionally advises the engineer on speeds, signals, and directives by calling out changes and alerting the engineer when in violation, but without having the ability to physically control the train or change actions taken by the engineer (other than to force an emergency stop).

The tasks in Exhibit III-1 were identified as being the primary in-cab responsibilities of a conductor on a tour. “Primary responsibilities” in this context refer to traditional in-cab duties a conductor could reasonably be expected to perform on most train trips. Duties that occur infrequently are addressed in Section III.B.

**Exhibit III-1: Traditional routine conductor duties by category**

<table>
<thead>
<tr>
<th>Category</th>
<th>Conductor duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crew supervision (advising the engineer)</td>
<td>Conductor used to supervise crew when there were brakemen, but this has become an advisory role with two-person crews (end-of-train devices and other technology that allowed safe operations by two-person crews were added more than 30 years ago)</td>
</tr>
<tr>
<td></td>
<td>Alerts engineer to changes in speed along the route</td>
</tr>
</tbody>
</table>
### Category

**Conductor duty**

- Alerts engineer to signal status, which governs the movement of the train
- Alerts engineer to any other mandatory directives received
- Place the train in emergency stop if conditions warrant

### Dispatcher/crew communication

- Communicates with dispatcher on mandatory directives or other instructions and relays this information to the engineer
- Communicates with road foremen during the movement of the train through work zones and to comply with Form B requirements
- Communicates with other trains during roll-by inspections or to alert them of any emergency situations
- All other communication with outside parties

### Form & record management

- Responsible for recording signal aspect on signal awareness form, if other than clear, to indicate change in train status
- In addition to receiving mandatory directives from dispatcher and alerting engineer, must write them down
- Responsible for ensuring all paperwork is in order before the train departs, including train journal and air brake slips
- Responsible for recording any trackside detector warnings and any train delays

### B. In-Cab Conductor Tasks in Special Situations

In addition to routine tasks, conductors traditionally performed certain tasks in certain special situations, including dimensional loads, PIH/TIH trains, and emergency situations, as well as watching for objects on the track. The effect of PTC on these situations is discussed in Section IV.C.

**Dimensional Loads**

A small percentage of trains will have one or more cars with a load that is larger or heavier than standard, and therefore presents a heightened risk of collision with objects on or around the track, and/or may require lower speeds to avoid shifting the load. These dimensional loads have a system of categorization that largely tracks with the increasing size of the load. The largest loads tend to require extra supervision and often are handled as a special train movement to isolate any extra risks from standard train operations.
Conductors are traditionally tasked with monitoring the speed restrictions for a train with dimensional loads. A conductor also may assist with clearance concerns by looking out the left-hand window. This is only valid if the dimensional load is near the front of the train, and still may have limited value even then, given the likelihood that line of sight may be poor in many circumstances. A more likely scenario in cases of tight clearance would be for the conductor to exit the train to validate adequate space, in which case it would cease to be an in-cab activity.

**Poison and Toxic Inhalation Hazard (PIH/TIH) Trains**

PIH/TIH trains do not require any additional in-cab activity from conductors beyond what is required in trains not hauling PIH/TIH material, although monitoring speed restrictions is a key concern for PIH/TIH trains, particularly in urban and environmentally sensitive areas.

**Emergency Situations**

In an emergency situation, including mechanical failures and accidents, the conductor may, in some cases, play a role in contacting the dispatcher or help desk, contacting other trains, and helping in other ways to mitigate the problem. Train crews however are specifically instructed not to act as first responders; their role is to secure the train in an emergency.

**Identifying Objects on Track**

When not engaged in other duties, a conductor traditionally act as a “second pair of eyes,” watching out the window for trespassers, vehicles at crossings, and other items on the track that could lead to accidents and injuries.
IV. Conductor Tasks in PTC-Equipped Locomotives

It is Oliver Wyman’s assessment that technology now performs most, if not all, of the routine tasks previously performed in-cab by conductors. Part A describe the impact of PTC on routine conductor tasks, and Part B provides validation of these findings through observations of actual tours (via in-cab video).

Concerns raised about the removal of conductors from locomotive cabs have generally centered around infrequent and rare events, where the presence of a second person supposedly provides additional safety benefits, and these are discussed in Part C.

A. Replacement of Routine In-Cab Conductor Tasks by PTC

Based on Oliver Wyman’s rail expertise and supported by interviews with rail operational and technology personnel, routine, repeatable activities performed by the conductor have been replaced by improved communications, electronic data capture, and the presence of the PTC control screen, which provides the engineer with information previously provided by the conductor. Exhibit IV-1 summarizes how the conductor’s primary in-cab responsibilities have been largely replaced by technology, most notably PTC. Key safety tasks are discussed in more detail below.

### Exhibit IV-1: Routine conductor duties impacted by PTC and other technologies

<table>
<thead>
<tr>
<th>Crew supervision (advising the engineer)</th>
<th>Technology impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conductor duty</strong></td>
<td><strong>Technology impact</strong></td>
</tr>
<tr>
<td>Speed changes: Alerts engineer to changes in speed along the route</td>
<td>PTC alerts the engineer on speed restrictions and maintains information on the CDU in front of the engineer</td>
</tr>
<tr>
<td>Signal status: Alerts engineer to signal status, which governs the movement of the train</td>
<td>PTC alerts the engineer on signal status and can stop the train if a signal indicating a slow down or stop is missed</td>
</tr>
<tr>
<td>Mandatory directives: Alerts engineer to any mandatory directives received</td>
<td>Directives are pushed by the dispatcher into the PTC system, where the engineer accepts or declines them via the CDU</td>
</tr>
<tr>
<td>Conductor duty</td>
<td>Technology impact</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Former requirement for conductor to write down and repeat instructions from dispatcher has now switched, or is in the process of switching, to electronic mandatory directives</td>
<td></td>
</tr>
<tr>
<td>Emergency stop: Place the train in emergency stop mode if conditions warrant</td>
<td>PTC will stop the train if the train exceeds its authority (e.g., passing a signal to not enter the next block)</td>
</tr>
</tbody>
</table>

### Dispatcher/crew communication

<table>
<thead>
<tr>
<th>Conductor duty</th>
<th>Technology impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicates with dispatcher on updates/bulletins and relays this information to the engineer</td>
<td>Updates/bulletins are pushed by the dispatcher into the PTC system, where the engineer acknowledges via the CDU</td>
</tr>
<tr>
<td>Communicates with road foremen during the movement of the train through work zones and to comply with Form B requirements</td>
<td>Work zones still involve the conductor speaking with the road foreman for local instructions that may not yet be in PTC. Railroads are however beginning to test systems to eliminate the need for direct communication between the cab and road foreman</td>
</tr>
<tr>
<td>Communicates with other trains during roll-by inspections or to alert them of any emergency situations</td>
<td>Roll-by inspections are out-of-cab activities for the conductor. Conductors can alert other trains of emergency situations but this also can be handled by dispatchers</td>
</tr>
<tr>
<td>All other communication with outside parties</td>
<td>The engineer has a radio and can handle less frequent communications that may occur</td>
</tr>
</tbody>
</table>

### Form & record management

<table>
<thead>
<tr>
<th>Conductor duty</th>
<th>Technology impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal awareness form: Responsible for recording signal aspect, if other than clear, to indicate change in train status</td>
<td>Most railroads have eliminated the signal awareness form, though some still require it as a means of keeping the conductor engaged in routine activities</td>
</tr>
<tr>
<td>Mandatory directives: In addition to receiving from dispatcher and alerting engineer, must also write down directives</td>
<td>The formal process of receive, repeat, and write is less used and is migrating toward PTC only</td>
</tr>
<tr>
<td>Responsible for ensuring all paperwork is in order before the train departs, including train journal and air brake slips</td>
<td>This is electronic, often on laptops or tablets, and it need not be done by in-cab personnel</td>
</tr>
<tr>
<td>Responsible for recording any trackside detector warnings and any train delays</td>
<td>This information is captured electronically through PTC and trackside detectors, making written copies unnecessary</td>
</tr>
</tbody>
</table>

### Speed Changes

Exhibits IV-2 and IV-3 illustrate the graphical and text elements, respectively, on the CDU screens that are available to the engineer. As noted, since the CDU displays the current and maximum allowed speed of trains, conductors no longer need to monitor the speed, reference bulletins, and then advise the engineer on speed changes. The CDU also depicts the upcoming
track grade (steepness) and lists stopping and warning distances, eliminating the need for conductors to monitor the track and determine how far in advance the brake should be triggered to not exceed train movement authority. In addition, the track line on the CDU shows whether PTC is implemented on upcoming track, letting the crew know when PTC can be operable.

Exhibit IV-2: Graphical elements of the CDU screen

12 Positive Train Control Safety Plan by Southern California Regional Rail Authority, op. cit.
Signal Status

With PTC, wayside units and central computers communicate train signals to the train management computer, eliminating the need for conductors to monitor signals along the route. Railroads have been shifting from the requirement that conductors maintain signal awareness forms or transmit acknowledgement of signals via radio. Where these tasks are still done, it is to keep the conductor engaged in routine activities, rather than serving any safety-related purpose.

13 Positive Train Control Safety Plan by Southern California Regional Rail Authority, op. cit.
Dispatcher Communications

The CDU electronically integrates communication from the dispatcher to the engineer, bypassing the conductor by design. In the past, dispatchers provided detailed instructions to conductors via radio, but PTC has allowed dispatchers to send mandatory directives to train management computers and then simply provide conductors with brief updates.

In addition, the railroads and technology suppliers are continuing to expand PTC capabilities to include more complex directives, such as dimensional loads, further reducing the need for information to be communicated via radio.

Updates sent by dispatchers are visible on the CDU. When a new bulletin or directive arrives, a cyan notification appears on the CDU and instructs the crew to review the message. Once the message is acknowledged by the engineer, the CDU returns to its home screen state (Exhibit IV-4).

Exhibit IV-4: Reception and acknowledgement of bulletin on CDU

![CDU Screen with Bulletin Notification]

Should the train management computer temporarily be unable to send and receive updated information from the rest of the PTC network due to communication dead spots along train

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14 ITC Human Machine Interface Standards Guide.
routes or other issues, the train is still able to operate based on the PTC information it already has in its system. If dispatchers or yardmasters send a message or directive to the train that the locomotive does not receive, the PTC system will notify the dispatcher or yardmaster of the transmission failure, prompting dispatchers or yardmasters to utilize radio communication to convey the information to the in-cab crew.

**Form & Record Management**

Conductors are traditionally responsible for storing, referencing, and writing train information, which may take the form of tablets, bulletins, documents, manuals, and paper forms brought into the cab. This information includes the size and weight of the train, guides on train operations, and location-specific movement restrictions. Because most of this information is now programmed into PTC – and more will be programmed into PTC in the future – conductors no longer need to spend time or effort checking and updating hard copies of paperwork.

**Emergency Stop**

Traditionally, the conductor could place the train in emergency stop if conditions warrant (via a stop button), such as passing a signal to not enter the next track block. Emergency stops (except in cases of manual override) are now handled by PTC and is in fact one of the primary safety features of PTC.

**B. Validation of PTC Replacing Conductor Activities**

To confirm Oliver Wyman’s finding that safety-critical conductor tasks have been replaced by PTC, we reviewed actual freight train tours in PTC-equipped locomotives to observe how conductors’ routine activities have changed, using a random sample of in-cab videos. More than 100 hours of tour video were reviewed.
On average across the tour videos, conductors were observed engaging in operational tasks (i.e., on the radio, doing paperwork, using a tablet) for less than five minutes per hour. We did not observe any conductor activities that were critical to safe operation of the train. The majority of conductor activities observed involved either following rules that have not yet caught up to newer technology, or to keep conductors active and engaged during the tour – given that PTC has made their safety-critical tasks redundant.

For example, on average conductors were observed spending less than two minutes per hour on the radio during tours. Most commonly, conductors used the radio when the train was leaving or pulling into a terminal (to communicate with dispatchers or yardmasters). Some railroads, however, require conductors to report signals via radio rather than complete signal awareness forms, prompting those conductors to use the radio frequently but only for a few seconds at a time. As noted previously, the engineer can now access and acknowledge signal information directly via the CDU, making signal reporting on the part of the conductors redundant.

In addition, conductors were observed to spend a few minutes per hour using tablets and doing paperwork – but all safety-critical information, such as mandatory directives, is electronically stored and made available to the engineer via the CDU. As noted previously, some railroads are still requiring conductors to receive, repeat, and write down directives, even though this is redundant to PTC.

Similarly, while conductors were observed engaging in discussions with engineers during tours, any safety-critical information the conductor would have provided traditionally to the engineer is now available directly to the engineer via the CDU.

Cumulatively then, while conductors are engaged in a few minutes of routine activities per hour, the vast majority of their time is now spent watching ahead or in conversation. Safety
critical tasks have migrated to the engineer, as the design of PTC and locomotive controls intended.

Conductors’ amount of activity per tour is most directly related to which railroad they work for – confirming that each railroad currently is mandating different practices for its conductors to follow for specific duties. For example, across the four Class I railroads that provided full-length tour videos, Railroads A and B ask conductors to complete signal awareness forms by hand, while Railroad C requires conductors to call signals via radio, and Railroad D orders conductors to not call signals but rather transmit an update via radio every ten miles. As shown in Exhibit IV-5, the result is that conductors at Railroad D spend the most time on the radio. We also observed conductors spending significantly more time on paperwork for Railroad D.

**Exhibit IV-5: Differences in observed conductor activities by railroad**

<table>
<thead>
<tr>
<th></th>
<th>Railroad A</th>
<th>Railroad B</th>
<th>Railroad C</th>
<th>Railroad D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio correspondence</td>
<td>3.3%</td>
<td>1.5%</td>
<td>1.9%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Checking tablets/bulletins</td>
<td>3.2%</td>
<td>4.1%</td>
<td>1.8%</td>
<td>7.9%</td>
</tr>
</tbody>
</table>

Essentially, it is these policy differences that ultimately shape the tasks conductors complete onboard during tours in PTC-equipped locomotives – rather than the work being necessary to the safe operation of the train. We expect that these policy differences will become standardized over time as railroads become habituated to the use of PTC.

**C. In-Cab Conductor Tasks in Special Situations with PTC**

Section III.B. described the additional limited tasks conductors traditionally performed in certain special situations. Concerns raised about the removal of conductors from locomotive cabs

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15 Oliver Wyman review of 16 randomly selected full crew tour videos. Note sample size was four videos per railroad.
have generally centered around such special situations, which are infrequent to rare, due to the belief that the presence of a second person might provide additional safety benefits. It is Oliver Wyman’s assessment, however, that a PTC-equipped train operated by a solo engineer in these special situations would be no less safe than a PTC-equipped train with a two-person crew. The impact of PTC and other technologies in these situations is described below.

**Dimensional Loads**

Speed restrictions for individual cars involving dimensional loads are not currently being entered into PTC. Thus it may be necessary for a conductor to perform additional monitoring of trains speeds in such cases at present. This is, however, expected to be a short-term issue, as there are no identified technical reasons for excluding this information, and railroads have indicated that dimensional load restrictions will be added to PTC in the near future.

With regard to monitoring clearances for dimensional loads, in an engineer-only operation, this task could be performed separately by an assigned ground service employee.

**Poison and Toxic Inhalation Hazard (PIH/TIH) Trains**

If hauling PIH/TIH materials, an entire train will be designated in the PTC system as a “PIH/TIH train,” and thus any directives or speed restrictions involving the train will be communicated to the engineer via the CDU.

The only concern raised involving single-person operations of PIH/TIH trains was that in high-threat urban areas, one railroad reported that not all of the speed restrictions are covered by PTC. Under these circumstances, either a conductor would need to board the train in these areas
or the engineer would have to monitor all speed restrictions, at least until this information can be completely captured by PTC.¹⁶

**Emergency Situations**

A conductor has no specific tasks related to emergency situations that could not be performed by other personnel. An engineer can change the operation of the train and contact a dispatcher in an emergency. It is the dispatcher who initiates processes to alert first responders and other railroad personnel and to restrict other train movements in the area of the emergency.

Most of the activities that are necessary following an emergency event involve out-of-cab repair and/or mitigation efforts, which are not the responsibility of train crews.

**Identifying Objects on Track**

While not mitigated by PTC or other current technology, the conductor task of watching for objects ahead (trespassers, vehicles at crossings, etc.) is not as valuable as is commonly assumed. Opponents of single-person crews assume that additional observers mean a greater chance of an early warning, and that even if the train could not completely stop, then perhaps by slowing the train sooner, the severity of an accident might be lessened.

In practice, however, this is not realistic. Trains require an extremely long distance to slow and stop. A freight train may exceed 10,000 gross tons, with steel wheels on steel rails providing little friction to stop quickly. Furthermore, neither the conductor nor engineer watches out the window with binoculars or other magnifying lenses, even when they have an extensive line of sight.

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¹⁶ Our understanding is that the carriers are not currently proposing to use engineer-only crews on trains carrying PIH/TIH materials.
Exhibit IV-6 shows the results of brake tests conducted at the Transportation Technology Center in Pueblo, CO. The chart is for a medium-sized train moving at 40 mph on a 1.5 percent down grade. The x-axis represents the distance from the stopping target measured in feet. The y-axis is the speed of the train, which is initially 40 mph. As braking starts, the train requires 2,500-3,500 feet to slow to 30 mph (7,000 feet from the target to 3,500-4,500 feet from the target). Therefore, just to **slow** the train by a mere 10 mph would require an unobstructed sight distance and the ability to spot an object from one-half to two-thirds of a mile away. To fully **stop** the train would require about one mile of unobstructed sight distance and the ability to spot an object at that distance. (Exhibit IV-6 is only one example, as braking distance curves change with speed, grade, weight of train, and track condition.) Thus, even if an additional observer would increase the chance of early warning, it would almost never be the case that the additional braking time would make a substantial difference.

**Exhibit IV-6: Dynamic brake test stopping distance at 40 mph**

Values of 930, 931, and 932 are the field test identification number for different test runs. Bell curve represents range of stopping distances based on Monte Carlo simulations

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V. Analysis of Engineer Workload in PTC-Equipped Locomotives

Part A of this section presents a human factors analysis of engineer-only operation in a PTC-equipped train. Part B discusses additional technology changes that are expected to further reduce the engineer’s workload in the near future.

Because PTC already monitors train movements for compliance, some of the typical responsibilities of the engineer are now handled by the technology. The most directly monitored engineer duties are those concerning train controls, such as managing the throttle to slow the train and applying the brake when necessary. And as noted previously, PTC provides the engineer with a continuous, direct, and interactive stream of information and can stop the train if needed, supplanting the need for a conductor.

If the PTC system should fail during engineer-only operations, the engineer can safely operate the train during short periods when PTC is out (provided they have authority to do so) or worst case, can stop the train until PTC is again operable.

A. Human Factors Analysis of Engineer-Only Train Operation

For the purposes of this section, “human factors analysis” refers to an assessment of human capabilities and limitations in relation to workload, and that might impact the safety and efficiency of operations. Oliver Wyman reviewed various human factors issues (see Appendix A) to determine which if any might differ between two-person and one-person operations in PTC-equipped trains.

Two key human factors issues have been raised as concerns by opponents to engineer-only operations, cognitive overload and fatigue/boredom. In neither case is there is an increased adverse safety risk for one-person versus two-person crews, as the conductor plays no role in
mitigating these factors beyond the mitigation already provided by PTC, legacy safety systems, crew management practices, and federal work rules.

**Cognitive Load**

A concern prior to PTC installation was that new technology might place additional burdens on the engineer in interacting with the CDU; however, Oliver Wyman firsthand experience and observation, supported by discussions with rail operating and technology experts, yielded no additional tasks or burdens being placed on the engineer. In actuality, the PTC system affords a significant reduction in “cognitive load” for engineers; that is, there is a reduction in multiple-source attention and communication requirements, short-term working memory load, and potential for distraction during safety-critical decision making.

Since information on speeds, signals, restrictions, etc. is constantly available on the CDU for the engineer to reference, PTC has made required interactions between the conductor and engineer a redundant process. For example, prior to PTC, to navigate through a track section with several restrictions ahead, a number of exchanges would have occurred between the conductor and engineer: receiving information, writing down information, performing read and repeat, and planning the required train speed through the section. Post-PTC, these exchanges have been eliminated or made redundant, with the information being provided by the PTC system.

The PTC system provides warnings and attention getters *in addition* to legacy train systems, and visual aids such as track maps and guidance on upcoming train control actions. This reduces the opportunity for error and the workload of engineer, with the conductor role no longer essential to train safety.
The PTC system is a mature and fully operable system, but it is still being developed in terms of its capabilities and integration with other technology, such as energy management systems. It was reported that certain aspects of PTC capabilities are not yet fully exploited or operational on all railroads, e.g., dimensional loads and selected restricted speed\textsuperscript{18} scenarios. Thus, further opportunities to reduce exposure to cognitive load are possible in future versions of PTC.

**Fatigue/Boredom**

A second human factors concern is that the engineer may not be properly rested at the start of a tour or could be less alert while alone. In addition, a state of “low cognitive arousal” – such as when a task is routine, requires little vigilance, or has little external stimulus – can lead to monotony or boredom. There is no evidence however to support that two people in the cab versus one has a material impact on fatigue or boredom. This is the reason that locomotive safety systems monitor the engineer even now on two-person tours: the engineer must regularly respond to a train “alerter” button to indicate that they are awake; the train will stop if this button is not pushed when required. Furthermore, if the engineer is distracted or microsleeps and fails to acknowledge a directive via the CDU or misses a signal, PTC will stop the train. Both these safety systems will continue to operate to ensure the engineer is awake and alert during solo operations.

In addition, each railroad has crew fitness for duty policies and processes that will continue to apply regardless of crew size. For example, at the beginning of a tour, it is typical for a railroad supervisor to check-in crews as they arrive for duty and assess their fitness (including determining whether recent use of alcohol or drugs is evident, or obvious signs of fatigue). Incoming crews that appear unfit are prevented from going on duty.

\textsuperscript{18} Restricted speed is defined as a speed that permits stopping within one-half the range of vision but not exceeding 20 mph.
Finally, a review of the Federal Railroad Administration (FRA) Railroad Safety Program, the Rail Safety Improvement Act, and subsequent changes to FRA rules show that rail safety regulations have successfully evolved to address adverse human factors trends, with fatigue risk management as a particular focus – including training for railroad employees. The FRA also sets hours-of-service limitations to ensure crew are not fatigued, e.g., 12 consecutive hours on duty with at least ten consecutive hours off duty before crew are permitted to return to work. Long-distance truck drivers are governed similarly by hours-of-service rules – but generally operate alone in trucks that do not have the built-in backup safety systems of a train.

Human Factors Conclusions

In summary, Oliver Wyman has no significant or empirically justified concerns about the engineer having the information needed to safely operate the train, about the safety of the engineer or the operation of the train, or about the engineer becoming overloaded with simultaneous tasks during engineer-only operations in PTC-equipped trains.

A review of human factors best practices deployed by railroads that have gained considerable experience in conducting single-person train operations in the US and Europe, both passenger and freight, could be a useful way to verify that any human factors issues that might arise during solo operations are proactively managed to a level of reasonable expectation. Generally, this means ensuring effective compliance, the adoption of codes of practice/standards, and seeking out and deploying best practices. Important aspects to include in such a review are the cultural

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19 US Department of Transportation, “Role of Human Factors in Rail Accidents,” March 16, 2007; CFR 49, Subtitle B, Chapter II, Part 228 subpart F Substantive Hours of Service Requirements for Train Employees Engaged in Commuter or Intercity Rail Passenger Transportation.
20 Title 49, Subtitle B, Chapter II, Part 228, Passenger Train Employee Hours Of Service; Recordkeeping And Reporting; Sleeping Quarters Appendix A to Part 228—Requirements of the Hours of Service Act: Statement of Agency Policy and Interpretation.
21 The Federal Motor Carrier Safety Administration (FMCSA) sets trucking hours-of-service rules. Both FMCSA and FRA are agencies of the US Department of Transportation.
stance of an organization’s safety leadership and the competence of front-line staff in managing day-to-day threats to safety defenses. Examples were given in interviews where operations managers meet crews coming onto duty and hold safety briefings to highlight specific operational safety topics that have human factors vulnerabilities, e.g., running at restricted speed, switches, or other aspects that present safety hazards.

**B. Impact of Energy Management Systems on Engineer-Only Train Operation**

Newer technology is reducing the engineer’s workload even further, specifically energy management systems (EMS) like Trip Optimizer and LEADER. Stationed on board locomotives, EMS maximize fuel efficiency and improve train handling by calculating the optimal speeds at which trains should move while respecting all speed restrictions. While previous generations of EMS simply computed and recommended speeds to engineers, current iterations automate the acceleration and deceleration of trains – reducing the need for the engineer to perform these tasks.

Each of the Class I freight railroads in North America is at various stages of implementing, updating, and testing EMS. These systems operate by communicating with PTC. Information that affects locomotive movement, such as length, weight, consist, and horsepower, are all entered into PTC and factored into EMS speed calculations. In addition, track information, such as grade, track curvature, environmental considerations, speed restrictions, upcoming signals, trip schedule, and slip conditions are entered into PTC before a tour, so EMS can recommend speeds based on the context of a full tour. This breadth of information allows EMS to anticipate whether upcoming track will be congested or open. If a locomotive is slated to pass through a congested area, EMS can manipulate the train’s speed to avoid long wait times; conversely, if a
train is traveling on open track, EMS can slow the train (while still keeping the train on schedule) to conserve fuel.22

All EMS speed recommendations and goals are communicated to the engineer via an interface adjacent to the interactive PTC CDU.23 Like drivers that can activate cruise control in a car by pushing a button above a certain speed, engineers can turn on EMS once trains reach 12 mph and let the technology automatically handle the throttle and brake. “Zero to zero,” an emerging technology, is designed to allow EMS to work from start to stop, further reducing the amount of time and attention engineers will need to actively devote to train operations. Of course, engineers can override EMS if necessary, and engineers receive training on using the energy management interface.24

Conductors do not interact with EMS or have access to their displays. All movement recommendations are communicated to engineers’ energy management interfaces and the engineer has control of the system.

23 ITC Human Machine Interface Standards Guide.
Appendix A. Study Methodology

In addition to the views of Oliver Wyman subject matter experts with operational railroad and human factors experience, a range of primary sources were used to understand and validate the in-cab activities of conductors pre- and post-PTC and to analyze human factors impacts for engineer-only operations.

Conductor Tasks and Responsibilities Pre-PTC and Post-PTC

Oliver Wyman reviewed the Program for Certification of Railroad Conductors (49 CFR § 242) forms filed by Class I railroads with the FRA. Federal regulation under 49 CFR § 242.101 requires railroads to maintain and report a program certification for each person performing service as a conductor.\textsuperscript{25} The forms filed with the FRA by each of the five Class I railroads participating in this study were reviewed, compared, and summarized.

Oliver Wyman then conducted interviews with operating and technology experts at the five Class I railroads. The interviews explored the current role of the conductor, how that role has changed with new technology, less frequent activities where a conductor may be required, and any concerns should a conductor not be in the cab.

Third, in-cab videos were reviewed to validate conductor tasks and frequencies in PTC-equipped trains. Oliver Wyman used a random sampling plan in reviewing videos. Two sets of videos were observed in this study: 16 full-length videos (averaging over six hours each) – four each from BNSF, CN, NS, and UP – that displayed part or all of a continuous tour; and 32 clips from KCS that captured conductors’ activities across a variety of trains in two-minute bursts.

\textsuperscript{25} 49 CFR § 242.101 – Certification program required.
Three different types of territory (non-urban, urban, and steep grade) and three different types of cargo (bulk, intermodal, and merchandise) were included in the sample.

**Human Factors Analysis of Engineer-Only Operations**

Oliver Wyman conducted interviews with operations and train technology/systems personnel (including road foremen of engines, trainmasters, conductor/engineer trainers, PTC operations managers, and corridor managers), some who have had experience in two-person and one-person operations (both with and without PTC). The interviews made use of two widely recognized, operationally focused human factors models (described below) – the “Swiss Cheese” model and the “Dirty Dozen” model, which were explained and discussed with the interviewees to ensure that the appropriate context was bought to bear. In addition, in-cab video footage and current FRA safety regulations were reviewed for human factors elements and these findings verified in interviews.

**Swiss Cheese Model**

The Swiss Cheese model (Exhibit A-1) is an accident causation model, developed by Dr, James Reason, Emeritus Professor of the University of Manchester, a widely recognized author and lead proponent in the practical application of human factors in complex systems.

In the model, a succession of defensive layers (such as equipment design, processes and procedures, training, and authorizations) – are used to prevent inherent system hazards from contributing to an incident or accident. “Holes” in the layers represent flaws in defenses, which can be active failures (such as an individual operator not following a safety procedure) or latent failures (such as poor equipment design). Latent failures are typically hidden and only exposed in the event of an active failure.
A textbook example is an aircraft incident from 1990, in which the pilot’s windshield was replaced on the ground, only to be blown out by cabin pressurization on the next flight. A technician used incorrect screws to secure the windshield (the active failure). Unfortunately, poor aircraft design meant that the windshield was fitted from the outside of the plane; if it had been fitted from the inside, cabin pressure would have held the window in place, even with the wrong screws (the latent failure). If either of these “holes” had been removed (the correct screws had been used or a better windshield designed), the accident would not have happened.

A key principle of the Swiss Cheese model is that there is a combination of defenses, both at the organizational and individual level, that work together to maintain the safety of the system. Such defenses are put in place and maintained by the organization, which then expects a set of

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behaviors from employees who are trained and deemed competent in the performance of their duties. Effective human factors assessment and strategies (in the form of policies, processes, and procedures) can minimize the exposure of employees to those factors that adversely influence human performance and lead to accidents and other losses.

**Dirty Dozen Model**

In 1993, Gordon Dupont categorized commonly occurring contributing factors to accidents into a framework known as the Dirty Dozen model, based on his work as an accident investigator for the Transportation Safety Board of Canada and in developing crew resource management training for flight crews and maintenance technicians at Transport Canada.

The “Dirty Dozen” refers to twelve of the most common human factors issues that can act as precursors to accidents or incidents (Exhibit A-2). The model is frequently referenced as a reliable set of factors that influence human performance in workplace settings. Oliver Wyman reviewed these factors in interviews to determine which might be relevant to engineer-only operation in PTC-equipped trains, as discussed in Section V.

**Exhibit A-2: “Dirty Dozen” Most Common Human Factors Leading to Errors**

|--------------------------|----------------------------------------|--------------------|---------------------|
BEFORE THE KANSAS DEPARTMENT OF TRANSPORTATION

K.A.R. 36-43-1. CREW REQUIREMENTS

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

EXHIBIT 5

Statement of Dewayne Swindall (December 2022)
BEFORE THE FEDERAL RAILROAD ADMINISTRATION

DOCKET NO. FRA-2021-0032:
TRAIN CREW STAFFING

STATEMENT OF DEWAYNE SWINDALL
SUBMITTED BY
THE ASSOCIATION OF AMERICAN RAILROADS

Introduction and Summary

1. I am President and CEO for The Indiana Rail Road Company (“INRD”), a 250-mile regional railroad operating in Indiana and Illinois.

2. In this Statement I will describe how INRD has been safely and effectively operating with one-person crews since 1997.

Background on Indiana Rail Road Company’s One-Person Crew Operations

3. The Indiana Rail Road Company (“INRD”) is a 250-mile regional railroad operating in Indiana and Illinois, and it has been safely and effectively operating with one-person crews since 1997. In 1986, INRD purchased a rail line from the Illinois Central. Prior to purchase by INRD, Illinois Central was operating two trains a day with 10 people (5 people per train) on a dilapidated 110-mile segment of railroad. After purchasing the Illinois Central rail line, INRD reduced redundant positions from train service, implemented innovative operating practices, such as one-person crews, and shed rigid work rules. Subsequently, INRD could then offer rates competitive with the trucking industry and capture substantial amounts of traffic that previously moved by lower cost trucking operations. As a result, INRD has grown from 14,000 carloads in
its first full year of operation to 136,203 carloads in 2021 and has grown the company from 16 employees to 130 employees in the same time frame.

4. The implementation of one-person crew operations at INRD required research, innovation, and use of modern-day technology. The railroad worked closely with the Federal Railroad Administration ("FRA") Chicago Region Office to develop safe one-person crew practices and rules. There is a section in the INRD Special System Instructions, developed with assistance from FRA, applicable to one person crew operations, which is periodically reviewed by the FRA. In addition to consulting with the FRA, INRD studied the operations of New Zealand’s Tranz Rail. Tranz Rail implemented one person crews in 1987. INRD observed Tranz Rail’s operating practices, reviewed their Alternative Train Crewing Handbook, interviewed employees, and discussed issues of alertness and fatigue with Tranz Rail officials. INRD also obtained information from a study performed by New Zealand Tranz Rail that concluded that the health and safety of individuals and the public were not compromised by employing one-person crew operations. Prior to implementing one-person crew operations, INRD also reviewed the Study of One-Person Train Operations, dated May 1997, prepared by Beauchemin Beaton Lapointe Inc. for the Transportation Development Centre (TDC) in Canada, which studied one-person operations in Belgium, Sweden, United Kingdom, Germany, Netherlands, New Zealand, Sweden, and Norway. Finally, INRD considered suggestions and safety concerns of its own employees and management during implementation of the new one-person crew operations.

Scope of One-Person Crew Operations

5. In 2021 INRD utilized one-person crew operations on about thirty-one (31) starts per week.
6. Today, the INRD maintains our core routes to FRA Class III standards or higher with an average main track train speed of thirty-seven (37) miles per hour in controlled territory. The average distance a train is operated during a one-person crew shift is seventy (70) miles and the average on-duty time of a one-person crew is 8.3 hours. One-person crew operations run seven (7) days a week. The average train size is approximately sixty-eight (68) railcars, typically merchandise or coal trains. Merchandise trains may contain some hazmat cars, but do not contain any crude oil or PIH.

7. Currently, all train operators undergo a rigorous year-long training program that involves classroom and field work and are certified, per FRA regulations, as both conductors and engineers and are thereafter referred to at INRD as “train operators.” They are trained and tested on the INRD Special System Instructions, including rules for “One Person Road Operations,” developed in conjunction with the FRA. INRD train operators, on a one-person crew, are not distracted by managing consist and train make up because they handle trains that have already been made up. The train operator receives the train consist of a complete train from customer service. In the event a car must be set-out of the train, the one-person crew must wait for assistance from other employees to perform these actions, according to INRD rules.

8. Any FRA rules that apply to an engineer or conductor also apply to an INRD one-person crew and all one-person crews are required to hold a job briefing with dispatch prior to beginning the job. There are additional rules that apply only to one-person operations. For instance, per INRD One Person Road Operations rules, a train operator may not operate a locomotive long hood forward in excess of two miles and must contact dispatch to send another employee to assist in the event a crossing must be flagged. Additionally, a train operator who is performing one-person operations must stop the train before copying a mandatory directive from
dispatch. INRD rules require that before a train dispatcher may issue a mandatory directive to a one-person crew, the dispatcher must ask the crew, “Are you stopped?” and receive verbal confirmation the movement has stopped before issuing a mandatory directive.

9. INRD has implemented additional safety measures as well. Each INRD locomotive has an in-cab alerter that continuously monitors train operator vigilance, senses train operator’s control inputs such as throttle, brakes and horn and prompts the train operator for response if no activity is detected after thirty seconds. If no response is received from the train operator the in-cab alerter initiates a safe emergency stop. INRD also uses a fleet management system which permits managers and dispatchers to monitor the condition, speed, and location of each train. INRD continues to test new technology, such as a recent trial of in-cab automated warning system that gives verbal warnings to train operators if they are getting close to the speed limit or improperly utilizing the braking system.

10. When operating as a one-person crew, train operators are required to have a redundant form of communication in the form of a company issued electronic device should the primary locomotive radio malfunction. The train operator must test both the electronic device and radio prior to departure. Cell phones remain off and are stored out of sight in a train operator’s grip during operation of the train and are only to be turned on in case of an emergency. INRD’s train operators are in continuous radio contact with dispatch. In the event of a train problem, the train operator is instructed to contact dispatch to call another employee in for assistance. At any given time, a train is not more than about an hour away from another employee on the railroad. In the unlikely event a train operator must leave the cab of the locomotive, the train operator must secure the train, lock the cab, and check in at regular intervals with dispatch.
11. INRD has never had an incident involving a one-person crew that was caused by crew fatigue. Prior to implementing one-person crews, INRD considered ways in which to regulate train operator schedules. All INRD employees work local jobs and have the ability to return to their home after every shift. Where operationally possible, one-person crews are given assigned jobs with set schedules where they work the same time each day. Two-thirds of INRD’s train operators are on assigned jobs. Train operators on INRD’s extra board positions maintain two consecutive off days each work week.

12. Further, as INRD has upgraded its class of track and speed, train operators are able to complete a job in less time, resulting in shorter shifts and less time on-duty. INRD employs one-person crews only where it makes operational sense and creates efficiencies without compromising safety or violating FRA regulations. For instance, jobs that require protection for shoving or pushing movements or require manual activation of switches are staffed with a two-person crew. INRD performs regular drug and alcohol testing and strictly enforces the prohibition on using electronic devices in the locomotive cab. Random testing for Rules Compliance is routinely performed by qualified managers.

Safety Experience/Results

13. Safety is the number one priority at INRD. If there were any indication that operating with one-person crews endangered the safety of INRD employees or the public, INRD would not continue one-person operations regardless of the efficiencies. However, there is no evidence that one-person operations are unsafe. In fact, INRD has operated safely with one person crews for over two decades now.

14. INRD's own internal data clearly indicates one-person crews are, in fact, just as safe as two-person crews. INRD has only incurred one FRA Reportable human factor incident
involving a one-person crew in twenty-five years of one-person crew operations. Single-person crews accounted for 18.3% of INRD total man hours from 2006 to July 2022 and accounted for only 5.9% of total human factor incidents. On the other hand, two-person crews were 81.7% of INRD man hours in that same time frame but accounted for 94.1% of human factor incidents.

15. Additionally, the BLET has contractually agreed to our safe, single person crews since 2001, in the collective bargaining agreement.

**Conclusion**

16. INRD has safely operated with one-person crews since 1997. During those twenty-five years, INRD has seen improvements in its productivity and safety, allowing it to provide competitive, environmentally friendly service to its customers.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

_Dewayne Swindall_

Dewayne Swindall

08-Dec-2022 | 1:12 PM PST

Date
BEFORE THE KANSAS DEPARTMENT OF TRANSPORTATION

K.A.R. 36-43-1. CREW REQUIREMENTS

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

EXHIBIT 6

Mark Burton, Rail-Truck Competition in an Era of Automation Technology (December 2022)
Rail-Truck Competition in an Era of Automation Technology

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Opinions or points of view expressed within this report represent the author’s views and do not necessarily represent the official position the Association of American Railroads, the AAR’s members, or the University of Tennessee. The author, alone, is responsible for any errors.
On July 26, 2022, The Federal Railroad Administration (FRA) announced a Notice of Proposed Rule Making (NRPM) which would require two-person crews aboard nearly all Class I Railroad freight trains. Discussions surrounding the NRPM are rightfully focused on rail safety, Positive Train Control (PTC), and other technological and operational issues. However, this proposed rulemaking also has profound implications regarding the level and nature of freight competition between railroads and North America’s truckers, particularly in an era of increased vehicle automation. It is this latter matter that motivates the current analysis.

INTRODUCTION

Hidden from the view of most, North American commerce has grown ripe for important new competition between freight railroads and motor carriers – competition that is likely to be broad in its dimensions and transformational in its effects.

At the core of this unfolding contest is a set of labor-saving automation technologies that promise marked improvements in worker productivity and corresponding reductions in freight transportation costs across nearly every mode. However, the course of the competition, the extent and distribution of its benefits, and its ultimate value to affected economies are, as yet, unknown. Instead, these outcomes will be determined by the pace of technological development, the capacity and inclination for private sector investment, and the formidable effects of public sector policies.

Within this context, the Federal Railroad Administration’s (FRA’s) proposed requirement for two-person freight train crews would stand as an impediment to robust freight competition and the attendant economic rewards that competition would yield. For well over a century, labor-saving technologies have been a key source of productivity gains within transportation. These advances have been achieved without any sacrifice in operational safety or the wellbeing of labor. To think that this progression in productivity through innovation is ended simply reflects

1 See, Federal Railroad Administration, Docket No. FRA-2021-0032, Notice No. 1.
a poverty of imagination. As the following text demonstrates, the proposed FRA rulemaking appears contrary to the public interest.

The remainder of the current report is organized as follows. Part One describes the relevant economics faced by motor carriers and freight railroads, the competition that exists between these modes, and the ongoing course toward further automation. Based on this foundation Part Two provides some very preliminary empirical estimates of the FRA’s potential effects as a result of the proposed two-person train crew mandate. Final thoughts are provided in Part Three.

Part One – The Economic Setting

WHEN TRUCKS AND TRAINS COMPETE

Railroads and motor carriers serve a wide array of markets that have differing requirements determining the relative weighting of service and price in the decisions on modal choice by shippers. However, customer decisions on the relative importance of these factors will usually be decided in terms of the lowest total supply cost to the firm which does not have an adverse impact on its sales or revenue production capability.

In choosing carriers and modes, or even origins and destinations, shippers match the supply-chain value of available transportation services with overall service costs. Because the cost of substituting one transportation alternative for another is relatively high, transportation practices, once established, are often insensitive to moderate, transient changes in freight rates.

Vehicle automation will significantly disrupt the fundamental cost relationships that underlie current railroad and motor carrier prices. The effects will be neither temporary nor modest. Instead, they will likely be significant and lasting changes that fundamentally restructure the market roles for each mode. Moreover, once new shipper choices, patterns, and practices are settled on, reversing these new equilibria will be difficult if not impossible.

The Basic Picture

Figure 1 depicts typical unit costs for motor carriers and freight railroads that serve the same freight market. This figure illustrates a fundamental difference in cost structures between modes. Railroads are financially responsible for both freight vehicles and the networks over which these vehicles operate, whereas motor carriers do not own highways and only contribute
to offsetting highway costs in limited ways, such as when they purchase fuel for use on publicly owned roads. As a result, unit rail costs decline as outputs (typically measured in ton-miles) increase, while trucking costs are relatively constant in output volumes. The implications are straightforward. When shipment sizes or origin-destination distances are relatively small, motor carriage provides the least-cost alternative. However, when either shipment size or distances make overall quantity greater, rail becomes the preferred alternative within the subject market.

Figure 1 – Market Size and Mode

LABOR-SAVING GAINS ARE KEY TO FREIGHT PRODUCTIVITY

For both motor carriage and freight railroads, the costs of labor and fuel are the primary determinants of unit operating costs depicted in Figure 1. Thus, many of the productivity gains realized in both sectors have been tied to the number of ton-miles of freight achievable per labor hour or per gallon of fuel consumed. In the case of trucking, cost reductions have largely been accomplished through larger vehicles and publicly funded improvements to the highway network. Freight railroads fully fund and, therefore, completely control both the networks over which they operate, as well as the vehicles operating over these networks. Thus, technological

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2 According to survey data obtained by the American Transportation Research Institute (ATRI), driver wages and benefits account for roughly one-third of operating costs. The Association of American Railroads confirms a similar figure for Class I railroad operations.
improvements in freight railroading reflect self-funded improvements to both vehicles and infrastructure.

**Railroad Technologies**

Arguably, many of the rail-oriented technological improvements implemented in the latter 19th century and pre-World War II, 20th century (e.g., air brakes, automatic couplers, and more powerful locomotives) improved rail labor productivity. However, enhanced labor productivity has been at the very center of technological enhancements achieved in the decades since.

Immediately following World War II, the railroad industry undertook the full transition from steam locomotives to diesel. This conversion dramatically reduced labor use both in terms of locomotive maintenance and train operations. Diesel locomotives require far less routine maintenance and do not require an onboard fireman. The latter meant that, practically, the locomotive crew could be reduced from three to two.³

During the same era signaling along mainline routes was measurably improved, with many segments upgraded to Centralized Traffic Control (CTC). CTC provides train dispatchers with direct control over railroad switches and signals. This enhances network capacity through more seamless coordination and reduces the labor activities of onboard train crew members. Even where CTC was not placed, Automatic Block Signal (ABS) systems were routinely installed.

In the 1980’s improved communications technologies allowed the elimination of cabooses from most freight trains and with this came a further reduction in total train crew size (from four crew members to three).⁴ Moreover, the reduced need for online switching has now led to operations with two person crews in most cases.⁵

The closing decades of the 20th century also witnessed the introduction of Distributed Power (DP) within freight train consists. This technology involves placing one or more locomotives at varying locations within the train to provide additional motive power. The distributed locomotives are uncrewed, controlled instead via radio communications from the lead locomotive. This analogue of truck platooning offers at least four advantages. DP reduces

---

³ Dieselization made the fireman’s position unnecessary. However, a combination of labor and legal impediments slowed the actual elimination of firemen from freight locomotives by nearly two decades.

⁴ Communications improvements included the development of End-of-Train monitoring devices and enhancements to wayside defect detection equipment.

⁵ Other productivity enhancing / labor saving technological advances include the use of system wide gangs for track maintenance and the use of distributed (locomotive) power in freight train consists.
drawbar forces and, thereby, facilitates longer trains. It also improves train handling, reduces fuel consumption, and improves braking response.\(^6\)

Finally, within the current context, one of the most important technological improvements has been the development and privately funded implementation of Positive Train Control (PTC). PTC is an overlay on existing CTC systems that automatically maintains train separation. Ultimately, PTC will reduce the distances that separate trains and in doing so significantly increase the capacity of existing rail routes and increase average train speeds. As envisioned, these improvements can further reduce the need for onboard crew members, further lessen railroad operating costs, and allow rail carriers to compete vigorously for highway traffic.

**Emerging Truck Technologies**

Truck automation takes many forms that range from zero enhanced sensing or automated assistance to fully autonomous vehicles that require no driver responsibility whatsoever – driverless trucks (Figure 2). The technological spread between these extremes is divided into six increments with varying combinations of sensing and independent vehicle responses. Again, in the motor carrier arena, the next step in applying cost-altering automation technologies is the implementation of *truck platooning*. The American Trucking Association (ATA) defines platooning as –

> Truck platooning is similar to a truck convoy except that the platoon of trucks (2+) is connected electronically through direct short-range communications that brings the vehicles to within close following distance (approximately 30 feet). The platooning process requires the driver of truck two to steer the truck and uses sensors to collect data that controls a truck’s braking system and speed. The technology makes use of a forward collision avoidance system and vehicle-to-vehicle communication to allow two trucks to travel close together.\(^7\)

While nascent, the technology necessary to implement truck platooning is largely in place and on-road pilot platooning projects are underway. In its early form, platooning requires no modifications or additions to existing infrastructure, but it does generally require changes to state laws.\(^8\)

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\(^7\) See: [http://www.trucking.org/article.aspx?uid=88d4ea4c-8c43-4073-bd2b-2242c79cc081](http://www.trucking.org/article.aspx?uid=88d4ea4c-8c43-4073-bd2b-2242c79cc081)

\(^8\) While not necessary, truck platooning is often discussed in conjunction with truck-only highway lanes. For example, see: “Separation of Vehicles – CMV-Only Lanes,” National Academy of Sciences, Transportation Research Board, NCHRP Report 649, NCFRP Report, March 2016.
As envisioned, truck platooning does not eliminate the need for a driver in each unit, nor does it currently affect applications of federal hours-of-service regulations for drivers. Consequently, initially, platooning will not affect motor carrier labor costs.

Platooning does, however, measurably reduce fuel consumption and related costs. While data are limited, equipment manufacturers suggest that fuel use for trailing units is reduced between 10 and 14 percent and fuel consumption for the lead truck is diminished by roughly four percent. Given that fuel represents as much as 40 percent of motor carrier per-mile costs, the application of platooning could reduce carrier costs by as much as six percent. Advocates of platooning also suggest that the improved safety performance they predict will lower motor carrier insurance rates.

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Automation Trucking Beyond Platooning

Motor carrier vehicle automation is comprised of elements that can be applied in various ways. Truck platooning is highlighted because its use is likely in the immediate future. However, higher degrees of automation are foreseeable, and the more advanced applications may make it possible to further reduce driver use and costs. Under such scenarios, the incentives for carriers to invest in automation technology become sufficient to offset the much higher capital costs.\(^\text{10}\)

While there is no robust prediction of the timing, there are numerous estimates of the savings to be had through truck automation. Early estimates suggested that full automation over all but the “first” and “last” mile of truck service could reduce motor carrier costs by approximately 15 percent. However, two more recent studies – one authored by Swedish researchers and a second produced by engineering faculty at Georgia Tech – suggest an average cost reduction of 29 percent and a possible maximum savings of as much as 40 percent.\(^\text{11}\) The remainder of the current analysis will focus on the mid-range figure of 29 percent.

EXTERNALITIES, INCREASED AUTOMATION AND TEMPORAL COMPLICATIONS

Transportation practitioners are well familiar with the relationship between freight transportation and the imposition of external costs – costs which are incurred by individuals who are not participants in the transportation transaction. While freight transport affects the broader community in a variety of ways, the two most noted freight externalities are tied to the sector’s effects on public safety and air quality. Thus, to the extent that the proposed FRA rulemaking affects the distribution of traffic between freight modes it has the potential to affect the magnitude of the external costs that are imposed on the communities where freight moves. Specifically, a diversion of traffic from rail to all-highway routings will increase the magnitude of external costs. These outcomes are, to a degree, considered in Part Two of this report.

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\(^{10}\) For example, U.S. Xpress has recently conducted demonstrations using fully driverless trucks in the Atlanta-Dallas traffic lane, as well as more localized Texas markets. See, U.S. Xpress, “Mapping a route to the future of autonomous trucks,” https://www.usxpress.com/2022/05/11/mapping-a-route-to-the-future-of-autonomous-trucks/ or Wilner, Frank, “Reason Together or Face the Sword,” Railway Age, September 2022, p. 10.

What is not treated here or (or elsewhere) are the likely time paths and extents of additional automation in either rail or motor carriage. Ultimately, in the case of trucking, the goal is driverless trucks over long, line-haul segments, with traditional drivers providing service over movements first and last miles. Presumably, labor would also be involved in monitoring driverless segments and responding in the event of mechanical (or other) issues. A similar result is equally possible in the case of rail. No one, however, has ventured to predict the time paths over which automation will advance to the point where such outcomes a reality. Thus, assessing the present value of future advances in either industry is difficult.

Part Two – Preliminary Empirics

**POTENTIAL RAILROAD TRAFFIC DIVERSIONS**

Based on the above discussion, the current analysis is extended to provide what can only be regarded as very preliminary estimates of automation-induced railroad traffic diversions to all-highway routings that may result from the proposed FRA rulemaking. These estimates are based on the following assumptions.

- A reduction in motor carrier costs of 29 percent for non-coal freight resulting from full motor carrier automation;
- A mandatory onboard train crew of two individuals (status quo) as proposed by the FRA;
- No diversion of remaining railroad coal traffic; and
- No additional reduction in non-crew railroad operating costs.

In combination, the first two assumptions are presumed to lead to the outcome depicted in Figure 3. Within this figure, progress in truck automation is captured by a downward shift in the curve labelled ATCT. When scenario truck rates fall below the line-haul rates currently offered by railroads, the subject freight traffic diverts to truck. Alternatively, if the scenario truck rate still exceeds the currently observed rail rate, the traffic is retained by the railroads. While this modest deterministic modeling approach is simple, it is not materially different than the approach employed by more complex deterministic models including the Intermodal

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12 The analysis presented here is limited to rail-to-truck diversions and does not include the increased use by existing truck customers in response to lowered trucking rates.
Transportation and Inventory Cost (ITIC) model routinely used by U.S. DOT in its deliberations.\textsuperscript{13}

The current division of freight traffic between rail and motor carriage reflects existing economic conditions and pricing practices within each mode with respect to each commodity and customer served by that mode. Under the proposed NPRM, railroad costs (and rates) will be constrained within these current conditions. At the same time, emerging truck automation has the potential to eventually reduce motor carrier costs significantly. If this cost-based diversion occurs and, as has been the case in the past, these cost savings are passed along to the customer by motor carriers, traffic may be driven from rail to truck by the changing economic relationships and the ability of the two modes to modify their prices to reflect these changes.

\textbf{Trucking Costs/Rates}

As noted above, each year ATRI surveys both common carrier and private trucking operations to ascertain operating costs. It is these costs as for 2019 that are used as the basis for the analysis.

\textsuperscript{13} The ITIC was originally developed by the Association of American Railroads during the 1990s. Later, it was adopted and adapted by the FRA, which periodically updates this model. FRA has continued to rely on the ITIC to produce analytical results. For example, see, Federal Highway Administration, Modal Shift Comparative Analysis Technical Report, \textit{Comprehensive Truck Size and Weights Study}, June 2015.
here. The ATRI values are summarized in Table 1. The final column in this table converts the per mile costs to the per ton-mile based on a simple conservative assumption.

The average per ton-mile cost for 2019 is estimated to be 11.3 cents. Again, based on the Transportation Research Record study and the study produced by Georgia Tech, we estimate that driverless trucks would reduce trucking costs with a midpoint range of 29 percent. The corresponding rate related to this cost reductions is 8.0 cents per ton-mile.

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Per Mile Cost</th>
<th>Per Hour Costs</th>
<th>Percent</th>
<th>Per Net TM</th>
</tr>
</thead>
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<td>Equipment</td>
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<td>Maintenance</td>
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<td>1.6980</td>
<td>66.94</td>
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Source: American Transportation Research Institute

**Railroad Traffic, Rates, and Traffic Diversions**

The source of rail data is the Surface Transportation Board’s Carload Waybill Sample (CWS) as summarized by the Board. The CWS is a stratified sample of roughly 600,000 records that can be used to replicate the whole of rail commerce. Here, the revenue per ton-mile was calculated for each record and grouped by commodity and compared to the automation truck rate thresholds discussed above, the results of this analysis are provided in Table 2.

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14 2021 data are not yet available and 2020 data were distorted by the COVID pandemic. Accordingly, the whole of the current analysis is anchored in 2019.


16 The analysis assumes an average shipment lading of 15 tons.

17 In the case of motor carriage, the rates are assumed to equal marginal costs.

18 See, Surface Transportation Board, Annual Rail Rate Index Study (supporting materials), https://www.stb.gov/wp-content/uploads/Annual_Rail_Rate_Index_Study_2020.pdf. Because the current work excludes the potential diversion of railroad coal movements, the STB data on this commodity group are not included here.

19 Revenue per ton-mile is used in place of the marginal movement costs based on the proven need for railroads to recover common and sunk network costs through the application of at least some rates that exceed marginal cost. This practice is routinely referred to as demand-based pricing.
<table>
<thead>
<tr>
<th>Commodity Group</th>
<th>Distance Group</th>
<th>2019 Nominal RPTM (Cents)</th>
<th>2019 Ton-Miles (Millions)</th>
<th>Retained Ton-Miles (Millions)</th>
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<td>0.0</td>
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<tr>
<td>Metallic Ores</td>
<td>2</td>
<td>7.075</td>
<td>2,356.0</td>
<td>2,356.0</td>
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<tr>
<td>Metallic Ores</td>
<td>3</td>
<td>3.736</td>
<td>4,584.0</td>
<td>4,584.0</td>
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<td>1,247.0</td>
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<td>Crude Oil</td>
<td>4</td>
<td>2.722</td>
<td>10,720.0</td>
<td>10,720.0</td>
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<tr>
<td>Crude Oil</td>
<td>0</td>
<td>2.747</td>
<td>61,191.0</td>
<td>61,191.0</td>
</tr>
<tr>
<td>Non-Metallic Minerals</td>
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<td>11.221</td>
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<tr>
<td>Non-Metallic Minerals</td>
<td>2</td>
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<td>8,687.0</td>
<td>8,687.0</td>
</tr>
<tr>
<td>Non-Metallic Minerals</td>
<td>3</td>
<td>3.995</td>
<td>71,179.0</td>
<td>71,179.0</td>
</tr>
<tr>
<td>Food and Kindred</td>
<td>1</td>
<td>7.196</td>
<td>7,622.0</td>
<td>7,622.0</td>
</tr>
<tr>
<td>Food and Kindred</td>
<td>2</td>
<td>4.895</td>
<td>27,834.0</td>
<td>27,834.0</td>
</tr>
<tr>
<td>Food and Kindred</td>
<td>3</td>
<td>3.584</td>
<td>61,191.0</td>
<td>61,191.0</td>
</tr>
<tr>
<td>Lumber and Wood Products</td>
<td>1</td>
<td>8.171</td>
<td>2,752.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Lumber and Wood Products</td>
<td>2</td>
<td>5.994</td>
<td>6,661.0</td>
<td>6,661.0</td>
</tr>
<tr>
<td>Lumber and Wood Products</td>
<td>3</td>
<td>4.216</td>
<td>42,406.0</td>
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<td>Pulp, Paper and Allied</td>
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<td>10.970</td>
<td>2,723.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Pulp, Paper and Allied</td>
<td>2</td>
<td>6.946</td>
<td>7,819.0</td>
<td>7,819.0</td>
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<tr>
<td>Pulp, Paper and Allied</td>
<td>3</td>
<td>4.832</td>
<td>27,109.0</td>
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<td>Chemical</td>
<td>1</td>
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<td>22,078.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Chemical</td>
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<td>5.663</td>
<td>62,084.0</td>
<td>62,084.0</td>
</tr>
<tr>
<td>Chemical</td>
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<td>3.817</td>
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<td>143,205.0</td>
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<td>1</td>
<td>10.166</td>
<td>7,657.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Petroleum</td>
<td>2</td>
<td>5.973</td>
<td>16,576.0</td>
<td>16,576.0</td>
</tr>
<tr>
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<td>4.637</td>
<td>45,279.0</td>
<td>45,279.0</td>
</tr>
<tr>
<td>Stone, Clay and Glass</td>
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<td>7.712</td>
<td>6,895.0</td>
<td>6,895.0</td>
</tr>
<tr>
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<td>2</td>
<td>5.427</td>
<td>12,090.0</td>
<td>12,090.0</td>
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<tr>
<td>Stone, Clay and Glass</td>
<td>3</td>
<td>4.526</td>
<td>15,519.0</td>
<td>15,519.0</td>
</tr>
<tr>
<td>Primary Metal Products</td>
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<td>8.909</td>
<td>5,945.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Primary Metal Products</td>
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<td>7.035</td>
<td>10,435.0</td>
<td>10,435.0</td>
</tr>
<tr>
<td>Primary Metal Products</td>
<td>3</td>
<td>4.836</td>
<td>28,143.0</td>
<td>28,143.0</td>
</tr>
<tr>
<td>Transportation Equipment</td>
<td>1</td>
<td>29.771</td>
<td>4,800.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Transportation Equipment</td>
<td>2</td>
<td>16.284</td>
<td>11,073.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Transportation Equipment</td>
<td>3</td>
<td>11.310</td>
<td>27,806.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Waste and Scrap</td>
<td>1</td>
<td>8.691</td>
<td>4,932.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Waste and Scrap</td>
<td>2</td>
<td>4.716</td>
<td>9,829.0</td>
<td>9,829.0</td>
</tr>
<tr>
<td>Waste and Scrap</td>
<td>3</td>
<td>3.880</td>
<td>6,879.0</td>
<td>6,879.0</td>
</tr>
<tr>
<td>All Other</td>
<td>1</td>
<td>29.317</td>
<td>254.0</td>
<td>0.0</td>
</tr>
<tr>
<td>All Other</td>
<td>2</td>
<td>15.880</td>
<td>774.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

20 Distance Groups are as follows: 0 Undefined, 1 < 500 Miles; 2 >500, but < 1,000 miles; 3 > 1,000, but <1,500 miles; and 4 > 1,500 miles
21 Single Car refers to six cars or less; Multi-Car refers to between seven and 49 carloads; and Unit Train includes shipments of 50 or more carloads.
Cautions and Caveats

The results presented here represent an extreme case. The data are highly aggregated and, therefore, mask circumstances where rail traffic would not divert to highway routings. For example, some rail movements require shipper investments in equipment and facilities with long asset lives. If diversion to all-truck routings would require the abandonment of these assets, the diversion may not take place over a relevant time horizon, even if truck rates are lower than competing railroad prices. There are also examples where shipment characteristics favor rail transportation to the exclusion of truck. This is particularly true of many liquid chemical and petroleum products, including plastics. Finally, the analysis assumes that the rail industry will not engage in further non-crew-related cost saving activities. In summary, the empirical results provided in Tables 2 likely represent a long-run upper bound on foreseeable diversions. Nonetheless, this upper limit should not be dismissed.

TRAIN CREW MANDATES AND THE RESULTING TRAFFIC DIVERSIONS MAY IMPOSE UNNECESSARY AND OTHERWISE AVOIDABLE EXTERNAL COSTS

In the face of emerging technologies, mandating two-person train crews seems is unnecessary and the resulting diversion of rail traffic to all-road routings may impose avoidable economic losses. Specific categories include:

- A potential incremental increase in truck-involved crashes;
- An incremental increase in freight-related fuel consumption;
- Potential incremental increase in pollutant emissions; and
- A probable incremental increase in necessary highway expenditures (both federal and state).

Each of these is treated in the text that follows:

Truck Crashes and Public Safety

Table 3 provides truck crash fatality data for 2019 as proffered by the Federal Motor Carrier Safety Administration (FMCSA). They suggest there were 0.01668 fatalities in truck-involved crashes per one million truck miles. The rail to truck diversions described above imply an additional 5.4 billion truck miles each year. This translates into scores of additional fatalities.

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22 The static nature of the discussion implies that automation’s implementation and the resulting shipper response would occur instantaneously. In fact, both are likely to be quite gradual, occurring over decades.

from incremental truck-involved crashes. The 2020 monetization values from the U.S. Department of Transportation suggest each statistical life is valued at $11.6 million. According to the current estimates, the total value of attributable crash-related fatalities is estimated at more than $10 billion over a 20-year time horizon. Because this figure does not include injury and property damages from non-fatality truck-involved crashes, it necessarily understates the public safety impacts of the estimated rail-to-truck traffic diversions.

Table 3 – 2019 Truck-Involved Crash Fatality Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value per Million Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal Crashes Involving Large Trucks</td>
<td>4,479</td>
</tr>
<tr>
<td>Large Trucks Involved in Fatal Crashes</td>
<td>5,005</td>
</tr>
<tr>
<td>Large Truck Occupant Fatalities</td>
<td>892</td>
</tr>
<tr>
<td>Total Fatalities in Large Truck Crashes</td>
<td>5,005</td>
</tr>
<tr>
<td>Million Vehicle Miles in Large Trucks</td>
<td>300,050</td>
</tr>
</tbody>
</table>

PER MILLION MILES TRAVELED

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value per Million Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal Crashes Involving Large Trucks</td>
<td>1.49</td>
</tr>
<tr>
<td>Large Trucks Involved in Fatal Crashes</td>
<td>1.67</td>
</tr>
<tr>
<td>Total Fatalities in Large Truck Crashes</td>
<td>1.67</td>
</tr>
<tr>
<td>Total Large Trucks Registered</td>
<td>13,085,643</td>
</tr>
</tbody>
</table>

Clearly, based on these statistics, improvements in motor carrier safety offer greater potential gains. However, potential gains do not necessarily equal realized gains. On the one hand, the technologies associated with motor vehicle automation are generally credited with improved safety performance. On the other hand, the motor carrier industry has an inconsistent record on matters of vehicle maintenance as related to safety.

Hazardous Materials

The same outcome is also evident in transportation-related hazardous materials releases and their consequences (Table 4). Overall, trucks are responsible for the largest number of hazmat movements, but marine vessels are more heavily loaded, and rail shipments travel longer distances, so that on a ton-mile basis, hazardous material shipments are divided almost equally between the three modes. Yet, trucks are responsible for 87.3 percent of hazmat incidents, 95.4 percent of all hazmat fatalities, and 71.1 percent of all hazmat property damages.

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25 Based on a real discount rate of seven percent.

Table 4 – Transportation-Related Hazardous Materials Incidents

<table>
<thead>
<tr>
<th>Freight Mode</th>
<th>1-Year Annual Average</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INCIDENTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Carriers</td>
<td>14,402.4</td>
<td>87.3%</td>
</tr>
<tr>
<td>Railroads</td>
<td>680.8</td>
<td>4.1%</td>
</tr>
<tr>
<td>ALL MODES</td>
<td>16,491.7</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>FATALITIES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Carriers</td>
<td>10.3</td>
<td>95.4%</td>
</tr>
<tr>
<td>Railroads</td>
<td>0.2</td>
<td>1.9%</td>
</tr>
<tr>
<td>ALL MODES</td>
<td>10.8</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>INJURIES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Carriers</td>
<td>147.5</td>
<td>71.1%</td>
</tr>
<tr>
<td>Railroads</td>
<td>46.8</td>
<td>22.5%</td>
</tr>
<tr>
<td>ALL MODES</td>
<td>207.6</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>DAMAGES ($ MILLIONS)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Carriers</td>
<td>$59.9</td>
<td>72.3%</td>
</tr>
<tr>
<td>Railroads</td>
<td>$22.4</td>
<td>27.1%</td>
</tr>
<tr>
<td>ALL MODES</td>
<td>$82.9</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Source: U.S. DOT, Pipeline and Hazardous Materials Safety Administration

**Fuel and Emissions**

Table 5 duplicates emission factors per-mile for rail and heavy trucks as provided in a University of Delaware study of land-side emissions. It also contains incremental tons of pollutant emissions attributable to rail-to-truck diversions, along with annual dollar values. Finally, based on an estimated 125 ton-miles per gallon for trucks and 525 ton-miles per gallon for railroads, the calculations suggest an incremental annual increase in diesel fuel consumption of more than 29 million gallons.

Based on methods mandated by the U.S. Department of Transportation for use within benefit-cost analyses, the annual value of the 20-year value of incremental pollution is estimated at $14.8 billion.27

**Highway Expenditures**

27 Note that, based on allowed USDOT methods, this estimate is necessarily conservative. Specifically, the USDOT guidance allows (but does not compel) a separate and more aggressive treatment of CO2 emissions that was not applied here.
The results developed thus far suggest that if the potential labor-saving effects of truck automation are unmatched by similar efficiencies in freight railroading, total annual highway ton-miles will increase 26 and 30 percent based on railroad traffic diversions.

### Table 5 – Emission Factors and Diversion-Related Incremental Pollution

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Truck Emissions per TEU (grams)</th>
<th>Rail Emissions per TEU (grams)</th>
<th>Diversion-Induced Difference (Tons)</th>
<th>USDOT Value per Ton</th>
<th>Annual Dollar Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen Oxide (NOX)</td>
<td>6.8600</td>
<td>2.8100</td>
<td>48,124</td>
<td>$15,600</td>
<td>$750,735,654</td>
</tr>
<tr>
<td>Particulate Matter (PM10)</td>
<td>0.1200</td>
<td>0.0700</td>
<td>594</td>
<td>$47,600</td>
<td>$28,280,324</td>
</tr>
<tr>
<td>Sulfur Oxide (SOX)</td>
<td>0.2200</td>
<td>0.0300</td>
<td>2,258</td>
<td>$41,500</td>
<td>$93,693,426</td>
</tr>
<tr>
<td>Carbon Dioxide (CO2)</td>
<td>1,001.000</td>
<td>144.970</td>
<td>10,171,767</td>
<td>$52</td>
<td>$528,931,886</td>
</tr>
<tr>
<td><strong>ANNUAL SUM</strong></td>
<td><strong>1,001.000</strong></td>
<td><strong>144.970</strong></td>
<td><strong>10,171,767</strong></td>
<td><strong>$52</strong></td>
<td><strong>$1,401,641,290</strong></td>
</tr>
</tbody>
</table>

Comparatively, the projected annual diversion-induced additions to truck ton-miles are roughly equivalent (500 billion ton-miles) to the growth in truck traffic evidenced in the U.S. from the middle 1980s through the present. This incremental change would be in addition to natural economy-wide traffic growth and any induced traffic growth among existing all-truck users.

Given the anemic performance of the Interstate Highway Trust Fund (IHTF), it would be tempting to invoke hyperbole and assume a Chicken-Little posture, but to do so seems irresponsible. A significant diversion from rail and rail-truck to all-truck carriage would place large demands on roadway infrastructure. However, the requisite roadway infrastructure investments would likely be needed over the course of a generation. There are, however, three takeaways. These include:

- The public roadway elements of a highly automated roadway system – network design, network elements (ramps, lane markings, etc.), and capacity implications – have yet to be estimated;
- An increase in motor carrier productivity that is met with an artificially and unnecessarily suppressed response by the railroad industry will, absent any other pressures, waylay an already overburdened federal system of highway financing; and,

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30 For time series data reporting freight ton-miles by mode see, Bureau of Transportation Statistics, Table 1-50: U.S. Ton-Miles of Freight (BTS Special Tabulation).
As currently configured and administered, the IHTF will be incapable of meeting the infrastructure demands that will result from unfettered motor carrier automation.

Part Three – Concluding Thoughts

PUBLIC DISCUSSIONS AND RESULTING POLICIES WILL BE FRAMED AROUND SAFETY AND THE ENVIRONMENT

Policy discussions surrounding vehicle automation and implementation will continue to touch on many issues and outcomes related to the technology’s commercial value, its labor effects, and land use implications, but important as these matters may be, they will ultimately be eclipsed by two issues – public safety and the environment. Both in the case of rail and motor carrier automation, it is the possible safety and environmental benefits that have driven public policy to date and these topics’ dominance will continue. For both railroads and trucking, there are two questions that emerge – (1) How large are the potential gains from improving safety and air quality; and (2) will the implementation of automation technologies help secure those available gains?

Regarding the first question, whether focusing on highway crashes, hazardous material releases, or pollutant emissions, the superior performance of rail carriage, when compared to trucking, makes the potential gains from improved railroad safety relatively large. Similarly, air quality impacts are significant. An unbalanced program of technological advancement will divert tens of millions of tons of freight from rail to truck and, in doing so add measurably to the degradation of air quality. Railroad locomotives burn less fuel per ton-mile and emit fewer pollutants. When monetized, based on USDOT guidance, the potential rail-to-truck diversions would inflict nearly $15 billion in, otherwise avoidable, air quality damages over a 20-year planning horizon.

SUMMARY OF FINDINGS AND FINAL THOUGHTS

Labor-reducing automation has the potential to improve competition between North American railroads and motor carriers. In turn, this will ease supply-chain troubles and otherwise benefit the economy. However, realizing these gains will require solid, forward-looking public policies that facilitate rather than impede technological innovation. The safety and environmental
implications of further rail and truck automation must be fully understood before FRA imposes a crew-size mandate.

While extremely simplistic, the empirical sketch developed here suggests that the FRA rule will divert a significant volume of rail traffic to all-highway routings, reducing non-coal rail traffic between seven and 14 percent. Corresponding railroad revenues are also predicted to fall. The diversions seemingly would diminish public safety, increase annual fuel consumption by as much as 40 million gallons, and lead to major increases in the demand for highway capacity. However, much like the safety outcomes these additional economic projections can and should be verified or refuted through a carefully designed, disaggregated, and dynamic analysis. Both the data and techniques for doing so are (or will soon become) available.
BEFORE THE KANSAS DEPARTMENT OF TRANSPORTATION

K.A.R. 36-43-1. CREW REQUIREMENTS

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

EXHIBIT 7

Statement of Brendan M. Branon (December 2022)
Introduction and Summary

1. In 2016, the Chairman of the National Carriers’ Conference Committee ("NCCC"), A. Kenneth Gradia, submitted a statement to the Federal Railroad Administration ("FRA") in connection with its review of a proposed rule on train crew staffing. See Dkt. No. FRA-2014-0033. In his statement, Mr. Gradia explained that questions of train crew size have historically been handled in collective bargaining between the railroads and the unions that represent their operating craft employees, the Brotherhood of Locomotive Engineers & Trainmen ("BLET") and the Sheet Metal Air Rail & Transportation Workers Transportation Division ("SMART TD") (formerly the United Transportation Union ("UTU")). Mr. Gradia used that history to demonstrate why FRA should continue to leave issues of crew size to the collective bargaining process under the Railway Labor Act. In particular, he showed that the unions and the carriers are best positioned to balance the complex competing interests underlying the crew size debate, including the purported safety concerns that unions have raised as a reason for resisting staffing changes prompted by improvements in technology. A copy of Mr. Gradia’s statement is attached.
2. I am Mr. Gradia’s successor as Chairman of the NCCC. As was the case in 2016, the NCCC represents more than thirty freight railroads – including all the Class I carriers – in collective bargaining with the rail unions, as well as with respect to other labor-related matters of industry-wide concern. The purpose of my Statement is to demonstrate that what Mr. Gradia said six years ago remains true today: train crew size is a subject for collective bargaining, not federal regulation.

3. Indeed, the wisdom of leaving crew size to collective bargaining is even more evident now than it was in 2016. The issue of crew size (or “crew consist”) is currently in active negotiations between SMART-TD and several carriers represented by the NCCC. As shown in more detail below, the parties are discussing a wide range of details concerning changes in the role and deployment of the conductor that will not only lead to greater efficiency in operations, but will also provide better working conditions, including the ability of employees to work regular shifts and go home at night. In other words, the parties are currently in the midst of negotiating what can be a mutually beneficial arrangement.

4. There is no sound basis for regulatory interference with those negotiations. In fact, as Mr. Gradia noted, Congress specifically intended “to preclude unwarranted interference by the Secretary ... with any matters which traditionally have been or would have been subject to settlement through collective bargaining agreements. ... [and] to insure that the Department of Transportation under the aegis of its authority over railroad safety would not become embroiled in what could be classified as an economic issue. ... The Secretary of Transportation’s authority is over railroad safety, not labor management disputes.” S. Rep. No. 91-619, at 6–7 (December 18, 1969) (emphasis added).
5. As was true when FRA last examined this question, crew size is still “traditionally” subject to “settlement through collective bargaining.” It has been and remains, first and foremost, a “labor management dispute” and an “economic issue.” The carriers and the unions have a long-standing, proven ability to handle these issues in a safe and effective way. Federal regulators should, therefore, refrain from disrupting the ongoing collective bargaining process and allow the parties to come to a mutually acceptable resolution that will lead to a more efficient, more competitive, and safer freight railroad system.

**Background**

6. The railroad industry’s extensive history of collective bargaining over train crew size is set forth in detail in Mr. Gradia’s 2016 Statement, ending with what he refers to as the “Modern Era” of bargaining, covering roughly the last 20 years. He notes that even after the parties reached agreements providing for the standard two-person crew, the railroads and unions have continued to bargain over crew size issues, including, for example, during the 2005 national bargaining round and in a tentative agreement between one railroad and UTU in 2014.

7. Although Mr. Gradia did not mention it, there were also crew size-related agreements during the modern era (in 2005 and 2008) between the engineers’ union, BLET, and two of the Class I carriers. Both of those agreements effectively provide that when only a single person is necessary to operate a train, that person will be a locomotive engineer. The agreements also provide for additional compensation for locomotive engineers who are required to operate trains without a conductor in the locomotive cab. Those agreements reflect the expectation of BLET that single person crews are both feasible and safe.
8. A related and significant development during the modern era – a development that has greatly influenced recent collective bargaining – is the introduction of positive train control (“PTC”) technology, which Congress mandated in the Rail Safety Improvement Act (“RSIA”). Public Law No. 110-432, Division A, 122 Stat. 4848-4906 (Oct. 16, 2008). The history, purposes, and capabilities of PTC are, of course, familiar to the FRA and other industry experts, so I will not review them in detail here. Briefly stated, PTC is a computerized system that delivers directions to the engineer and monitors train location, speed and direction and, if necessary, stops a train automatically. PTC makes it unnecessary for a conductor to perform onboard functions such as serving as an observer and recording dispatching orders; those tasks are effectively and safely handled by the new technology. Thus, PTC eliminates the principal remaining safety-based rationale for having a second person stationed in the locomotive cab, especially when traveling between terminals.

9. Ground service work to support train operations – switching cars and throwing switches – is often still necessary under current staffing models. However, with the elimination of the need for a conductor in the locomotive, those individuals can now be stationed where that work is actually performed – on the ground. Employees can support train operations from a vehicle or a fixed location, which allows them to have more regular, predictable work schedules with the ability to go home at night (rather than staying at a hotel at an away-from-home terminal).

10. In compliance with the RSIA mandate, the railroads spent more than $14 billion building, installing, and testing PTC systems across their respective networks. By 2019, the
implementation of PTC was essentially complete. It has proven enormously successful in safely and reliably supporting the engineer in the performance of his or her duties.

**Current Crew Size Bargaining**

11. The most recent national bargaining round began on November 1, 2019, when the railroads and unions were free to serve new notices of proposed changes in the parties’ agreements. With the success of PTC, the railroads determined that the time had come to re-address the issue of crew consist. As Mr. Gradia noted in his statement, the extant collective bargaining agreements regarding crew size date back, for the most part, to the late 1980s or early 1990s. Those agreements generally require railroads to operate with one conductor on each train crew. They did not contemplate PTC or other technological advancements and need to be updated to account for modern technology and operational methods.

12. To that end, the majority of the NCCC railroads formally served a national (multi-employer) Section 6 notice under the Railway Labor Act, inviting SMART-TD to bargain over the crew size issue at the national level. SMART-TD declined that invitation. The railroads’ national notice to SMART-TD also included a range of other proposals concerning rates of pay, employee benefits, and work rules. Despite SMART-TD’s refusal to bargain over crew size at the national level, the NCCC and SMART-TD (along with the other 11 major rail unions) moved ahead with national handling of the railroads’ other Section 6 proposals (as well as the unions’ related proposals).

13. Anticipating that SMART-TD would decline to bargain over crew size at the national level, each Class I railroad also served its own separate local Section 6 notice on SMART-TD, proposing changes in crew size and/or deployment. These local notices varied to
some extent, but for the most part, they explain how and why PTC eliminates any plausible remaining need for a conductor to ride in the locomotive cab. Most of these notices go on to note that there will still be a substantial on-going role for employees represented by SMART-TD, who, under the railroads’ proposals, will continue to handle the ground-based work necessary to support train operations and which is traditionally performed by employees represented by SMART-TD. Accordingly, such notices propose a re-deployment of conductors to ground-based work locations for all train operations that are equipped with PTC or equivalent technology.

14. The railroads’ local Section 6 notices described above also expressly address the “safety concerns” raised by SMART-TD and its predecessors in response to any proposals to adjust collectively-bargained crew consist rules. In particular, those notices state as follows:

[T]here is no empirical support for the notion that two-person operations are safer than one-person operations. Engineer-only crews have operated for many years in locations around the world with safety records that are equal to – if not better than – two-person crews. Europe is perhaps the best example as its freight rail industry has a long track record of safe and extensive engineer-only crew operations. The Federal Railroad Administration, which has responsibility for rail safety oversight, has also weighed in on the safety of engineer-only crews, saying there is no evidence that trains with a single crew member are less safe. But regardless of what the data show about historical safety records, that debate is largely moot now that PTC is online. PTC technology fully replicates the safety benefit provided by a conductor in a locomotive cab. When PTC technology is combined with support from on-the-ground personnel, this new operating model will be able to handle blocked crossings and other unexpected events as well as or better than the current model.

15. These notices further state that “resisting the advancement of new technology in the workplace is a short-sighted proposition. Employees and employers alike must adapt or be left behind.” The notices explain that “[m]odernizing crew staffing to provide for engineer-only operations in PTC territory will help to put this industry on a sustainable path by ensuring our ability to compete with other transportation modes even when they also adopt new technologies
and new operating methods,” which will benefit SMART-TD’s members by preserving “stable, high-paying jobs for the foreseeable future.”

16. SMART-TD initially resisted bargaining over the above local notices, claiming that any crew size proposals were barred by so-called “moratorium” provisions in the existing 1990s-era agreements. That led to a lengthy series of court cases and arbitration proceedings, lasting almost two years. The dispute over whether SMART-TD was obligated to bargain was ultimately resolved in the carriers’ favor in a set of awards issued by Arbitrator John LaRocco on July 28, 2021. Those awards generally provide that – with respect to the prevailing or standard moratorium clause in the industry – the carriers’ local Section 6 proposals are valid and that SMART-TD is obligated to bargain with the carriers over those proposals seeking changes in crew consist.

17. Following the LaRocco Awards, the various railroads and SMART-TD general committees met on a total of 12 separate occasions in direct negotiations (i.e., prior to mediation) to bargain over the carriers’ crew size proposals.¹ These meetings took place over a period of about 8 months. In early 2022, the labor unions, including SMART-TD, invoked mediation under the Railway Labor Act with respect to the parties’ other pending Section 6 proposals concerning wages, benefits and work rules. The individual railroads then requested mediation of the local crew size notices.

18. The National Mediation Board (“NMB”) accepted the individual railroads’ mediation requests and docketed a separate mediation case for each participating railroad. It

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¹ There were also a handful of negotiating sessions while the court challenges were still ongoing, pursuant to an injunction entered by a federal district court. That injunction was vacated by the court of appeals, after which the union refused to meet until the LaRocco Awards established that it was obligated to do so.
assigned mediator Michael Kelliher to assist the parties in reaching agreements. Since then, from early May of 2022 through the present, the parties have conducted a total of 18 mediation sessions under the NMB’s supervision. The most recent of those mediation sessions occurred during the week of December 5-9, 2022. Additional mediation sessions have been scheduled in 2023 by the NMB, which controls the schedule for and pace of mediation. Mediated bargaining will continue until (a) the parties reach agreement or (b) the NMB concludes that the parties are at impasse, in which case it can “release” the parties and proffer binding arbitration under Section 7 of the Railway Labor Act.

19. The core issues currently under discussion with SMART-TD are largely the same in all of the negotiations. In general, the main subjects have been:

(a) The timing and terms for implementation of the proposed changes in redeployment of employees;

(b) The extent to which the new agreements will provide for employee protections from furlough or layoff, including any protections of continued employment for current workers;

(c) The scope of work “owned” by members of SMART-TD, including both the extent to which they are guaranteed the right to continue to perform existing ground service work (such as coupling or uncoupling cars, throwing switches and the like) as well as rights to additional or new areas of work.

20. The subjects being discussed by the parties are complex and multi-faceted, requiring a delicate balance of considerations. As Mr. Gradia’s explanation of the extensive history of crew size bargaining demonstrated, these are the kind of issues best handled in
collective bargaining. Questions of safe and timely implementation of new staffing models have been repeatedly and successfully addressed in prior agreements (both crew consist agreements and otherwise) or have long historical antecedents in the railroad industry. While that is no guarantee of success in the current negotiations, the parties on both sides are working hard and in good faith, recognizing that there is at least the potential for a mutually beneficial deal, resulting in a safe, efficient and effective system that protects existing employees and improves their working conditions.

21. Federal regulatory interference in the crew size issue would damage this process, including the current negotiations and, at least potentially, the broader collective bargaining relationship as well. Aside from encouraging mandates that are driven more by one side’s policy preferences than demonstrable safety concerns, the use of federal regulation in this fashion diminishes the proper role of negotiations. There is less of an imperative to engage in good faith bargaining if the parties believe that a federal agency will impose an outcome. If FRA enacts a crew size rule, it will give both sides an incentive, whenever any contentious issue arises between railroads and unions, to try to use the federal regulatory process to impose a preferred outcome instead of negotiating for a mutually acceptable solution.

22. In this regard, it is worth re-emphasizing the words of Presidential Emergency Board No. 213, which recognized that collective bargaining is the only proper forum to address crew size in the railroad industry:

Three Presidents, the Congress, the Courts, a Presidential Railroad Commission, various Boards, and other Tribunals have been drawn into the controversy [over crew size]. All have made lasting contributions. However, at the end of their productive and painstaking labors, all of our predecessors were agreed that the matter can best be resolved with finality through the conscientious collective bargaining efforts of the directly interested parties.
Report of PEB No. 213 at 8 (emphasis added). The Board concluded that “the process of good faith collective bargaining should be the mechanism that provides for the resolution of this dispute.” Id. at 15. As Mr. Gradia noted, that still remains true today.

Pursuant to 28 U.S.C.§ 1746, I declare under penalty of perjury that the foregoing is true and correct.

Brendan M. Branon

December 14, 2022
BEFORE THE FEDERAL RAILROAD ADMINISTRATION
Docket No. FRA-2014-0033

TRAIN CREW STAFFING

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

EXHIBIT F

Statement of A. Kenneth Gradia
BEFORE THE FEDERAL RAILROAD ADMINISTRATION

DOCKET NO. FRA-2014-0033:
TRAIN CREW STAFFING

STATEMENT OF A. KENNETH GRADIA
SUBMITTED BY
THE ASSOCIATION OF AMERICAN RAILROADS

Introduction and Summary

1. I am the Chairman of the National Carriers’ Conference Committee ("NCCC"), which represents more than thirty freight railroads – including all the Class I carriers – in multi-employer collective bargaining with the 13 different rail unions that represent the railroads’ employees. I have served as Chairman of the NCCC since 2008. Before my tenure as the Chairman, I was the Vice-Chair of the NCCC from 2002 to 2008, and Director of Labor Relations from 1990 to 2002. Prior to my work for the railroad industry, I was an attorney for the Federal Railroad Administration ("FRA").

2. I am familiar with virtually every aspect of collective bargaining with the various rail unions. I have handled a wide range of labor issues over the years, including the various crew size issues that have arisen in negotiations between the rail carriers and the operating craft unions, the Brotherhood of Locomotive Engineers & Trainmen ("BLE") and the Sheet Metal Air Rail & Transportation Workers Transportation Division ("SMART TD"). I am well-acquainted with the long history of bargaining over these matters, extending back for 100 years or more. I make this statement on the basis of personal knowledge and on the basis of documents that the NCCC maintains in the regular course of business.
3. My primary purpose in this Statement is to demonstrate that the freight railroad industry and the rail unions have, for many years, consistently handled all of the difficult and interrelated questions of crew size at the bargaining table. Crew size has been raised in multiple rounds of bargaining dating back to the early 1900s. It has also been addressed by a variety of neutral fact-finders, including presidential commissions, federal courts, arbitrators, and emergency boards appointed by the President. Indeed, crew size has historically been one of the most important – if not the most important – issue in bargaining with the operating crafts since at least World War II, with strongly held views on both sides of the issue. The long-standing expectation of both sides – carriers and unions – is that crew size is and will remain a subject of collective bargaining.

4. As a result, mandating crew size limits by federal regulation would undercut and disrupt the collective bargaining process in a fundamental way. Agreements on crew size are woven into the very fabric of the industry. The industry’s preferential work rules, rates of pay, and benefits for operating crafts are attributable, at least in part, to trade-offs made with respect to changes in crew size. More specifically, operating employees have received a substantial part of the savings for past crew size reductions in the form of increased compensation. If crew size is set by regulation, it will, as a practical matter, limit the ability of the railroads and the unions to freely bargain for changes in staffing. This will not only overturn settled expectations – it will alter the long-term scope, direction and tenor of bargaining, with consequences that cannot be predicted and could be undesirable for the carriers or the employees (or both). To put it more bluntly, if the railroads are forced to bear unnecessary labor costs attributable to excess crew members, they will have to seek savings through other avenues to remain competitive.
5. I will also show that questions of safety, including the issues raised in the Notice of Proposed Rule-Making ("NPRM"), have always been an intrinsic part of the bargaining over crew size. More specifically, the rail unions have repeatedly resisted changes in crew size by citing concerns about safety. The unions' standard argument – during every phase of reductions in crew size – has been that railroads cannot operate safely with reduced crews. The railroads have typically countered by demonstrating that there is no empirical support for such claims. The safety aspects of crew size have also been examined and considered by the various presidential commissions and emergency boards referenced above. For the most part, the railroads' position on safety questions has prevailed. Over the long history of this issue, most neutral fact-finders have concluded that there is no evidence that larger crews are necessary for safety, especially during periods marked by the introduction and maturation of new technology.

6. In short, the historical experience of collective bargaining over crew size strongly suggests that FRA should not try to prescribe a rule on this subject. As described in greater detail below, the unions have objected whenever Congress tried to legislate solutions or arbitrators imposed agreement terms for crew size. The unions have, until now, argued strenuously that questions of crew size should always be decided at the bargaining table, and never imposed by third parties. And to that extent they are correct: voluntarily negotiated solutions are invariably the best answer to the industry's labor issues.

7. Nor should there be any doubt that crew size is, in fact, a labor issue. Congress recognized that fact when it set limits on the power of the Secretary of Transportation to regulate the "qualifications of employees." 49 U.S.C. § 20110. The legislative history of that statutory provision shows that it was intended
to preclude unwarranted interference by the Secretary ... with any matters which traditionally have been or would have been subject to settlement through collective bargaining agreements. ... The committee determined that this sentence was necessary to insure that the Department of Transportation under the aegis of its authority over railroad safety would not become embroiled in what could be classified as an economic issue. *An example of the problem that is intended to be avoided here is found in the well-known ‘fireman’ issue. While a question of safety may very well be involved in the issue of whether a fireman is needed in the cab of a locomotive, the economic aspect of the issue is at least as great in the eyes of labor and management. But without the provision under discussion, a decision or nondecision by the Secretary might be interpreted as deciding the issue even though the agreement reached or which might have been reached should not have been inconsistent with rules ... issued by the Secretary. The Secretary of Transportation’s authority is over railroad safety, not labor management disputes.*

S. Rep. No. 91-619, at 6–7 (December 18, 1969) (emphasis added). By using the fireman issue as an example, Congress clearly indicated that it wanted FRA to stay out of the business of crew size regulation – a subject that has “traditionally” been “subject to settlement through collective bargaining agreements.”

**Background**

8. During their long history, the railroads have undergone many dramatic alterations due to advances in technology, increasing competition, government regulation, and the tides of economic change. The industry started prior to the Civil War with steam engines, fired by wood, and using hand brakes that had to be operated separately on every car. As operations expanded, coal-fired boilers replaced wood, and engines gradually became larger and more powerful. Steam power remained the order of the day, however, well into the 20th century. The gradual introduction of diesel and diesel-electric locomotives and modern air brake systems between the 1920s and 1950s had profound ramifications for the industry and its labor force. At around the same time, the expansion of the national highway system – a *de facto* subsidy for trucks – introduced new levels of competitive pressures for the railroads.
9. In order to keep pace with technological change and the constantly evolving competitive environment, the railroads must regularly update their operating practices and, as a result, their collective bargaining agreements. At many points in the railroads’ history, the inability to make sufficiently rapid changes in labor practices – due to resistance at the collective bargaining table, overly burdensome regulation, or other factors – has caused serious financial problems, most notably during the period of swift and severe economic decline in the 1960s and 1970s.

10. Crew size – the number of workers required on a train – is one of the most obvious examples of this pattern. Questions relating to the number of crew members on a train have historically included two major issues. First, in the world of railroad labor relations, the term “manning” historically referred to issues concerning engineers and firemen. Firemen were a vestige of the steam era – they were originally responsible for maintaining the fire in coal-burning boilers on steam engines. When the steam locomotive gave way to diesel and electric power, however, the fireman’s principal function disappeared. Nevertheless, railroads continued to run trains with firemen (or “firemen-helpers”) on the crew.

11. The second major issue concerned brakemen and conductors. Brakemen were originally responsible for setting and releasing hand brakes on rail cars, while conductors threw switches, coupled and uncoupled cars, and directed the movement of locomotives through the use of signals to the engineer. The brakeman’s job was made essentially meaningless with the advent of automatic air brakes, but, as with the firemen, trains continued to operate with brakemen on the crew for many years thereafter. The term “crew consist” historically refers to the number of conductors and brakemen on a train crew.
Crew Size in the Early Years

12. Train crews originally consisted of an engineer, a fireman, and one brakeman for every ten cars, meaning that there were in some cases ten or more employees on a single train. By 1900, early air brake systems were increasingly common, but employees still had to manually set hand brakes to supplement the air brakes. The typical crew complement around the turn of the last century was five on through-freight service (one engineer, one fireman, one conductor, and two brakemen). On local service, the typical crew was six or seven, including one or two extra brakemen to assist with "less-than-carload" small package service.¹

13. From the very outset, the unions that represented these employees consistently argued that every member of the crew was necessary for safety reasons, and sought to require railroads to maintain (or increase) crew size through collective bargaining. The records of that era are fragmentary, but in 1900 the Brotherhood of Railroad Trainmen and the Order of Railway Conductors jointly collected and published the agreements and rules in a compilation entitled "Rules and Rates of Pay in Train and Yard Service on the Principal Railroads of the United States." It shows that at least 31 railroads had crew rules applicable to one or more classes of operating service, the earliest being a November 7, 1889 agreement between those two unions and the Evansville & Terre Haute and the Evansville & Indianapolis railroads for three brakemen on all local freight trains. By 1910 most of the railroads had crew consist agreements, principally governing local freight service, requiring up to four brakemen.

14. The United States Railroad Administration, which operated the railroads during World War I, did not establish any consist or manning rules. After the war, the United States Labor Board was likewise silent on the subject. Moreover, no national agreements between 1917 and 1959 made pursuant to Presidential Emergency Boards and awards of Arbitration Boards contained crew consist or manning provisions. Crew size remained a subject of local bargaining and practice until 1937.

The First National Agreements: 1937-1959

15. During the 1920s, some carriers began to use diesel locomotives in yard service without assigning firemen. The usage of diesel locomotives expanded to passenger service in the early 1930s. Some railroads assigned firemen to this service, while others did not.

16. In October 1936, the Brotherhood of Locomotive Firemen and Enginemen ("BLF&E") proposed adoption of a national rule providing that firemen be assigned to all types of locomotives in all classes of service. In February, 1937, a group of nine carriers — six of which did not own any diesel locomotives at the time — reached an agreement known as the 1937 National Diesel Agreement. It provided that firemen would be assigned to all locomotives, including diesel-electric locomotives, with the exceptions of single and multiple unit electric trains in commuter services and certain smaller locomotives.

17. At the time, few railroads expected that diesel power would become prevalent — there were only 218 diesels in service as compared to 43,624 steam locomotives. But by 1948, diesel locomotives were moving more than 50 percent of the freight, and by 1960 it was more than 97 percent. Thus, less than 20 years after the National Diesel Agreement, technological change had eliminated almost all of the work previously performed by firemen.
18. Nevertheless, in 1950, the BLF&E fought to add a second fireman to road diesels, claiming that the additional employee was needed for “safety” reasons. In particular, the union argued that
diesel operation . . . creates a peculiar safety factor that requires individual attention. It maintains that the safe operation of Diesels is seriously jeopardized during the absence of the fireman (helper) from the cab incident to his attendance upon engine-room machinery. A competent person in addition to the engineer should be available at all times in the cab of Diesels, the organization insists, primarily to act as a lookout but also to take over immediately in case of any emergency arising out of the sudden incapacity of the engineer.

Report of Emergency Board No. 70 (1949) at 19. The emergency board rejected that argument, noting, among other things, that diesel locomotives included new safety technology, such as automatic braking in the event of the incapacity of the engineer, which undercut the “safety” claims of the unions. In subsequent bargaining, the carriers ultimately prevailed on this issue. The new agreement did, however, preserve the requirement to staff a single fireman on all locomotives (again with certain exceptions).

19. In 1956, some railroads made their first concerted attempt to remove firemen from diesel locomotives. The firemen’s union resisted, arguing, among other things, that a fireman was still needed in the locomotive cab for safety reasons, *i.e.*, as a lookout and a backup to the engineer in case of unexpected incapacity. The carriers’ proposal to eliminate firemen was later withdrawn as part of a broader settlement on wage and work rule disputes.

20. During this same period, there was little change in the number of train service employees (conductors and brakemen) on train crews. Carriers and unions both sought changes in crew consist in multiple bargaining rounds, but neither was able to secure a recommendation from an emergency board on this point. In these cases, as with the fireman issue, the union
relied heavily on "safety" arguments. For example, before PEB No. 77, involving a dispute between the Southern Pacific and the Brotherhood of Railroad Trainmen, the union cited examples of "extremely hazardous switching situations on public streets in Los Angeles and San Francisco" to justify its demands for a mandatory third brakeman on every crew. Report of Emergency Board No. 77 (1949) at 8. It also cited casualty statistics, but the Board was skeptical of that data, stating that "[i]t cannot be said, as a universal proposition, applicable system-wide, that a two-brakeman crew is inherently dangerous or more hazardous than three men on the same operation." *Id.* at 9.

21. In December, 1957, more than 200 railroads established the Committee of Six (railroad officials) to investigate and report on the manner and degree to which agreements, rules, and practices governing employment and working conditions were affecting the financial and competitive positions of the industry and the efficiency of railroad operations. The Committee reported that 18,000 unneeded brakemen and fireman-helpers were costing the industry $150 million annually (more than $1.2 billion in 2016 dollars).²

22. Yet by 1959, there was still no standard national rule as to the number of men in a crew; the consist differed from state to state and from railroad to railroad and even among sections of the same railroad. The unions' policy continued to be to press aggressively for a "minimum safe crew consist" of two road brakemen or yard helpers on each and every crew, as well as at least one fireman. The parties' debate over the relative safety of reduced crews continued to be front and center in each round of bargaining on virtually every major carrier throughout this period.

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² Before Emergency Board No. 172, Consist of Train and Yard Crews, Carriers' Exhibit No. 1, Statement of James E. Wolfe, p. 3.
The Initial Wave of Change: 1959-1963

23. In 1959, the financial condition of the railroads worsened, and they resolved to press more vigorously for the elimination of unnecessary positions. In response, the unions repeated their “safety” claims to justify both the need for a fireman as well as the third brakeman. This led to the highly contentious 1959 wage and rules movement, which was perhaps the first large-scale battle over crew size.

24. The industry’s proposed changes were issued on November 2, 1959. The notice of each railroad, addressed to the BRT and BLF&E, stated the desire of the railroad to eliminate “all agreements, rules, regulations and practices, however established,” which specified crew consists, and the desire that “management shall have the unrestricted right, under any and all circumstances” to determine consists thereafter. When the initial bargaining over these proposals proved fruitless, the parties agreed, in October, 1960, to the appointment of a Presidential Railroad Commission, chaired by the Secretary of Labor, to investigate the operational and safety claims of both sides.

25. The Commission spent over 13 months of study on the matters before it. There were 96 days of testimony resulting in 15,306 pages of transcript, including 79 witnesses and 155 depositions. There were also 319 exhibits, totaling 20,319 pages; photographs, motion pictures, and other documents and visual presentations. Thousands of miles of field trips were devoted to inspecting railroad facilities, passenger and freight trains, yards, industrial switching,


harbor facilities, and main and branch lines, in mountain, desert, plain and valley terrains in day and night operations under varying conditions of traffic density, including a wide range of equipment and a variety of traffic control systems.\(^5\)

26. The railroads testified that technological, operational, and traffic changes over the years had so changed the jobs of train and engine service that most, if not all, brakemen and firemen positions were redundant. They submitted studies of 499 positions on 25 of the largest Class I railroads which indicated that 47% to 78% of the time of brakemen was sedentary, that is, sitting while maintaining a lookout (observing passing signals and visually inspecting a moving train while on curves) or doing nothing, and that 29% to 40% of the time of firemen was "idle time."\(^6\)

27. The railroads also focused on various technological improvements that made the operating craft jobs safer and easier: spring switches, centralized traffic control, electric lanterns and fuses, radios and telephones, reduction in the incidence of hot boxes, detectors of dragging equipment, reduction of physical effort in manipulating hand brakes, improvements in knuckles and air hoses to reduce repairs by brakemen, and such yard improvements as track-fill signals, automatic classification of cars, and communication devices.\(^7\) They also offered extensive expert testimony showing that the rate of accidents and casualties was not altered by the presence of additional persons on the train crews, and that there was no sound empirical basis for drawing a connection between safety and crew size.

\(^5\) Presidential Railroad Commission’s Summary Fact Sheet on Rules Dispute Between Carriers and Operating Unions (Official Text), at 2.


28. For example, the railroads presented a report analyzing 501 accident investigations between 1947 and 1960. The railroads noted that the engineer was alone in the cab for only 11 of these accidents, meaning that the presence of a fireman in the cab had done nothing to prevent 490 of the 501 accidents during that time period. The railroads argued that there was, moreover, no evidence in any of the 11 engineer-only accident reports to suggest that the presence of a fireman in the cab would have made any difference. The railroads also pointed out that in no case did any accident investigation result in a recommendation for additional crew members.⁸

29. The union testimony before the Commission was diametrically opposed to that of the railroads. They offered anecdotal evidence of situations where, they claimed, the role of the fireman as a “lookout” had made a difference.⁹ The experts, in the union view, differed regarding the desirable degree of safety in crew work. They argued, in particular, that not all railroads were “safety conscious.” They concluded that “the size of train crews has long been a subject for collective bargaining” and “the reason for this is because it directly affects the personal safety of each individual crew member.”¹⁰

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⁸ Appendix Vol. 1 to the Report of the Presidential Railroad Commission, at 34.

⁹ Supporting Documentation of the Presidential Railroad Commission, “Before the Presidential Study Commission, Modernization of the Wage-Rule Structure of Railway Operating Employees, 1961, Surrebuttal, Crew Consist Issue in Regard to Train Service Employees, Employees’ Exhibit No. 118, Witnesses: V.W. Satterwhite, T.M. Walters, and L.B. Richardson, Filed on behalf of Brotherhood of Railroad Trainmen, Switchmen’s Union of North America, Order of Railway Conductors and Brakemen, and Brotherhood of Locomotive Firemen and Enginemen,” at 1-3, 6-7. More generally, the unions argued that the role of employees as “lookouts” contributed to safety. For example, the unions placed heavy emphasis on the need for a rear brakeman on a train to supplement the conductor in the caboose because of the need for a “constant watch” on both sides of a moving train for hot boxes and other equipment failures, and for signals from wayside employees. Cornell University. Library, Supporting Documentation of the Presidential Railroad Commission, Box 25, Folder 3, “Employees’ Exhibit No. 118, Surrebuttal: Crew Consist Issue in Regard to Train Service Employees,” at 4-6.

¹⁰ Appendix Vol. 1 to the Report of the Presidential Railroad Commission, at 42.
30. The Commission filed its report with the President on February 26, 1962. The Commission concluded that a total of three men could operate a freight train safely—an engineer, a conductor, and a brakeman—rejecting the unions’ argument that five employees were necessary. In doing so, the Commission specifically rejected the unions’ safety arguments with respect to both firemen and brakemen.

31. With respect to firemen, the Commission considered and rejected the unions’ argument that the position was necessary as a “lookout” and to provide emergency relief to the engineer. It noted that there was no evidence that the service of a fireman as a “lookout” did anything to avert accidents. *Id.* at 39. It also noted that “[t]he performance of yard and switching operations without firemen is not hypothetical, for the record indicates that industrial switching by a number of private firms, the Armed Forces, and switching and terminal companies is performed safely and efficiently without the use of a fireman.” *Id.* As for the asserted need for emergency relief of the engineer, the Commission noted that the technological solution of “dead man’s controls” justified operations without a fireman in the cab. *Id.* at 43-44.

32. With respect to brakemen, the Commission again found that there was no proof for the unions’ insistence that larger crews result in fewer accidents. *Id.* at 57. It stated that while “there may well have been some such cases . . . the evidence does not establish that the number has been substantial, and this is an area not subject to statistical evaluation.” *Id.*

33. The Commission concluded with a reaffirmation of the need for collective bargaining to address differences over crew size. It is perhaps ironic that, at the time, it was the carriers who were suggesting that collective bargaining was no longer capable of solving the

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problem, while the unions were defending the bargaining process as the right method to work through these issues. The Commission stated:

The [unions] . . . believe that the collective bargaining process as hitherto employed with respect to crew consist issues is sound both in principle and in the light of its long history in the railroad industry, and that it is adequate to meet any real problems which may exist. They say that in proper instances changes have been negotiated.... In this industry, whatever may be said of others, the employees have a legitimate collective bargaining interest in the matter of crew consist, and it is our view that the collective bargaining process should remain the basic method for resolving disputes concerning this matter...with an expedited method of final determination, through arbitration.

*Id.* at 55-56 (emphasis added).

34. The Commission’s findings were rejected by the unions, and so the parties returned to the bargaining table. When negotiations reached an impasse, the carriers invoked their right under the Railway Labor Act to implement the proposed changes. The unions filed suit, and the case resulted in a ruling by the Supreme Court that the parties were free to use self-help, subject to the President’s right to appoint an emergency board under the RLA.

35. In order to avoid a debilitating nationwide strike, President Kennedy appointed Emergency Board No. 154 to make recommendations for settlement of the issue. The parties repeated essentially the same arguments that they had made to the Presidential Railroad Commission, and the Board issued recommendations that mirrored the Commission’s findings. Further bargaining failed to resolve the issue, and so in August 1963, Congress passed emergency legislation providing for binding arbitration. Public Law 88-108 created a tripartite arbitration panel, known as Arbitration Board No. 282, that was charged with making a final and binding determination of the issues of crew size, including both the fireman issue and the brakeman issue.
36. Before Arbitration Board No. 282, the parties repeated their arguments yet again, including with respect to the alleged “safety” ramifications of reductions in crew size. The carriers pointed to statistics showing that there had been a steady decline in accidents and casualties, which, they argued, was primarily attributable to technology. They argued that not only was there no empirical evidence that larger crews help to prevent accidents, but in fact the evidence suggests that larger crews make accidents worse by exposing a larger number of employees. The unions, for their part, adopted the same approach of using primarily anecdotes to portray a link between crew size and safety. They said that additional crew members served a valuable function by watching for hazards, and were also necessary in case of emergency, such as the sudden impairment of the engineer.

37. In the end, the Board agreed with the findings of the Commission. Greatly simplified, the Award of Board No. 282 ruled that the brakeman and fireman positions were unnecessary and that the jobs could be eliminated. With respect to crew consist, it handled the issue by sending the issue to the individual properties for negotiation, with binding arbitration if they were unable to agree. The result of those local arbitration proceedings was the elimination of a large number of unnecessary brakeman positions (a total of about 8000 jobs). On the fireman question, the Award of Board 282 found that there were essentially no jobs that could be justified on the grounds of “safety.” However, it gave the union the right to designate 10 percent of freight and yard jobs as requiring firemen. It also provided for elaborate procedures for reducing the number of fireman positions, as well as very substantial separation allowances. As a result of this award, the carriers were able to eliminate about 18,000 of 35,000 fireman positions.
38. The Award of Arbitration Board No. 282 expired after two years, leading to a renewal of the debate over crew size. The unions demanded that the phased-out jobs be restored, and, in November of 1965, filed new proposals under Section 6 of the RLA to that effect. The bargaining followed a similar pattern, but eventually 33 railroads signed an agreement to restore the disputed positions. This agreement—known as the “Luna-Saunders” Agreement—reinstated one fireman and three brakemen on every crew. The railroad signatories to this Agreement were motivated by at least two factors. First, they sought union support for the merger of the Pennsylvania and New York Central Railroads. Second, in exchange for restoration of the abolished positions, the unions agreed to not oppose the repeal of the New York state law that required a set number of employees in a train crew. (The New York law was, in fact, thereafter abolished.) The agreement was effective until January 1, 1970.

39. Other railroads, primarily those in the south and west, opposed the Luna-Saunders Agreement. The unions—which at around this time consolidated four brotherhoods into the United Transportation Union ("UTU")—struck several carriers in February 1968, forcing them to sign the so-called “Jacksonville” agreement restoring 1,000 of 1,175 jobs that had been eliminated by agreement or arbitration in the late 1960s. A number of railroads signed similar agreements. By October 10, 1968, approximately 80% of the unions’ membership were covered by such agreements, with the dispute remaining unsettled on 67 railroads employing about 14% of the membership.12

40. Strikes and strike threats against some of the hold-outs, including the Belt Railway of Chicago, the Illinois Central, and the Louisville & Nashville ("L&N"), eventually led to the appointment of Presidential Emergency Board No. 172. The parties' arguments to that Board were familiar: the union's basic contention was that safety considerations required a larger crew.

41. In response, the carriers presented a more comprehensive and detailed empirical argument on the safety question than they had in the past. The carriers argued, in particular, that technological advances made it safe to operate with just two employees on the crew, and that accident rates had not increased after crews were reduced from three brakemen to two in 1963. The carriers noted that the safety records of the Illinois Central, L&N, and Belt Railway were actually better than on those railroads that were still operating with an extra employee. They showed that the casualty rate on the three railroads in question was 5.39 per million man-hours, as compared to the national average of 7.39, and an average of 8.51 on those railroads that used an extra employee. They also made a statistical case by comparing the safety records on railroads prior to and after the removal of the third brakeman (a 15.79 accident rate per million hours on two-man crew trains versus 21.24 on three-man crew trains). The extensive technological changes that contributed to these results included automatic block signaling, centralized traffic control, improved brake system, and two-way radios.

42. In December 1968, the Board recommended that the disputes be resolved by using the same parameters set forth in the Award of Board No. 282 and the subsequent local arbitration awards. The unions rejected those recommendations and struck, forcing more of the "Jacksonville" style settlements.
43. One carrier – the Chicago & North Western – continued to resist. Following litigation over the bargaining that went to the Supreme Court, the parties finally reached a settlement under which the railroad agreed to pay employees a substantial differential if they worked on a reduced crew. They also provided for reduction of crews on an attrition-type basis, meaning that jobs would be blanked as employees retired or otherwise left the carrier’s service. The core ideas of this settlement – increased pay in exchange for reductions in crew size plus attrition-based reductions – eventually became the foundation for resolution of the issue.

44. Meanwhile, renewed bargaining was ongoing on other carriers, who sought to reverse the terms of the Luna-Saunders settlement. Negotiations broke down in June 1970, and yet another emergency board was appointed, this time by President Nixon.

45. Emergency Board No. 177 concluded, as had every other board to examine the issue, that there was no need for firemen on freight and yard diesels. Accordingly, the Board recommended implementation of the following arrangement: (a) a new job classification would be created, combining the functions of firemen and brakemen, (b) no new hires would establish firemen seniority, and existing firemen would be eliminated through attrition, and (c) the carriers would develop a training program to allow for promotion of firemen to either conductor or engineer.

46. In July of 1972, the parties finally reached a voluntary agreement on the fireman issue. The July 19, 1972 Manning Agreement, as it is called, provided that fireman would have the right to exercise seniority in freight and yard service unless they were in training as an engineer or working in passenger service, as a hostler, or as an engineer. It also allowed for furlough of firemen hired after the date of the agreement. As with the voluntary agreement on
crew consist, the 1972 Manning Agreement represented at least a partial break-through that led to the eventual settlement of the national issue. It is notable that in both situations – the Chicago & North Western agreement and the 1972 Manning Agreement – it was a voluntary agreement that finally led the way to labor peace. It is also notable that, despite the reduction in crew size, the safety record of the industry continued to improve.

47. In 1978, a further agreement was reached to modify the training and promotion rules of the industry. With the partial elimination of the fireman craft, a new source of supply was needed for engineer trainees. The combination of the firemen and brakemen unions into the UTU helped to facilitate a deal under which brakemen were given preference for jobs as firemen, and then were in line for promotion to engineer. This was the beginning of the modern system of dual seniority, in which employees in engine service have seniority in the train service craft, and vice versa.

48. These agreements were not, however, the end of the story. The industry’s financial performance continued to worsen in the 1970s, leading to, among other things, widespread bankruptcies. Excess crew costs certainly contributed to the industry’s financial troubles, because even with the new wave of agreements in place, many trains were still being operated with both a fireman and two brakemen in addition to the engineer and conductor. The railroads’ costs for firemen and brakemen positions by 1970 were in excess of $500 million dollars, which was very close to the total net income of the industry at the time.

49. In 1978, one of the railroads in bankruptcy, the Chicago, Milwaukee, St. Paul & Pacific (also known as the Milwaukee Road) entered into agreement with the UTU to allow for attrition-based removal of second brakemen. As with the original C&NW agreement, the
railroad was required to pay special allowances to the remaining employees whenever it operated with a “reduced” crew. Between 1978 and 1982, the UTU signed essentially identical agreements with a group of other carriers, including Conrail, the Missouri Pacific, Union Pacific, Burlington Northern, Frisco, Atchison Topeka & Santa Fe, Seaboard Coast, Norfolk & Western, and Southern Railway. Again, there was no decline in safety due to these changes.

50. In addition, Congress passed the North East Rail Services Act in 1981, authorizing the immediate elimination of all second brakemen jobs on Conrail (subject, once again, to severance and various other conditions). Federal taxpayers were, at that time, subsidizing Conrail’s operations. Congress concluded that labor costs were far too high to sustain a viable enterprise, meaning that, without reform, Conrail would continue to be a drain on the treasury. 45 U.S.C. § 1101. Congress obviously understood that these labor savings could be achieved without affecting safety, and, in fact, here again, safety improved after the change.

**Recovery and New Progress: 1985-1993**

51. By this point, the trend toward collectively bargained elimination of the fireman and second brakeman positions was clear, but further work was necessary to bring about the more fundamental change required to fully reduce all of the unnecessary positions. There were two problems, at least from the industry’s perspective. First, attrition-based reductions of firemen and second brakemen positions was often too slow and had too many exceptions, meaning that many trains were still being operated with five employees. Second, the first round of “Milwaukee Road” agreements did nothing to address the issue of the first brakeman position, which was just as superfluous as the second brakeman position. Again, the parties worked through these issues at the bargaining table.
52. Between 1985 and 1988, a number of the carriers reached agreements with the unions to accelerate attrition-based reductions of firemen and second brakemen. On June 28, 1985, Conrail negotiated an agreement with the UTU that dealt with the firemen issue by providing that all firemen and hostlers would be eliminated through attrition, and trainmen would become the sole source of supply for engine service positions.

53. At the same time, the UTU reached a similar agreement with the other freight railroads, but it failed to ratify. Presidential Emergency Board 208 was appointed in August of 1985. It recommended settlement along the lines of the tentative agreement, including complete elimination of firemen through attrition. The parties were subsequently able to ratify a new version of the agreement based on the Emergency Board’s recommendation.

54. In 1987, the C&NW and UTU entered negotiations over crew size, including the carrier’s proposal to allow so-called “conductor-only” operations, i.e., trains staffed with only an engineer and a conductor. The carrier argued that the attrition program established by the 1973 agreement was too slow and did not allow for removal of the first brakeman. The matter was submitted to Emergency Board 213. In its Report to the President, the Board noted that the UTU cannot “seriously contest the practicality of utilizing a crew consist of a conductor and one brakeman” on any train. Report at 19. It also noted the feasibility of conductor-only operations on at least some through-freight service. Id. The Board therefore recommended that a procedure be established to give “either party the right to request a change from the crew consist which it had previously determined to be appropriate.” Id. Under this procedure, the party proposing the change had the burden to show that the change “does not diminish safety or efficiency, is consistent with industry practice, and will not increase the costs of operations substantially.” Id.
If the parties could not agree, the matter could be submitted to binding arbitration, which would also encompass any issue regarding the payments to employees whose positions were eliminated. *Id.* at 19-20. The UTU rejected these recommendations, and so Congress passed a law imposing the recommendations as an agreement. P.L. 100-429 (1988).

55. Subsequent arbitrations pursuant to this procedure gave C&NW the ability to operate a number of trains “conductor-only.” At around the same time, the UTU and several other carriers voluntarily agreed to allow conductor-only operations on some through-freight service, again in exchange for protected status, increased pay, and/or other benefits. Such agreements typically limited the number of cars that could be in any train operated “conductor-only.”¹³

56. The move toward conductor-only crews accelerated again during the national round of bargaining in 1988. In that round, the railroads — including most of the nation’s Class I carriers — again sought the right to run any train with a crew of one engineer plus one conductor, but the UTU refused to discuss the issue at the national level, arguing that crew consist was a local issue and so could only be discussed outside of multi-employer bargaining. In response, the carriers proposed wage cuts in lieu of crew reductions. The parties were unable to reach agreement, and so the matter again would up in front of an emergency board.

57. In the proceedings before Emergency Board No. 219, the carriers sought a 20 percent pay reduction or elimination of the remaining second brakemen plus the reduction or elimination of most first brakemen and yard helper jobs — a total of about 22,000 positions. The carriers argued that

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¹³ See, e.g., Norfolk & Western — UTU Agreement (July 30, 1987) (allowing for conductor only service on certain coal trains with no more than 25 cars).
the traditional head-end crew prior to the elimination of cabooses during the
1980s consisted of but one ground service employee plus the engineer. Cabooses
were eliminated because technological advances did away with rear-end work.
The employees who came up to ride at the head-end brought no work with them.

Report of Presidential Emergency Board No. 219 at 31. Thus, the railroads argued, there was no
need for more than two employees in the locomotive cab.

58. The Board held that crew consist was, as the UTU had argued, a “local” issue, but
nevertheless agreed with the carriers that “the matter must be bargained to resolution in 1991.”
Id. at 66. It therefore recommended that the parties follow a procedure similar to the one
recommended by PEB 208 for the C&NW. More specifically, it recommended that the parties
engage in local bargaining, with the right to submit the matter to binding arbitration in the event
that there was no agreement. As with the C&NW recommendation, the carrier – presumably the
party seeking a change – had “the burden of proving that such a change does not diminish safety
or efficiency, is consistent with industry practice, and will not increase the costs of operations
substantially.” Id. at 67.

59. The UTU rejected the Board’s recommendations and struck the carriers. The
same day, Congress passed P.L. 102-29. This legislation essentially imposed the
recommendations of PEB 219 as a settlement and established procedures by which the parties
could resolve remaining differences, including a “special board” that was authorized to review
the PEB’s conclusions. Proceedings before the special board reaffirmed the findings of PEB 219
on crew consist with only minor changes.

60. Subsequent local arbitrations pursuant to the PEB 219 procedure largely resulted
in new rights for carriers to run most trains with a crew of one engineer and one conductor.
Those awards typically acknowledged that "conductor-only crews on through-freight and converted through-freight are safe, efficient, and consistent with evolving industry practice."

*See, e.g., Kansas City Southern Ry. & UTU, Crew Consist Arb. Board No. 4, Final Award (March 16, 1992) (Scheinman) at 15.* Nevertheless, this remained a source of contention for years after the arbitrations were over.

**The Modern Era**

61. In the aftermath of PEB 219, most carriers have operated with one engineer and one conductor on through freight service, albeit with greater variation in staffing levels for yard jobs. The lingering issues were, for the most part, finally resolved when the railroads entered into a new round of "crew consist" agreements that provide for a class of "protected employees." *i.e.,* employees who were employed at the time of the crew size reductions and receive lifetime protection from furlough or job loss. In other words, the carriers guaranteed that they would continue to maintain positions for these existing train and engine service personnel. Again, it is notable that the shift to two-person crews did not adversely impact safety.

62. Modern crew consist agreements typically include a moratorium that generally prohibits the service of proposals for changing provisions governing car limits, pure attrition, protected employees, lonesome pay or productivity allowances prior to the attrition of all protected employees.

63. In the last twenty years, there has been relatively little activity with respect to crew consist and manning issues. In fact, at the national level, there have been only three instances where questions of crew size have arisen in recent years. And, consistent with the
history outlined above, each one of the questions about crew consist in the modern era has been handled through collective bargaining.

64. First, after the railroads introduced remote control technology, they reached agreements with the operating craft unions about how such work would be done. The first round of agreements was with the UTU, and primarily concerned use of remote control in switching-type work. The second round of agreements was with BLET, and concerned use of remote control technology in main line operations. The implementation of remote control resulted in significant changes in the make-up of operating crews – for example, with respect to yard and switching work assignments, the carriers removed the engineer from the crew because the engineer’s work is now performed by computer.

65. There were extensive disputes about the implementation of remote control – both unions challenged the agreements in court and in arbitration at various points. But in the end, the collectively bargained solutions were upheld, and the arrangement has proven to be relatively non-controversial in recent years. It is also notable that at no point in this process did any regulatory agency attempt to intercede in the debate about which craft should “own” the work or operate the technology, or whether the carriers could eliminate positions from the crew. The labor relations questions were left to the bargaining table.

66. Second, in the multi-employer bargaining round that began in 2005, the carriers proposed, among other things, that “crew size shall be based on operational needs as determined by the railroad.” In the alternative, the carriers sought adjustments in compensation, such that “the compensation of the entire crew shall not exceed the compensation which would have been paid to the crew had crew staffing been determined by the railroad by the operational needs
alone.” The UTU challenged this proposal in federal court, arguing that it could not be required to bargain about crew consist on a multi-employer basis. The court, citing to the findings of PEB 219, held that the union could not be required to bargain at the national level regarding crew consist, but that the carriers’ alternative wage proposal was lawful. “Accordingly,” the Court declined to “use its authority to enjoin bargaining on wages pending local resolution of crew consist issues.” United Transp. Union v. Alton & S. Ry. Co., 2006 U.S. Dist. LEXIS 13452 at *17 (S.D. Ill. March 10, 2006). Following this ruling, the parties were eventually able to reach a voluntary agreement through collective bargaining. (That agreement did not provide for changes in crew size.) Again, it is notable that the parties were able to reach that result without regulatory intervention. Indeed, the third party intervention in the 2005 bargaining round (i.e., the court proceedings) only delayed the collective bargaining that successfully resolved the dispute.

67. Finally, in 2014, one of the Class I carriers, BNSF Railway, reached an agreement with one of the general committees of SMART TD to adjust staffing for certain operations on a portion of the BNSF network. In sum, the agreement allowed BNSF to operate some trains with just an engineer in the cab, supported by a “master conductor” who could have responsibility for remotely supervising multiple trains or yard operations. In exchange, the agreement provided for various forms of compensation and benefit enhancements, as well as lifetime job protection for all existing SMART TD-represented employees. The agreement ultimately failed ratification and so did not go into effect. But again, the BNSF-SMART agreement represents a voluntary and mutual effort on the part of both carriers and the representatives of their employees to work
through the complex issue of train crew size, including all of the various subsidiary questions of compensation, efficiency, fairness, and safety.

Concluding Observations

68. While the foregoing history may seem long and complex, it is actually a rather abbreviated summary of what has been one of the complicated, lengthy, and contentious labor issues in American history. I have reviewed this history in order to show that there is a deep and intricate story of bargaining and dispute resolution when it comes to train crew staffing and related questions of safety – a story that carries great significance for both carriers and the unions. These have been hard-fought battles, with great sacrifices on both sides. It would be a grave mistake, in my view, for FRA or any other regulatory agency to wade into this area and attempt to simply impose new standards that are not acceptable to both sides. That would override the settled, historical approach of this industry to address crew size through bargaining, with potentially painful consequences for the relationships that are critical to preserving labor peace.

69. Proof of that can be found in the fact that bargained solutions have almost always been more successful than imposed solutions. For example, the Award of Arbitration Board 282 was, in the end, a failure. It did not produce lasting change with respect to the fireman issue. The real breakthrough came in the voluntary agreements of the 1970s. Likewise, the imposed recommendations of PEB 219 with respect to crew consist created enormous distress in the industry – it was not until later, when the parties reached voluntary agreements, that the issue was finally resolved. And even when it does become necessary for arbitrators or a PEB to help
the parties on these difficult issues, that kind of intervention happens within the collective bargaining framework and so is very different that a regulatory edict.

70. Indeed, the outside tribunals and fact-finders that have examined crew size issues over the years have repeatedly stressed that voluntary deals are by far the preferred course to resolving these matters. For example, in 1988 Presidential Emergency Board No. 213 stated as follows:

Three Presidents, the Congress, the Courts, a Presidential Railroad Commission, various Boards, and other Tribunals have been drawn into the controversy [over crew size]. All have made lasting contributions. However, at the end of their productive and painstaking labors, all of our predecessors were agreed that the matter can best be resolved with finality through the conscientious collective bargaining efforts of the directly interested parties.

Report of PEB No. 213 at 8. It further stated that “the process of good faith collective bargaining should be the mechanism that provides for the resolution of this dispute.” Id. at 15. That remains true today.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

[Signature]
A. Kenneth Gradia

June 14, 2016
BEFORE THE KANSAS DEPARTMENT OF TRANSPORTATION

K.A.R. 36-43-1. CREW REQUIREMENTS

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

EXHIBIT 8

FINAL REPORT

Evaluation of Single Crew Risks

Comparative Risk Assessment

ICF #142985

January 26, 2015

Report to:
Association of American Railroads
Suite 1000
425 3rd Street, SW
Washington, DC 20024

Prepared by:
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Fairfax, VA 22130
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This report was prepared by ICF Incorporated, LLC (ICF) for the account of the Association of American Railroads. The material in it reflects ICF’s best judgment in light of the information available to it at the time of preparation. Any use that a third party makes of this report, or any reliance on, or decision made that is based on it, is the responsibility of such third party. ICF accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.
# Table of Contents

1. **Introduction**.............................................................................................................. 1

2. **Approach**.................................................................................................................... 1
   2.1 Accident Scenarios................................................................................................. 1
   2.2 Fault Tree Analysis................................................................................................. 3
   2.3 Data Sources.......................................................................................................... 4

3. **Results and Conclusions**.......................................................................................... 5

Attachment A: **Fault Trees** .............................................................................................. 7

Attachment B: **Explanation of Data Used in the Fault Trees** .................................... 12
1. Introduction

At the request of the Association of American Railroads (AAR), ICF Incorporated (ICF) conducted a comparative risk analysis for select accident causes under present day mainline operations with traditional two-person crews versus future mainline operations on Class I railroad lines when a positive train control (PTC) system complying with Federal Railroad Administration (FRA) regulations is fully implemented—for both one- and two-person crews. The focus was on determining the frequency of accidents that might be impacted by crew size, and was limited to that fraction of Class I railroads’ operations that are subject to PTC requirements. Thus, it does not consider all causes of accidents and is not a full comparison of accident frequencies with and without PTC.

PTC systems can warn the crew of the need to take certain types of action, and are able to stop trains to avoid train-to-train collisions, overspeed derailments, incursions into established work zones, or passage through improperly positioned mainline switches. This allows the PTC systems to enhance safety, but also essentially minimizes the benefit of the second member of the crew in the locomotive. Single crew operations are not without precedent within the rail industry and within other industries. Most commuter and intercity passenger trains in the US are operated with one person in the cab, and many international rail systems and a few smaller railroads on the US also safely and effectively operate freight trains with a single crew member. Other industries have also reduced their staffing of critical operations as technology has developed to the point where fewer people are needed for the same activities. This can be seen in situations from control rooms to vessel navigation to manufacturing facilities.

2. Approach

This analysis looks at various scenarios that would be impacted by the implementation of a one-person crew and compares the risks for those specific scenarios for the present base case and both the one- and two-person crew alternatives under PTC operations. The intent of the analysis is to understand what could go wrong, what the consequences would be, and the chance of something actually occurring. Safety performance was measured primarily by the predicted occurrence of FRA-reportable train accidents.

Given some of the issues that have been encountered in achieving full implementation of PTC systems, this analysis does not use a specific future date—rather it assumes full implementation of PTC where it will be required and feasible. For traditional two-person crews, the time period used for data collection depended on the specific type of data, but typically was for 2013 or 2011-2013. It should be noted that the only data used in this analysis is for the Class I railroads as a whole. The intent of the analysis is to compare the nationwide difference for the select scenarios between the present and future operations cases, not to identify differences across individual railroads.

2.1 Accident Scenarios

ICF previously worked with a Risk Analysis Working Group (RAWG) assembled by the AAR, and comprising representatives of member railroads, AAR staff, and consultants to identify accident scenarios that were expected to be impacted by crew size. The RAWG
reported through the Interoperable Operations and Train Control Working Committee to the Safety and Operations Management Committee of the AAR (SOMC), which is composed of the chief operating officers of member railroads. The prior collaboration with the RAWG informed the present analysis.

The earlier work identified all the activities presently performed by today’s two-person crews. If the train crew is reduced to one crew member, the primary and secondary activities performed by second crew member would have to be reallocated, modified, or eliminated. The potential ways of addressing the second crew member responsibilities are:

- Reallocate them to the remaining crew member (the operator), where this is judged to be safe and operationally feasible.
- Use technology (in this case the PTC system) to modify the activity so that it can be carried out by the remaining crew member without reducing safety and operational performance.
- Transfer responsibility for the activity to a mobile worker who comes to the train when required.
- Change operating practices to eliminate the activity when trains are operated by a single crew member (or if they are required, do not operate that train with a single crew member).

A fault tree analysis was used to develop and display the different ways in which certain types of accidents or injuries arise today and how these might change under both future scenarios. To develop the fault trees, each train crew function was examined in turn to describe how the function is performed today with two-person crews and how it would be performed under PTC. For example, if a function of the train crew is to operate the train in compliance with speed limits and signal indications, then the accident scenario is a collision or derailment caused by a failure to comply with the limits and indications. Functions where there is no material change between one- and two-person crew operations, or where the nature of the new operations simply eliminates a function, were not considered further. Thus, the risk analysis considered only that subset of accident scenarios that would be expected to change (positively or negatively) under the crew size assumptions.

Four basic sets of accident scenarios were considered for changes under crew-size assumptions:

- **Accidents Due to Violations**: The accidents of concern for the comparative risk analyses are those that are driven by crew member actions, namely authority, overspeed, and signal decertifications. The fault trees also reflect the fact that there is the potential for a PTC system to display a warning to the operator to enable them to take a timely and appropriate action and to actually enforce the underlying requirements if appropriate. [Fault Trees 1 and 2]

- **Route Integrity Failures**: Accidents of interest that are attributable to route integrity failures are those can be caused by visible problems with the track or route where the crew members have time to react but fail to do so, or that may be caused
by certain problems with the track where PTC and other systems would have a chance of detecting the problem. [Fault Trees 3, 4A, and 4B]

- **Rollaway Accidents:** Two particular accident scenarios were identified that would be different for traditional operations today versus under the future cases. These involved instances in which: 1) the train was intentionally stopped to either move a hand operated switch or 2) to inspect the train after an emergency brake or detector stop. Regardless of why the train was stopped, the concern is if the train starts to roll away and the engineer in the cab must stop the train before an accident occurs. In general this will only happen if the train has not been properly secured and the slope is sufficient for the train to start to roll. In the future one-person crew case, there is no engineer in the cab, so the operator on the ground must get back into the cab to stop the train or the onboard system must stop the train. [Fault Trees 5 and 6]

- **Failure to Sound Horn:** Crew members influence the chance of an accident at a grade crossing because if they need to sound a horn and fail to do so, there is an increased chance of a grade crossing collision occurring. In the future case with a PTC system, the automatic activation of the horn also has to be considered. [Fault Trees 7 and 8]

2.2 **Fault Tree Analysis**

To construct a fault tree, one states the undesired event and then repeatedly asks how that might come about, until the basic causes or the lowest practical level of detail is achieved. The construction of the fault tree is the most critical step in fault tree analysis and involves elements of both art and science. A standard set of logic and event symbols facilitates construction. The logic operators indicate whether just one event is needed or if the full set of events shown is required for the event to progress. The symbols are depicted and described below to serve as guides for interpreting the fault trees that appear in Attachment A. The data for each event in the fault trees is given in Attachment B.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="AND gate" /></td>
<td>AND gate - all of the contributing events must occur to cause the identified intermediate or top event; inputs are multiplied</td>
</tr>
<tr>
<td><img src="image" alt="OR gate" /></td>
<td>OR gate - one of the contributing events must occur in order to cause the identified intermediate or top event; inputs are added</td>
</tr>
<tr>
<td><img src="image" alt="Initiating event" /></td>
<td>Initiating event</td>
</tr>
<tr>
<td><img src="image" alt="Contributing event" /></td>
<td>Contributing event - rate of occurrence per demand; conditional on prior initiating and contributing events</td>
</tr>
<tr>
<td><img src="image" alt="Intermediate level event" /></td>
<td>Intermediate level event - caused by more primary events developed below</td>
</tr>
<tr>
<td><img src="image" alt="Multiplier" /></td>
<td>Multiplier - accounts for number of similar components or systems such as the number of vehicles</td>
</tr>
</tbody>
</table>
The use of fault trees not only shows the combinations of events and failures that can lead to an accident, but also supports the quantification of the likelihood of occurrence of accidents under the different cases. The quantification considers historical data derived from analysis of the FRA accident database and data collection efforts by Class I railroads as described later in this memorandum, human error rates from other data sources, and professional judgments based on the collective experience gathered during the 2006 analysis from the working group for that study.

2.3 Data Sources
AAR played a key role in gathering data from the Class I railroads as well as in extracting data from the FRA’s safety databases to assist in the analysis. Specific data was obtained from:

- **FRA.** The FRA makes available on its website (safetydata.fra.dot.gov) numerous safety databases, many going back to 1975. AAR selected data for the Class I freight railroads only generally for both 2013 and for the five-year period 2009 through 2013, inclusively. Use of these FRA databases greatly simplified and standardized the estimates of accident and incident rates and risks as compared to obtaining and using data from individual railroads.

  AAR extracted the following parameters from the FRA Train Accident database:
  
  - FRA-reportable train accidents attributed to:
    - Signal violations
    - Authority violations
    - Speeding violations
  
  - FRA-reportable train accidents attributed via cause codes or accident type codes to obstructions or track defects. A small proportion of such defects might have been detected in time by a second crewman.

  From the FRA Highway Rail Accident/Incident (grade crossing) database, AAR extracted grade crossing collisions (a small proportion of which might have been preventable by the presence of a second crewman) out on the line of road. From the FRA Grade Crossing Inventory database, AAR extracted a partial measure of grade crossing collision exposure, i.e., the number of grade crossings, both the total and just those protected by active warning devices.

  And from the FRA Operational Data database, AAR extracted train miles as another exposure measure.

- **Class I Railroads.** Six individual Class I freight railroads participated in the study and submitted several types of data covering calendar years 2011-2013 from their internal databases. The railroads were CSX, NS, BNSF, UP, CN, and KCS.

  Parameters on which these railroads provided data included:
  
  - Road crew starts and road crew starts in PTC territory
• **ARINC Engineering Services.** In late 2012, ARINC conducted a reliability, availability, and maintainability study for various PTC system segments, providing an indication of the availability and failure rates for the wayside, locomotive, base station, and back office components. They noted that the software systems (back office) will improve in some ways as the systems are tested and enhanced, but that the hardware reliability is not expected to change much.

### 3. Results and Conclusions

Using the data from the fault trees in Attachment A, the following results were obtained for the comparison cases, expressed as results per million crew starts.

**Table 1: Fault Tree Results per Million Crew Starts**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Results Today</th>
<th>One-Person Crew with PTC</th>
<th>Two-Person Crew with PTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Train Accidents due to Violations</td>
<td>3.4</td>
<td>0.027</td>
<td>0.027</td>
</tr>
<tr>
<td>2. Train Accidents Due to Selected Route Integrity Failures</td>
<td>4.1</td>
<td>0.79</td>
<td>0.78</td>
</tr>
<tr>
<td>3. Train Accidents due to Rollaways</td>
<td>0.97</td>
<td>0.096</td>
<td>0.97</td>
</tr>
<tr>
<td>4. Grade Crossing Collisions due to Failure to Sound the Horn</td>
<td>0.7</td>
<td>0.07</td>
<td>0.07</td>
</tr>
</tbody>
</table>

These results suggest the following observations:

- The number of accidents due to violations decreases significantly (by more than a factor of 100) in the future case where there is a PTC system.
- Accidents due to the analyzed route integrity failures decline significantly, but not as much as those due to violations.
- Train accidents due to rollaways decrease by a factor of 10 with the removal of a second person from the cab due to fewer potential situations and additional care taken when the sole operator leaves the cab. [This scenario is not impacted by the addition of the PTC system, just the change in crew size.]
- Grade-crossing collisions attributable to the failure to sound the horn decrease by roughly a factor of 10 in the future case.
- The two future cases have very similar results, regardless of crew size.

Each of the major categories of events as shown in Table 1 represents an outcome that can also be expressed as an annual number of accidents, as shown in Table 2. The figures given in Table 2 are based on the crew starts in PTC territory for the seven major Class I railroads in the United States, an average of about 3.1 million crew starts for 2011-2013.

As such, these accidents represent only a fraction of the overall accidents—another 560,000 crew starts (based on 2011-2013 averages) would likely see the same rates as
today and there are many other causes of accidents that were not the subject of this evaluation.

Table 2: Fault Tree Results Expressed in Accidents per Year in PTC Territory

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Results Today</th>
<th>One-Person Crew with PTC</th>
<th>Two-Person Crew with PTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Train Accidents due to Violations</td>
<td>11</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>2. Train Accidents Due to Selected Route Integrity Failures</td>
<td>13</td>
<td>2.5</td>
<td>2.4</td>
</tr>
<tr>
<td>3. Train Accidents due to Rollaways</td>
<td>3</td>
<td>0.3</td>
<td>3.0</td>
</tr>
<tr>
<td>4. Grade Crossing Collisions due to Failure to Sound the Horn</td>
<td>2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Accident Totals</strong></td>
<td><strong>29</strong></td>
<td><strong>3.1</strong></td>
<td><strong>5.7</strong></td>
</tr>
</tbody>
</table>

Taken as a whole, future operations for the analyzed scenarios have fewer predicted accidents, limited from further reductions only by the current ability of today’s systems to identify a number of broken rail and equipment-out-to-foul failures as depicted on Fault Trees 3, 4A, and 4B. The differences between one- and two-person crews in the future cases are small, and both cases have appreciably fewer predicted accidents for the analyzed scenarios.
Attachment B: Explanation of Data Used in the Fault Trees

The specific data value used for each event indicated in the fault trees is summarized below. Each event has a unique identifying number that correlates to its entry in the table.

### Data Used in Fault Trees

<table>
<thead>
<tr>
<th>Event</th>
<th>Value</th>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fault Tree 1: Train Accidents Due to Violations – Today</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Authority violations</td>
<td>$6.8 \times 10^{-5}$/crew start</td>
<td>Based on violations of authorities resulting in decertifications as reported for 2011-2013 for six Class I railroads.</td>
</tr>
<tr>
<td>1.2 Violation causes accident</td>
<td>$9.6 \times 10^{-3}$</td>
<td>Actual ratio of average annual authority violation accidents to decertifications.</td>
</tr>
<tr>
<td>1.3 Overspeed violations</td>
<td>$8.4 \times 10^{-5}$/crew start</td>
<td>Based on overspeed violations resulting in decertifications as reported by six Class I railroads.</td>
</tr>
<tr>
<td>1.4 Violation causes accident</td>
<td>$1.4 \times 10^{-2}$</td>
<td>Actual ratio of average annual speed violation accidents to decertifications.</td>
</tr>
<tr>
<td>1.5 Signal violations</td>
<td>$9.7 \times 10^{-5}$/crew start</td>
<td>Based on signal violations resulting in decertifications as reported by six Class I railroads.</td>
</tr>
<tr>
<td>1.6 Violation causes accident</td>
<td>$1.6 \times 10^{-2}$</td>
<td>Actual ratio of average annual signal and other violation accidents to decertifications.</td>
</tr>
<tr>
<td><strong>Fault Tree 2: Train Accidents Due to Violations – Future Cases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Authority violations</td>
<td>$6.8 \times 10^{-5}$/crew start</td>
<td>Assumed same as today's case. See Event 1.1.</td>
</tr>
<tr>
<td>2.2 Violation causes accident</td>
<td>$9.6 \times 10^{-3}$</td>
<td>Assumed same as today's case. See Event 1.2.</td>
</tr>
<tr>
<td>2.3 Overspeed violations</td>
<td>$8.4 \times 10^{-5}$/crew start</td>
<td>Assumed same as today's case. See Event 1.3.</td>
</tr>
<tr>
<td>2.4 Violation causes accident</td>
<td>$1.4 \times 10^{-2}$</td>
<td>Assumed same as today's case. See Event 1.4.</td>
</tr>
<tr>
<td>2.5 Signal violations</td>
<td>$9.7 \times 10^{-5}$/crew start</td>
<td>Assumed same as today's case. See Event 1.5.</td>
</tr>
<tr>
<td>2.6 Violation causes accident</td>
<td>$1.6 \times 10^{-2}$</td>
<td>Assumed same as today's case. See Event 1.6.</td>
</tr>
<tr>
<td>2.7 System fails to enforce</td>
<td>$8 \times 10^{-3}$</td>
<td>Based on data in ARINC study on likely overall PTC system availability.</td>
</tr>
<tr>
<td><strong>Fault Tree 3: Train Accidents Due to Route Integrity Failures – Today</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1 Accidents – switch alignment (dark territory)</td>
<td>$5.7 \times 10^{-7}$/crew start</td>
<td>Involving road freight trains on main track at higher speeds, not during switching. Based on AAR analysis of FRA train accident data,</td>
</tr>
<tr>
<td>Event</td>
<td>Value</td>
<td>Discussion</td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
<td>------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>only)</td>
<td></td>
<td>2009-2014 for seven Class I railroads.</td>
</tr>
<tr>
<td>3.2 Accidents – visible broken rail, freight trains in dark territory only</td>
<td>$3.2 \times 10^6$/crew start</td>
<td>Based on AAR analysis of FRA train accident data, 2009-2014, this gives $6.4 \times 10^6$/crew start. Since many broken rail accidents occur far back in the train, suggesting the break occurred under the train, only 50% of the broken rails are assumed to be visible.</td>
</tr>
<tr>
<td>3.3 Accidents – equipment out to foul</td>
<td>$2.9 \times 10^7$/crew start</td>
<td>Based on AAR analysis of FRA train accident data, 2009-2014 for seven Class I railroads.</td>
</tr>
<tr>
<td>3.4 Visible track failure or obstruction</td>
<td>$9.1 \times 10^6$/crew start</td>
<td>Road bed defects, obstructions, and track buckling. Based on AAR analysis of FRA train accident data, 2009-2014 for seven Class I railroads, this gives $1.8 \times 10^5$/crew start. Only 50% of the obstructions or track failures are assumed to be visible to the crew.</td>
</tr>
<tr>
<td>3.5 Time to react</td>
<td>0.1</td>
<td>Estimate of the fraction of the time that the crew will have time to react based on judgment.</td>
</tr>
<tr>
<td>3.6 Do not detect/act in time</td>
<td>$9 \times 10^{-2}$</td>
<td>It has been estimated that the engineer will fail to see the problem in 10% of the occurrences and that the second crew member will have a 90% failure rate as he/she will be focusing on something else or that there will not be adequate time to take action.</td>
</tr>
</tbody>
</table>

**Fault Tree 4A: Train Accidents Due to Route Integrity Failures – Future Case with One-Person Crew**

<table>
<thead>
<tr>
<th>Event</th>
<th>Value</th>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>4A.1 Visible track failure or obstruction</td>
<td>$9.1 \times 10^6$/crew start</td>
<td>Assumed same as today. See Event 3.4.</td>
</tr>
<tr>
<td>4A.2 Time to react</td>
<td>0.1</td>
<td>Assumed same as today. See Event 3.5.</td>
</tr>
<tr>
<td>4A.3 Do not detect/act in time</td>
<td>0.1</td>
<td>It has been estimated that the single operator will fail to see the problem in 10% of the cases.</td>
</tr>
<tr>
<td>4A.4 Switch not properly aligned (dark territory only)</td>
<td>$5.7 \times 10^7$/crew start</td>
<td>Assumed same as today. See Event 3.1.</td>
</tr>
<tr>
<td>4A.5 System fails to detect</td>
<td>$8.0 \times 10^{-3}$</td>
<td>Estimate of likely PTC performance. See Event 2.7.</td>
</tr>
<tr>
<td>4A.6 Broken rail (freight trains in dark territory only)</td>
<td>$3.2 \times 10^6$/crew start</td>
<td>Assumed same as today. See Event 3.2.</td>
</tr>
<tr>
<td>4A.7 System fails to detect</td>
<td>0.2</td>
<td>Estimate of likely system performance.</td>
</tr>
<tr>
<td>4A.8 Equipment out to foul</td>
<td>$2.9 \times 10^7$/crew start</td>
<td>(primarily on-track equipment out to foul) Assumed same as today. See Event 3.3.</td>
</tr>
<tr>
<td>4A.9 System fails to detect</td>
<td>0.2</td>
<td>Estimate of likely system performance.</td>
</tr>
<tr>
<td>Event</td>
<td>Value</td>
<td>Discussion</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>Fault Tree 4B: Train Accidents Due to Route Integrity Failures – Future Case with Two-Person Crew</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41.1 Visible track failure or obstruction</td>
<td>$9.1 \times 10^{-6}$/crew start</td>
<td>Assumed same as today. See Event 3.4.</td>
</tr>
<tr>
<td>41.2 Time to react</td>
<td>0.1</td>
<td>Assumed same as today. See Event 3.5.</td>
</tr>
<tr>
<td>41.3 Do not detect/act in time</td>
<td>$9 \times 10^{-2}$</td>
<td>Assumed same as today. See Event 3.6.</td>
</tr>
<tr>
<td>41.4 Switch not properly aligned (dark territory only)</td>
<td>$5.7 \times 10^{-7}$/crew start</td>
<td>Assumed same as today. See Event 3.1.</td>
</tr>
<tr>
<td>41.5 System fails to detect</td>
<td>$8.0 \times 10^{-3}$</td>
<td>Estimate of likely PTC performance. See Event 2.7.</td>
</tr>
<tr>
<td>41.6 Broken rail (freight trains in dark territory only)</td>
<td>$3.2 \times 10^{-6}$/crew start</td>
<td>Assumed same as today. See Event 3.2.</td>
</tr>
<tr>
<td>41.7 System fails to detect</td>
<td>0.2</td>
<td>Estimate of likely system performance.</td>
</tr>
<tr>
<td>41.8 Equipment out to foul (primarily on-track equipment out to foul)</td>
<td>$2.9 \times 10^{-7}$/crew start</td>
<td>Assumed same as today. See Event 3.3.</td>
</tr>
<tr>
<td>41.9 System fails to detect</td>
<td>0.2</td>
<td>Estimate of likely system performance.</td>
</tr>
<tr>
<td><strong>Fault Tree 5: Train Accidents due to Rollaways – Today and Future Case with Two-Person Crew</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1 Movement of hand operated switch</td>
<td>1/crew start</td>
<td>Value based on statistics provided by two Class I freight railroads for the prior study.</td>
</tr>
<tr>
<td>5.2 Inspect train</td>
<td>$2.5 \times 10^{-2}$/crew start</td>
<td>By rule, emergency brake and detector stops are assumed always to require inspections by the conductor. Railroad data suggests this number of inspections required per crew start.</td>
</tr>
<tr>
<td>5.3 Train starts to move</td>
<td>$1 \times 10^{-3}$</td>
<td>A basic human error in securing the train coupled with being on a slope.</td>
</tr>
<tr>
<td>5.4 Engineer or system fails to stop motion</td>
<td>$1 \times 10^{-3}$</td>
<td>Expert opinion was that the engineer in today’s operation would stop train motion in almost all cases. Furthermore, the current alerter systems installed on most if not all road locomotives would stop any train from a rollaway accident once engaged if the engineer failed to take control. Probability reflects small fraction of locomotives without a functioning system.</td>
</tr>
<tr>
<td>5.5 Accident occurs</td>
<td>0.9</td>
<td>This will typically happen once the train is out of control, but a small fraction (10%) may not actually have an accident.</td>
</tr>
<tr>
<td><strong>Fault Tree 6: Train Accidents due to Rollaways – Future Case with One-Person Crew</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event</td>
<td>Value</td>
<td>Discussion</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>---------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>6.1 Movement of hand operated switch</td>
<td>1/crew start</td>
<td>Same as Event 5.1 above.</td>
</tr>
<tr>
<td>6.2 Inspect train</td>
<td>$1.3 \times 10^{-2}$/crew start</td>
<td>One-half of emergency brake and detector stops are assumed to require inspections by the single operator. The other half are assumed to require a mobile worker to perform the inspection.</td>
</tr>
<tr>
<td>6.3 Train starts to move</td>
<td>$1 \times 10^{-4}$</td>
<td>A basic human error in securing the train coupled with being on a slope, but the train is more likely to be secured than today (see Event 5.3) as the single operator will not have anyone in the cab to rely on if the train starts to move.</td>
</tr>
<tr>
<td>6.4 Operator or system fails to stop motion</td>
<td>$1 \times 10^{-3}$</td>
<td>Operator will generally be in proximity to the train, but will not have the same ease of access as an engineer in the cab (see Event 5.4). However, the alerter systems would stop any train from a rollaway accident once engaged if the operator failed to take control. Probability reflects small fraction of locomotives without a functioning system.</td>
</tr>
<tr>
<td>6.5 Accident occurs</td>
<td>0.9</td>
<td>Same as Event 5.5 above.</td>
</tr>
</tbody>
</table>

### Fault Tree 7: Grade Crossing Collisions Due to Failure to Sound Horn – Today

<table>
<thead>
<tr>
<th>Event</th>
<th>Value</th>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1 Need to sound horn</td>
<td>117 crossings / crew start</td>
<td>Based on AAR analysis of FRA grade crossing inventory database, grade crossings per route mile times miles per crew start gives crossings per crew start.</td>
</tr>
<tr>
<td>7.2 Fail to sound horn</td>
<td>$1 \times 10^{-3}$</td>
<td>The human error for the first crew member is assumed to be $10^{-2}$ based on a typical error rate for a critical task and the second crew member has a higher chance of error (0.1), both due to the reliance on the first person taking action and on having less time to take action.</td>
</tr>
<tr>
<td>7.3 Grade crossing collision</td>
<td>$3.4 \times 10^{6}$/ train crossings</td>
<td>Based on AAR analysis of the grade crossing collisions per million train crossings on the Class I railroads—10-year average for conservatisim.</td>
</tr>
<tr>
<td>7.4 Increase in accident rate without horn</td>
<td>1.75</td>
<td>&quot;Use of Locomotive Horns at Highway-Rail Grade Crossings; Interim Final Rule,&quot; Federal Register, Thursday, December 18, 2003, p. 70603.</td>
</tr>
</tbody>
</table>

### Fault Tree 8: Grade Crossing Collisions Due to Failure to Sound Horn – PTC Case

<table>
<thead>
<tr>
<th>Event</th>
<th>Value</th>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1 Need to sound horn</td>
<td>117 crossings / crew start</td>
<td>Same as today. See Event 7.1 above.</td>
</tr>
<tr>
<td>Event</td>
<td>Value</td>
<td>Discussion</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8.2 Fail to sound horn</td>
<td>0.1</td>
<td>With the activation by the PTC system, it is assumed that the operator(s) will be less vigilant as there is an automated system that will be expected to come on.</td>
</tr>
<tr>
<td>8.3 Horn activation fails</td>
<td>$1 \times 10^{-3}$</td>
<td>Estimate of likely failure of automatic horn activation, given possible problems like database errors.</td>
</tr>
<tr>
<td>8.4 Grade crossing collision</td>
<td>$3.4 \times 10^{-6}$/ train crossings</td>
<td>Same as today. See Event 7.3 above.</td>
</tr>
<tr>
<td>8.5 Increase in accident rate without horn</td>
<td>1.75</td>
<td>Same as today. See Event 7.4 above.</td>
</tr>
</tbody>
</table>
BEFORE THE KANSAS DEPARTMENT OF TRANSPORTATION

K.A.R. 36-43-1. CREW REQUIREMENTS

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

EXHIBIT 9

Correspondence re: K.A.R. 36-43-1,
State of Kansas Office of the Attorney General to
Kansas Department of Transportation (Sept. 1, 2020)
Ms. Geline Savage  
Kansas Department of Transportation  
Eisenhower State Office Building, 3rd - West  
700 SW Harrison  
Topeka, KS 66603  

RE: K.A.R. 36-43-1

Dear Ms. Savage:

Pursuant to K.S.A. 2019 Supp. 77-420(b), we have completed our review for legality of the above-referenced regulation. We met with you on Friday, August 28, 2020, to discuss our concerns about the proposed regulation. For the reasons discussed below, we are unable to approve the proposed regulation at this time.

1. The history section of the regulation lists two statutes, K.S.A. 66-1,216 and K.S.A. 75-5078, as the authorizing statutes. K.S.A. 75-5078 transfers “all the powers, duties, and functions” of the Kansas Corporation Commission (KCC), as it relates to railroads, to the KDOT. K.S.A. 66-1,216 authorizes the KCC the “full power, authority and jurisdiction to supervise and control common carriers . . . and is empowered to do all things necessary and convenient for the exercise of such power, authority and jurisdiction.” However, neither statute authorizes the KCC to adopt rules and regulations concerning the subject of K.S.A. 36-43-1. If the KCC had no such statutory authority, then none transferred to the KDOT.

2. The Federal Railroad Safety Act (FRSA), 49 U.S.C. § 20101 et seq., authorizes the Secretary of Transportation to regulate and issue orders for every area of railroad safety. 49 U.S.C. § 20103(a). The FRSA also has a broad preemptive provision for railroad safety: “Laws, regulations and orders related to railroad safety and laws, regulations, and orders related to railroad security shall be nationally uniform to the extent practicable.” 49 U.S.C. § 20106(a)(1). There are two savings clauses (or exceptions) to the preemption provision, see 49 U.S.C. § 20106(a)(2), but we have deemed neither to be applicable to K.A.R. 36-43-1.

The Federal Railroad Administration (FRA) studied the issue about the minimum number of crewmembers for locomotives and issued a Notice of Proposed Rulemaking (NPRM) to determine whether it should adopt a federal regulation on the size of locomotive crewmembers. On May 29, 2019, the FRA issued an agency action decision that withdrew the NPRM. The decision stated the FRA had “determined that no regulation of train crew staffing is necessary or appropriate at this time” and that its “notice of withdrawal provides FRA’s determination that no regulation of train crew staffing is appropriate and that FRA intends to negatively preempt any state laws concerning that subject matter.” 84 FR 24735-1, 2019.
Based upon *Burlington Northern and Santa Fe Railway Company v. Doyle*, 186 F.3d 790,795-96 (7th Cir. 1999), we have determined the FRA’s decision constitutes an order under the FRSA; this “negative preemption” by the FRA preempts state law. Accordingly, K.A.R. 36-43-1 lacks legality.

3. The Interstate Commerce Commission Termination Act (ICCTA), 49 U.S.C. § 10101 et seq., gives the Surface Transportation Board (STB) exclusive jurisdiction over certain activities of the railroads. See 49 U.S.C. 10501(b). The ICCTA’s preemption provision states, in pertinent part: “[T]he remedies provided under this part with respect to regulation of rail transportation are exclusive and preempt the remedies provided under Federal or State law.” 49 U.S.C. 10501(b). However, under the principle of federalism, a state maintains its traditional police powers to the extent the laws protect public health and safety concerns and do not target the operation of railroads. *State v. BNSF Ry. Co.*, 56 Kan. App. 2d 503, 511 (2018). Although the intent may be public safety, the plain language of K.A.R. 36-43-1 targets the railroad industry by prohibiting one-person train crews for locomotives traveling in or through Kansas. As such, the ICCTA preempts K.A.R. 36-43-1 because it has an effect on railroad operations that is more than incidental or remote. See 56 Kan. App. 2d at 513 (the ICCTA preempted K.S.A. 66-723 because it prohibited any railroad company operating in Kansas from allowing its trains, engines, or cars to block any public road within one-half mile of any city or town for more than 10 minutes at a time).

As we stated above, we are unable to approve the proposed regulation at this time. The original regulation is enclosed with this letter, along with the Economic Impact Statement.

Do not hesitate to contact our office if you have questions.

Sincerely,

OFFICE OF THE ATTORNEY GENERAL
Derek Schmidt

Athena E. Andaya
Deputy Attorney General

Janet L. Arndt
Assistant Attorney General

Encl.: Original Regulation and Economic Impact Statement

cc: Sen. Caryn Tyson, Chair, Joint Committee on Rules and Regulations
Rep. Ron Highland, Vice Chair, Joint Committee on Rules and Regulations
Sen. Oletha Faust-Goudeau, Ranking Minority Member, Joint Committee on Rules and Regulations
Jill Shelley, Legislative Research, State Capitol, Room 68-W
Natalie Scott, Office of Revisor, State Capitol, Room 24-E
Article 43. Train Crew Requirements

K.A.R. 36-43-1. Crew requirements; exceptions. (a) Each entity operating a railroad in Kansas shall maintain at least two crew members in the control compartment of the lead locomotive unit of each train.

(b) Compliance with subsection (a) shall not be required during switching operations, brake testing, or safety inspections; while stopped at a customer location; or while reducing the number of cars in a train when on a siding track. (Authorized by K.S.A. 66-1,216 and K.S.A. 75-5078; implementing K.S.A. 66-105, K.S.A. 66-1,215, and K.S.A. 66-1,216; effective P-________.)
BEFORE THE KANSAS DEPARTMENT OF TRANSPORTATION

K.A.R. 36-43-1. CREW REQUIREMENTS

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

EXHIBIT 10

K.A.R. 36-43-1
Article 43. Train Crew Requirements

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July 15, 2023

Gelene Savage
Chief Counsel
Kansas Department of Transportation
700 SW Harrison Street, 3rd Floor West
Topeka, Kansas 66603

Re: K.A.R. 36-43-1, “Crew requirements; exceptions.”

My name is Bill Kelly, and I am the Vice President of Safety & Compliance for the Cimarron Valley Railroad (CVR), a 200-mile short line freight railroad which operates in southwest Kansas.

This two-person crew regulation, though probably well intended, will not have any additional safety benefits for the CVR. In addition, it will end up costing approximately $400,000 per year in unnecessary additional crew members and vehicles for the CVR, thus detracting from the amount of money we have each year to invest back into the track infrastructure.

CVR currently moves unit grain trains with only one person in the cab of the locomotive while the other crew member shadows the train in a vehicle. Though this is a two-person crew operation as both the conductor and engineer are assigned responsibility for the train, it will not be eligible under the proposed regulation as written since the conductor is not physically in the cab of the locomotive.

CVR has been operating this way for decades and has not had a safety incident because of it. To explain how this works: Our crew goes on duty in Satanta, approximately 60 miles from our interchange point at Dodge City, KS. The conductor and engineer get in a vehicle and drive from Satanta to Dodge City. Once there, they both get out and do the appropriate safety checks and brake tests to ensure the train is safe for operation and in compliance with all state and federal regulations. Once ready, the engineer will begin to move the train while the conductor shadows the train in the vehicle. During the 86 mile move from Dodge City to the customer facility in Hugoton, the conductor will watch the train from the road ensuring there are no unusual movements with the freight, watch the tracks ahead to be sure there are no obstructions, and watch unprotected crossings ensuring a safe passage for both the train and the motoring public. If there is a customer switch needed, the conductor is able to drive ahead and line any switches and prepare the cars for movement.

Forcing the conductor to sit in the cab of the locomotive during the entirety of our 86 mile move significantly reduces their ability to monitor the external environment around the train. A conductor sitting in the cab is not able to drive ahead of the train looking for possible track issues. A conductor sitting in the cab is not able to see the rear of the train. Our conductor who shadows in a vehicle can do these things.
Our locomotives are equipped with safety technology that allows for this crew arrangement to be as safe as possible.

- First, our locomotives are installed with a system called Wi-tronix which alerts the crew and management of any unusual movements with the train. This is used for things like speed infractions, unnecessary braking, and rough train handling.

- Second, our locomotives are equipped with Alerters. The Alerters sound an alarm in the cab of the locomotive after 60 seconds of inactivity by the engineer. If the engineer doesn’t move the throttle, blow the horn, or make some other adjustment to the operating train, an alarm will sound. If nothing continues to be done, then the Alerter will place the train into an emergency brake application and stop the train. In the event the Alerter stops the train, Wi-tronix will send notification to the dispatchers and management.

- Lastly in our operation, the conductor and engineer are in constant radio communication. Our radios are able to communicate at a distance of 3-5 miles based on the terrain.

Our safety record on the CVR speaks for itself. We have had zero incidents using this operating method with an engineer in the cab and a trailing conductor in a vehicle.

As this regulation continues to be reviewed, I would ask KDOT to consider the direct impact this will have on the small business short line railroads operating in Kansas. In my experience in the short line railroad industry, the safest thing we can do is continue to reinvest in the infrastructure ensuring a strong, stable system capable of serving the rail customers who rely on us as their connection to the national freight network. Kansas has been a leader across the country in this regard and we are thankful for that. The financial impact this regulation will have on the CVR, however, will decrease the amount we can spend on safety measures that make a difference for our team members.

Thank you for your consideration of the impact this regulation will have on the short line railroad industry.

Bill Kelly
Vice President – Safety & Compliance
Cimarron Valley Railroad
July 11, 2023

Ms. Emily Brown  
Kansas Department of Transportation, Office of Chief Counsel  
700 SW Harrison Street, 3rd Floor West  
Topeka, Kansas 66603

Dear Ms. Brown,

I write as the President of Kansas City SmartPort, Inc., a regional economic development group focused on industrial and transportation growth in the bi-state Kansas City region. I encourage you to not adopt K.A.R. 36-43-1 which would mandate crew requirements for trains and put the state at a distinct competitive disadvantage as we compete to attract more intermodal, energy and agriculture rail service to our state. No other state has attempted to set significant transportation policy like this through the administrative rule process, and Kansas should not be the first.

A crew size mandate lacks a safety justification, undermines decades of meaningful collective bargaining, and jeopardizes state’s ability to compete in a rapidly changing transportation space. As the transportation sector rapidly changes, and other modes embrace automation, state policymakers must reject mandates that keep railroads in the past. Failing to recognize the reality and value of safe technological advancement in the rail sector will hinder the long-term viability of railroads and divert traffic from trains to trucks (which are less fuel-efficient) creating additional highway congestion and further damaging the state’s highway system.

Intermodal and farm products equal 77% of freight rail traffic that originates in Kansas and 59% of the freight rail traffic terminating in the state. If made final this regulation could provide a significant disruption to the already fragile national and regional supply chains; adversely impact intermodal, agriculture, and energy rail traffic; and reduce the ability of our state to grow.

Please support Kansas business and do not allow our state to be the first to mandate through regulation on this important topic. The state should look for ways to partner with railroads to promote public safety, rather than mandating stiffening regulation that will not improve public safety and put our state at a disadvantage. K.A.R. 36-43-1 is bad for Kansas and bad for Kansas businesses. Thank you for your consideration and public service.

Sincerely,

Chris Gutierrez  
President
Good morning. My name is Eric Stafford, Vice President of Government Affairs for the Kansas Chamber. The Kansas Chamber represents small, medium and large businesses of all industry segments across the state. We appreciate the opportunity to submit comments today with concerns related to the proposed regulation K.A.R. 36-43-1 by the Kansas Department of Transportation (KDOT). This is a significant issue for railroads that operate in Kansas.

Unfortunately, we are submitting these comments today, because like in November 2021, this administration is choosing to appease certain constituent bases to accomplish policy changes when those policy changes do not gain majority support in the Legislature. This abuse of authority by state agencies is why we so strongly supported the constitutional amendment that failed in 2022. So today, we are discussing a regulation that would require railroads operating in the state to maintain a minimum crew requirement of two.

First, as previously discussed, Senate Bill 215 was introduced this session and did not receive a committee hearing. Section 5 of SB 215 includes a near identical provision as these proposed regulations. Furthermore, crew size mandates, according to federal government studies, lack any safety justification as trains with one crew member have not been found to be any less safe than those with two. There is no evidence provided in the documents that KDOT did any real independent safety, economic or environmental studies. Furthermore, the rail industry, one of Kansas’ largest taxpayers, was not consulted by the agency on the economic impact to their industry. We have not seen an economic impact statement required by law from KDOT.

Second, the Kansas Department of Transportation has indicated in the economic impact statement that this rule will cost under $1 million for any two year period through 2024 or $3 million over any two year period after July 1, 2024. However, what research was conducted to look into the economic impact for the entire state? To our knowledge, not one railroad company was contacted regarding this proposed rule, and allowed the opportunity to provide input into what the actual financial impact would be to their company, or the industry as a whole.

Third, this regulation undermines all the years of collective bargaining between businesses and the unions representing their employees. In 2022, the Legislature passed and Governor signed a bill related to autonomous vehicles as the rapidly changing technology available in the transportation space is on the cusp of significant innovation. K.A.R 36-43-1 completely erodes any opportunities that could exist in the future safety gains with automation. Failing to recognize the reality and value of safe technological advancement in the rail sector will hinder the long-term viability of railroads and divert traffic from trains to trucks (which are less fuel-efficient) creating additional highway congestion and further damaging the state’s highway system.
Intermodal and farm products equal 77% of freight rail traffic that originates in Kansas and 59% of the freight rail traffic terminating in the state. Rail is such an integral piece to serve not only our state’s business and commerce needs, but the nation as well.Rails don’t stop at state borders, and disadvantageous regulations ONLY in Kansas are difficult and costly to manage. If made final this regulation could provide a significant disruption to the already fragile national and regional supply chains; adversely impact intermodal, agriculture, and energy rail traffic; and reduce the ability of our state to grow.

Please support Kansas businesses and commerce and avoid being the first state to mandate through regulation on this important topic. The state should look for ways to partner with railroads to promote public safety, rather than mandating strict regulations that will not improve public safety and put our state at a disadvantage. K.A.R. 36-43-1 is bad for Kansas and bad for Kansas businesses. Thank you for your consideration.
Thank you for the opportunity to comment on the Kansas Department of Transportation’s proposed adoption of a regulation to mandate crew size requirements for trains operating in Kansas.

KGFA is the state association of the grain receiving, storage, processing, and shipping industry in Kansas. KGFA’s membership includes over 950 business locations and represents 99% of the commercially licensed grain storage in the state.

KGFA members utilize the railroad system to move Kansas-grown grain to market. Intermodal and farm products make up 77 percent of freight rail traffic originating in our state, and 59 percent of freight rail traffic terminating in the state. As such, KGFA members have a direct interest in this proposed regulatory change.

The proposed regulation would mandate a minimum of two crew members in the lead locomotive unit of each train operating in Kansas. However, the proposal lacks a genuine safety justification. In fact, during the recent Joint Legislative Committee hearing, it did not appear as though any information was available to either demonstrate that lack of two-person crews had been the proximate cause of any unsafe conditions, or that having a minimum of two crew members present would mitigate an unsafe condition. This begs the question of whether this proposed regulation would even be efficacious in improving train safety.

The proposal also fails to recognize alternative technological advancements and processes in the rail industry that have been proven to increase rail safety. We would encourage the agency to partner with railroads in seeking truly meaningful ways to enhance public safety and not pursue this singular-focused regulation.

In addition, the proposed regulation would make Kansas the first state to attempt to mandate crew size through an agency action, alone, rather than through receiving direct authority from the legislature. If the agency believes that it is imperative to mandate two-person crews, then we would ask that this issue be given full consideration through the legislative process rather than be adopted as an agency regulation.

We must also mention the increased costs the proposed regulation would place on the rail industry and, as a pass through, on shippers. The ability of the grain industry to operate competitively often depends on their overhead and input costs, such as the cost of grain shipment. The proposed regulation would add labor costs onto rail roads, and those additional costs would be passed directly on to captive shippers such as grain elevators.
KDOT’s own economic analysis estimates these additional costs at $1.5 million annually – most of which would be passed directly onto shippers such as the grain industry. However, during the Joint Legislative Committee hearing, one short line operator in the state has indicated that the fiscal impact on their operation would be closer to $4.4M.

These increased costs would cause our industry to become less competitive, suppress employee wages, and lower prices elevators are able to offer farmers. The increased costs would also put our state at a competitive disadvantage as we seek to attract intermodal, energy, and agriculture rail service to our state in a rapidly changing transportation space. This would work against rural economic development in Kansas.

One final issue to raise concerns whether this entire area of regulation is preempted by federal agency regulations. While minds might disagree on this issue, it is clear that certain large Class 1 rail operators do believe this field to be preempted by federal regulation and have indicated that the rule would be challenged on those grounds should it become final.

In fact, the field would be expressly preempted under either a federal regulation that is being considered, or by federal legislation that has been introduced. It is our opinion that, taking all things into consideration, there is no good reason for Kansas to get ahead of the federal process on this narrow issue.

During the Joint Legislative Committee hearing, the majority of the committee strongly opposed this agency action and made a recommendation for the agency to not adopt the regulation. The committee cited all of the concerns that we raise once again within this letter.

If the proposed regulation were to become final, it would unnecessarily increase costs on the grain industry, cause economic harm to farmers and rural areas of the state, and disrupt grain supply chains.

For all of the reasons stated, we stand opposed to the regulation and would ask that the department not adopt the proposal as a final regulation.

Thank you for allowing us the opportunity to testify today.
July 17, 2023

Ms. Emily Brown
Kansas Department of Transportation, Office of Chief Counsel
700 SW Harrison Street, 3rd Floor West
Topeka, Kansas 66603

Re: K.A.R. 36-43-1, “Crew requirements; exceptions.”

Dear Ms. Brown:

On behalf of Canadian Pacific Kansas City (CPKC) through our subsidiary the Soo Line Railroad, I respectfully submit the following comments to encourage the Kansas Department of Transportation not to adopt K.A.R. 36-43-1 establishing state mandated crew requirements. The virtual impossibility of dealing with changing requirements every time a train on our multi-state network crosses a state line is why railroad regulation historically, and by law, has been handled at the national level. Moreover, no other state has attempted to set significant transportation policy like this, which in CPKC’s case could affect 20,000 miles of a rail lines across three countries, through an expedited administrative rule process that undermines democratic debate and study. Kansas should not be the first.

CPKC (following the April 14, 2023 federally-approved control of Kansas City Southern by Canadian Pacific), is the first and only single-line transnational railway linking Canada, the United States and México, with Kansas at the very heart of that 20,000 route mile network. The CPKC main line that runs through Kansas extends from Kansas City, MO to Heavener, OK and is at the heart of a network seamlessly connecting Kansas to the Canadian Prairies with essential inputs to Kansas farmers, Mexican markets for those farm products and a Kansas City intermodal terminal that provides countless everyday items to Kansas consumers. Since our line crosses into Kansas and runs only about 20 miles in the state before crossing back into Missouri and eventually entering Oklahoma, CPKC is an example of how having patchwork state rules will overly complicate interstate commerce. Any inconsistency between crew requirements on trains in Kansas, Missouri, Oklahoma or any state in the Union could interfere with how crews are assigned for runs from Kansas City to Pittsburg and from Pittsburg to Heavener slowing the movement of goods across the continent.

As stated in 49 U.S. Code Section 20106, the Federal Railroad Administration (FRA) regulation of railroads supersedes conflicting state regulations, “Laws, regulations, and orders related to railroad safety and laws, regulations, and orders related to railroad security shall be nationally uniform to the extent practicable.” The Federal Railroad Administration is currently working on a rule dealing with crew size requirements. See Docket No. FRA–2021–0032, 87 Fed. Reg. 45564 – 45622 (July 28, 2022). The proposed rule would impose, “[a] minimum requirement of two crewmembers … for all railroad operations, with exceptions proposed for those operations that do not pose significant safety risks to railroad employees, the public, or the environment.” FRA’s proposed rule is scheduled to be issued in February 2024 (https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202304&RIN=2130-AC88). There is no compelling reason for a state to rush into an area that is clearly in the federal domain, and in which, the congressionally mandated regulator has declared its intent to rule in the near future.
For Kansas to impose a rule now while a federal rule is pending could force railroads to make changes needed to comply with a Kansas rule for a few months, and then to make different changes to comply with a federal rule. In a business climate when it is difficult to find qualified new employees and it takes months for initial training of train crew members, this regulatory two-step would be extremely wasteful and potentially create safety problems and employment dislocations for many people. In conclusion, KDOT should not move forward with the proposed rule. Rather, it should suspend consideration of the matter pending the outcome of FRA’s rule in 2024.

Sincerely,

Larry Lloyd
Senior Director of US Government Affairs
Canadian Pacific Kansas City Limited
July 11, 2023

To: Ms. Emily Brown, Kansas Department of Transportation, Office of Chief Counsel (sent via email to emily.brown@ks.gov)

From: Ross Lane, Assistant Vice President, Government Affairs, Genesee & Wyoming Railroad Services Inc.

Re: Opponent Testimony on Proposed K.A.R. 36-43-1, establishing minimum crew size for railroad operations in the state of Kansas

Thank you for allowing me the opportunity to provide testimony in opposition to the Proposed Kansas Department of Transportation rulemaking on minimum crew size for railroads. I serve as Assistant Vice President of Government Affairs for Genesee & Wyoming Railroad Services Inc., and I have direct responsibility for government affairs support of Kyle Railroad Company (Kyle).

Kyle is a Class III short line railroad that operates 471 miles in the state of Kansas and an additional 84 miles in Colorado. The Kyle interchanges with both BNSF Railway and Union Pacific. Though the Kyle transports a variety of commodities, agricultural products make up the majority of the volume moved by the railroad. The Kyle employs hardworking and dedicated railroaders whose mission is safely moving the freight Kansans depend on every day, supporting customers and communities across fourteen counties in northern and central Kansas.

First off, the safety of our employees and the public is the top priority for the Kyle and is the guiding value behind every activity we undertake. As we endeavor to one day operate a railroad completely free of accidents and injuries, we will continue to invest in our people, training, technology, and infrastructure to make that a reality. Railroads including the Kyle, have made tremendous progress to improve safety for both the public and railroad employees. Kyle employees understand that if some action is not safe to do, it should not be done, and value the importance of working as a team to make sure safety is indeed “Job One”.

Unfortunately, K.A.R. 36-43-1 and the rulemaking process promulgated by KDOT ignores the unique operations of short line railroads and the hard work already completed and in progress to improve safety. The result of this rulemaking process will not result in increased safety, rather it will put short line railroads and their customers at an economic disadvantage and could result in a modal shift from rail to truck.

The economics and operations of short line railroads are fundamentally different than the larger Class I railroads. Short line railroads play a key role in moving goods the first and last mile and provide critical connections to Class I railroads who enjoy a broader national and international reach. These connections help businesses and communities of all sizes in Kansas maintain their ties to the national supply chain.

I want to highlight our very strong relationship with the Kansas Department of Transportation, with whom we are partnering with right now on several key projects to improve our infrastructure. I’m confident this positive relationship will continue to the benefit of the Kansas economy and Kansans across the state. We are proud of our shared interest in improving Kansas infrastructure. Without short
line rail service, many Kansas businesses would be forced to find alternative transportation options, and subsequently absorb or pass along their higher transportation costs to their customers.

However, the progress we have collectively made in maintaining a viable, productive, and growing short line industry is now at risk. Though there are many public benefits of shipping freight by rail, customers will almost assuredly pick the transportation option that is most economical. This rulemaking could simply force a shipper to choose another transportation option because of transportation cost increases, effectively negating the positive impact of state investment in short lines.

As you have heard and read in previous testimony, railroads form a national network that are regulated at the federal level to ensure uniform standards and safety practices, and importantly to maintain a fluid supply chain. For that reason, we strongly believe this rulemaking process is preempted by the ICC Termination Act of 1995 (ICCTA). The reason railroad regulations are vested at the federal level is simple: railroads operate across state lines, and across many jurisdictions. Railroads facing conflicting regulations across multiple states would certainly cause operational disruption and be untenable.

Additionally, there is already a Federal Notice of Proposed Rulemaking process underway that could create new national standards for crew size. Unlike the State of Kansas we believe, the Federal Railroad Administration has the authority to promulgate its rulemaking under the Federal Railway Safety Act. Importantly, that rulemaking process includes exemptions for railroads including those who have historically operated trains with less than two crewmembers.

I want to highlight that the Kyle already operates trains with two crew members. This labor agreement was negotiated between the railroad and its employees and is based on currently available technologies and work demands. Regrettably, this rulemaking process effectively undermines the collective bargaining process and future rulemaking without the input of railroads and their employees could further undermine this important relationship. Additionally, it will inevitably inhibit the development of new technologies that could make freight railroading both safer and more efficient.

The freight needs of Kansas shippers will not change if the proposed rule is adopted, but short line railroads will be faced with a regulatory environment that could discourage investment. Rather than enjoying the environmental and safety benefits of shipping freight by rail, Kansas shippers could be forced to use alternative modes including trucking, because railroads can no longer compete economically. The result for consumers and taxpayers will be increased wear and tear on public roadways, reduced public safety, greater greenhouse gas emissions, and higher prices for the products Kansans depend on.

On behalf of the Kyle railroad, I would urge the Kansas Department of Transportation to withdraw from the rulemaking process and work with railroads in a collaborative process to improve transportation safety. Thank you.
Statement of Laura McNichol
Proposed Administrative Regulation, K.A.R. 36-43-I:
Two-Crew Requirements

My name is Laura McNichol. I serve as Watco’s Senior Vice President and Chief Sustainability Officer. Thank you for taking the time to consider the impacts the proposed two-crew requirement will have on Watco.

By way of introduction, Watco is a family-owned business based right here in Kansas. The company was started in Pittsburg, in the heart of Crawford County, and continues to be headquartered there. Today, we are an international transportation services provider. In addition to logistics, mechanical railcar repair, ports and terminal services, we operate 45 short line railroads across the United States, Canada and Australia.

We have the privilege to be here today because we operate a safe business allowing us to earn the trust of our customers, partners and team members. Here in Kansas, we operate two Class III short line railroads and one Class II regional railroad. Colloquially, we call them all “short lines.” The Kansas and Oklahoma Railroad (KO) is headquartered in Wichita and operates over 974 miles in western Kansas supporting grain growers and shippers. We have the Kaw River Railroad, a Class III railroad, operating in the Kansas City area on both sides of the state line. The South Kansas and Oklahoma Railroad (SKOL) – Watco’s first railroad – is our Class II, and it stretches over 430 miles in southeast Kansas down into Tulsa, OK.
On our two big railroads in Kansas, we average over 120,000 carloads per year total. This is the equivalent to almost half a million trucks not on Kansas roadways, reducing pavement damage and providing competitive transportation options for farmers and shippers across the state.

Following the issuance of the proposed two-crew regulation that would require each entity operating a railroad in Kansas to maintain at least two crew members in the control compartment of the lead locomotive unit in each train, we conducted a financial review of the impact of compliance. There are small exceptions to the proposal for switching operations, brake testing, safety inspections and spotting cars on customer track. The state’s economic impact statement (EIS) states that the proposal, “will have no increased labor costs from the implementation of this regulation.” Based on Watco’s internal review of the compliance cost of the proposed regulation, the claim made in the EIS is wrong.
In assessing what Watco would need to do to comply with this regulation, we determined the cost of implementation would be more than $4.4 million annually. We trust this was not the intent of those who wrote the regulation; nevertheless, there will be a tremendous financial burden to Watco as a result despite the claims made in the announcement.

The SKOL and KO Railroads crew trains similarly. Each railroad operates with two-member crews today on most trains. However, the set-up is different than the proposed regulation. On some jobs, there are two people in the control compartment of the lead locomotive. On other jobs, the engineer is in the control compartment and the conductor is following or leading the train in a support vehicle, typically a pickup truck. The conductor often meets the train at a customer site to throw a switch, open a gate, de-couple or couple railcars for drop off and picking up. On the SKOL, we use an one-person crew for a job taking a train from one yard and to another yard such as between Owasso, OK and Cherryvale. Since we cross state lines for this job, once we reach the Kansas state line, we will need another crew member to locate in the control compartment of the lead locomotive on the train. The patchwork regulation being proposed by the State of Kansas makes our common carrier duty to haul interstate commerce challenging and costly.

The supporting vehicle operated by the train’s conductor often serves as a crew haul vehicle for taking crewmembers back and forth at shift change. In western Kansas, typical third-party crew hauling services do not exist and so moving crews over vast territories is borne by our railroad. The cost of establishing that service as a result of the proposed regulation is estimated to be more than $30,000 per month.

Short line railroads share the same federal safety regulator as the Class I railroads – the Federal Railroad Administration. Safety is a foundation principle at Watco. The safe movement of rail freight from origination to destination is paramount and in everyone’s best interest. Watco crews its trains based on long-established best safety practices, customer needs and the job at hand. Most
of our operations in Kansas run at 10 mph - twenty percent of the KO operates at 25 mph and roughly 50 percent of the SKOL operates at 25 mph.

Watco has long opposed proposals to mandate two-person crews at the federal and state level. While short lines are typically not the target of the campaigns pushing these policies, we typically find ourselves caught in the fray. In various legislative efforts to impose two-crew mandates, such as the most recent one in Oklahoma, which did not pass, short lines are exempted from the legislation or regulation.

By the numbers, Watco estimates that we would need 40 new team members to comply with the proposed regulation. During the ramp-up period required to hire those new team members needed to comply with the regulation should it be enacted, we anticipate service interruptions and a loss of 26,695 carloads in the first year. To screen, hire and properly train a certified conductor takes nearly six months at a total cost of $1,296,646 for 40 new team members. In this tight job market, Watco is very concerned about its ability to bring on that number of team members without compromising our customers’ needs. We estimate the need to buy five new vehicles to accommodate the crew hauling aspect of this regulation at a cost of roughly $225,000.

We appreciate you considering our statement on the proposed regulation.
Kansas Dept of Transportation
Public Imput Office (Hearings)
700 SW Harrison St - Topeka, KS 66603

Re: Proposed Ks Admin Regulation (K.A.R. 36-43-1)

WHY is KDoT (at K.A.R. 36-43-1 Crew Requirements) proposing a NEW regulation wherein KDoT says "It is anticipated that some portion of any additional railroad operating costs, based on two-person crews may be passed onto railroad customers. It is UNKNOWN to what degree this would occur, or the potential dollar amounts involved?"

Makes No sense to enact a regulation & NOT know its economic costs on railways!
Notice of public hearing on proposed administrative regulation set for July 17

A public hearing will take place at 9 a.m. on Monday, July 17, at the Eisenhower State Office Building (ESOB), 700 SW Harrison Street, in Topeka to consider the adoption of a proposed rule and regulation of the Department of Transportation on a permanent basis regarding railroad crew requirements.

The hearing will be in Auditorium A on the fourth floor of ESOB. Oral comments may be limited to five minutes. Interested parties may also attend the hearing via Zoom and comment by registering at the following link: https://zoom.us/webinar/register/WN_qZYuKfTR6Q1hQyDg.

A copy of the proposed regulation and the Economic Impact Statement for the proposed regulation can be viewed online at https://www.kotour.gov/. A summary of the proposed regulation and its economic impact follows:

K.A.R. 36-43-1 - Crew requirements; exceptions. This is a new regulation that identifies the minimum crew requirements for railroads operating in the State of Kansas with six exceptions.

Nearly all railroads in Kansas are currently operating with two-person crews and will have no increased labor costs from the implementation of the proposed regulation. The primary economic effect for the few railroads operating one-person crews would be the labor. However, railroads operating with a one-person crew may see reduced accidents, which will likely reduce operating costs and may offset any increased labor costs.

It is anticipated that some portion of any additional railroad operating costs, based on two-person crews, may be passed on to railroad customers. It is unknown to what degree this would occur, or the potential dollar amounts involved. Additionally, it would be expected that operating with a two-person crew would have a positive impact on various governmental entities due to more disposable income, purchases and associated sales tax in local economies.

This notice constitutes the opening of the public comment period, which ends on July 17, on
PROPOSED REGULATION K.A.R. 36-43-1

UNION PACIFIC RAILROAD COMPANY'S
PUBLIC COMMENT

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July 17, 2023
CONTENTS

INTRODUCTION ......................................................................................................................... 1

COMMENT ..................................................................................................................................... 5

I. Two-person crew requirements lack any safety justification ........................................... 5

II. The proposed regulation is federally preempted ................................................................. 9

   A. The Federal Railroad Safety Act preempts the proposed regulation ................................ 10

   B. The ICC Termination Act preempts the proposed regulation ........................................ 17

      1. The ICCTA bars states from directly regulating rail operations .................................. 17

      2. ICCTA preemption is not limited to “economic” or “non-safety” regulation .............. 19

      3. The FRSA does not create a carveout from ICCTA preemption ................................. 21

   C. The Railway Labor Act preempts the proposed regulation ......................................... 27

   D. The proposed regulation violates the Commerce Clause .............................................. 29

III. The proposed regulation would impede technological innovation, restricting safety and efficiency gains .................................................. 31

IV. The proposed rule would impede railroad competition with trucking, pushing traffic onto the highways .................................................. 35

CONCLUSION ............................................................................................................................. 37
INTRODUCTION

Union Pacific Railroad Company respectfully submits this comment on the Department of Transportation’s proposed regulation imposing minimum crew-size requirements for certain railroad operations in Kansas, K.A.R. 36-43-1. Though well-intentioned, this proposal is unjustified, unlawful, and counterproductive. Union Pacific urges the Department not to adopt it.

First, the proposed rule simply lacks a safety justification. Safety is Union Pacific’s top priority. Nothing is more important to Union Pacific than the well-being of its employees, its customers, and the communities where it operates. But no reliable information suggests that a minimum crew-size rule is needed to ensure safety. The Department’s Economic Impact Statement (EIS) says only that some prior accidents “may have been preventable by having a minimum crew,” pointing to submissions from parties supporting the proposal. But none of those anecdotes involve an accident that was clearly caused by a one-person crew or that clearly could have been prevented or mitigated by a two-person crew. And ample empirical data, including independent studies, show no correlation between smaller crews and more accidents—in fact, the opposite is true. That is presumably why safety regulators have repeatedly concluded that (as the NTSB Chairman told Congress) “we are not finding two-person crews to necessarily be a safety improvement over single-person crews.”

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Second, the proposed rule violates federal law in four distinct ways—two of which the Kansas Attorney General explained in disapproving the Department’s identical 2020 proposal. To start, the Federal Railroad Safety Act (FRSA) creates a uniform national rail-safety regime, preempts state law if the Federal Railroad Administration (FRA) has either issued regulations covering the same subject matter or determined that no such regulations are appropriate. And FRA has repeatedly determined that minimum crew-size rules are unjustified—and that a patchwork of state crew-size laws would improperly burden interstate commerce and threaten rail safety. FRSA preemption thus applies, as the Attorney General concluded in 2020.

The EIS largely overlooks FRA’s actions up until this point, noting instead that FRA has “proposed a rule regulating rail crew sizes for safety purposes.” Far from avoiding the preemption problem, however, FRA’s proposed rule confirms it. Even if FRA’s other actions did not already create preemption, the current rulemaking will do so—either by covering the subject matter or by codifying FRA’s determination that no such rules are appropriate. Indeed, one of FRA’s stated purposes is “to prevent the multitude of State laws regulating crew size from creating a patchwork of rules governing train operations across the country.” 87 Fed. Reg. 45564, 45565 (July 28, 2022). So whatever FRA’s final rule looks like—and even if FRSA preemption did not already apply—the final rule will inevitably preempt the Department’s proposal.

The ICC Termination Act (ICCTA) also preempts the Department’s proposed rule. As the Attorney General explained in 2020, the ICCTA preempts the proposed crew-size rule because it explicitly “target[s] the operation of rail carriers.” State v.
BNSF Ry. Co., 56 Kan. App. 2d 503, 511 (2018). The Department’s EIS tries to sidestep this conclusion by asserting that the ICCTA preempts only state economic regulation. That is incorrect. “[F]ederal preemption under the ICCTA is not limited only to economic regulations.” See id. at 515. The EIS also contends that the FRSA creates a carve-out from ICCTA preemption for safety-related laws, but no such carve-out exists—and it would not matter anyway, since FRSA preemption independently applies.

The Department’s proposal also runs afoul of the Railway Labor Act (RLA), which preempts state laws that intrude on the collective-bargaining process. State labor standards violate this restriction if they impose requirements narrow and stringent enough to effectively substitute the state as the bargaining representative. That is the case here: At the urging of a labor group, the proposal targets one set of jobs in just one industry, and imposes a stringent across-the-board rule that would prohibit one-person crew operations even if railroads and unions agreed. Labor preemption thus applies.

Finally, the Department’s proposed rule violates the federal Constitution’s Commerce Clause, which invalidates state regulations that burden the instrumentalities of interstate commerce and exceed what is “plainly essential” for safety. See Southern Pacific Co. v. Arizona, 325 U.S. 761, 763–81 (1945). State efforts to regulate rail operations are the paradigm example; a state’s “attempted regulation of the operation of interstate trains cannot establish nation-wide control such as is essential to the maintenance of an efficient transportation system, which Congress alone can
prescribe.” *Id.* at 782. And no evidence shows that two-person crews are *essential* to safety. The Commerce Clause thus bars the Department’s proposal.

*Third,* the proposed rule would impede innovation, preventing railroads from using new technology to improve both safety and efficiency. Having invested billions of dollars in a sophisticated Positive Train Control (PTC) system intended to eliminate certain human-error-caused rail incidents, Union Pacific is now rolling out new pilot programs that would move carefully and safely, but systematically, towards single-person crews—redeploying train-based conductors to ground-based crew positions. These programs should improve both efficiency, by enabling quicker solutions to mechanical problems and blocked crossings, and safety, by avoiding the need for conductors to walk long distances, sometimes at night or in inclement weather, to reach the problem area. Yet the proposed rule would impede Union Pacific (or other railroads) from testing programs like this, and would prohibit the ultimate implementation of these changes even if they prove beneficial.

*Fourth,* by targeting the rail industry but not the trucking industry—where one-person crews are universal—the proposed rule puts a thumb on the competitive scale in favor of trucking. As a result, the rule will likely push more traffic from the rails onto the highways. That is a counterproductive result, since trains are both more environmentally friendly and safer than trucks when transporting the same commodities, including hazardous materials.

For all these reasons, the Department should withdraw the proposal.
COMMENT

I. Two-person crew requirements lack any safety justification.

The Department’s proposed rule is unjustified. Although the EIS asserts that crew size “is a public health and safety concern,” EIS at 4, it fails to substantiate that claim, and ample contrary evidence exists. Thus, the rule is “not supported . . . by evidence that is substantial when viewed in light of the record as a whole,” including “all the relevant evidence in the record . . . that detracts from” the Department’s conclusions. K.S.A. § 77-621(c)(7), (d).

1. The EIS points to accidents and injuries that “occurred as a result from or in connection with trains operating with minimal crew members,” including in Kansas. EIS at 4 (emphasis added). But the fact that a train involved in an accident had a certain crew size does not mean the crew size caused the accident, or that a larger crew might have prevented it. And on that score, the EIS asserts only that “damage, fatalities, and injuries may have been preventable by having a minimum crew,” as supposedly “evidenced in Exhibit 2.” Id. (emphasis added).

Exhibit 2 consists of a handful of submissions by parties supporting the proposed rule. Of the exhibit’s 30 pages, 19 are copies of other states’ laws or federal guidance about crossing safety, which do nothing to substantiate safety claims about crew size. See Ex. 2 at 12–29. The exhibit’s remaining materials—three submissions from SMART-TD and letters from the Sierra Club’s Kansas Chapter and the director of Shawnee County Emergency Management—mention only six incidents spanning the last decade (none in Kansas) as supposedly supporting the proposed rule. None, however, show that one-person crews are a safety concern.
• The most commonly cited example is the tragic 2013 Lac-Mégantic incident in Canada. E.g., SMART-TD Flyer at 1. But Canada’s Transportation Safety Board found no evidence that a one-person crew was a cause or contributing factor to that accident. 81 Fed. Reg. at 13921. See also id. at 13922.

• SMART-TD also notes a 2018 California incident in which a train crew’s quick thinking saved “a man laying near the tracks with a severed arm”—but the key factor there was one crew member’s “training from his time in the U.S. Navy,” which taught him to use “a tourniquet around the man’s limb to stop the bleeding.” SMART-TD Flyer at 2. It is unclear how this unusual example supports a statewide minimum crew-size law.

• Likewise, while SMART-TD points to a 2018 collision in Wyoming, see Ltr. from Ty Dragoo to Hon. Carolyn McGinn at 2–3 (Mar. 17, 2022), the train in question had a two-person crew; the NTSB found that a brake-system failure was the probable cause. See Accident Report, NTSB/RAR-20/05 (Dec. 29, 2020), https://www.ntsb.gov/investigations/AccidentReports/Reports/RAR2005.pdf.

• SMART-TD also notes the 2013 derailment of a New York passenger train. See Ltr. from Ty Dragoo to Hon. Mike Peterson at 1 (Feb. 19, 2015). But there, the NTSB determined that the accident’s probable cause was that the engineer “had fallen asleep due to undiagnosed severe obstructive sleep apnea”; it did not suggest that crew size was a problem, noting instead that “a positive train control system” might have lessened or avoided the accident. Railroad Accident Brief, NTSB/RAB-14/12 (Oct. 24, 2014), https://www.ntsb.gov/investigations/accidentreports/reports/rab1412.pdf.

• SMART-TD contends that “the quick actions of the two man crew” mitigated the damage in a 2014 Lynchburg, Virginia derailment because “the conductor was able to go back and cut away as many explosive cars as he could.” See Ltr. from Ty Dragoo to Hon. Mike Peterson at 1 (Feb. 19, 2015). But it does not describe how the presence of multiple crew members enabled any specific actions, and the NTSB report about this incident says only this: “Shortly after the accident, CSXT personnel moved the 34 non-derailed cars and the locomotives a short distance from the derailment site and fire.” Railroad Accident Brief, NTSB/RAB-16/01 (reissued Apr. 3, 2017), https://www.ntsb.gov/investigations/accidentreports/reports/rab1601.pdf.

• Finally, Sierra Club points to a 2015 derailment in Fayette County, West Virginia—but it does not claim that crew size played any role there. See Written Testimony of Zack Pistora at 1 (Feb. 19, 2015).
Indeed, FRA “reviewed accident/incident data over a seventeen-year period ending in 2018”—thus including most or all of these examples—“and could not determine that any of the accidents/incidents involving a one-person crew would have been prevented by having multiple crewmembers.” See Train Crew Staffing, 84 Fed. Reg. 24735, 24739 (May 29, 2019) (emphasis added).

In short, the Department points to no empirical data about the relative safety of one- versus two-person crews, and it cites no examples of an incident in which a one-person crew clearly contributed to an accident or a two-person crew clearly avoided or mitigated one.

2. Actual empirical data rebuts the proposal’s speculative safety concerns. For example, consulting firm Oliver Wyman has collected statistics on one-person crews. According to those findings, Amtrak, commuter lines, and freight operations using one-person crews have had lower equipment and casualty incident rates than those operations using two-person crews:

**Equipment and Casualty Incident Rates (2007–2013)**

<table>
<thead>
<tr>
<th>Operator Type</th>
<th>Cab Crew Size</th>
<th>Incident Rate (per million train-miles)</th>
<th>Incident Rate (per 200,000 employee hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amtrak</td>
<td>Extensively 1-person</td>
<td>0.23</td>
<td>0.01</td>
</tr>
<tr>
<td>Commuter</td>
<td>Extensively 1-person</td>
<td>0.32</td>
<td>0.02</td>
</tr>
<tr>
<td>Indiana Railroad</td>
<td>Some 1-person</td>
<td>1.27</td>
<td>0.00</td>
</tr>
<tr>
<td>Class I</td>
<td>Multi-person</td>
<td>0.53</td>
<td>0.03</td>
</tr>
<tr>
<td>Regionals</td>
<td>Multi-person</td>
<td>1.10</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Similarly, Metrolink, a commuter rail system in Southern California, piloted two-person crews for 16 months and found no safety improvement—but it did note the possibility of increased distractions because of two-person crews.3 Experience in other countries likewise shows that one-person crew operations are safe; as FRA noted in 2016, “evidence . . . indicates that the safety records of these operations are acceptable.” See Regulatory Impact Analysis, Train Crew Staffing, Docket No. FRA-2014-0033, at 21 (Feb. 18, 2016). And FRA’s 2019 withdrawal order noted that, “despite studying this issue in-depth and performing extensive outreach to industry stakeholders and the general public,” FRA “cannot provide reliable or conclusive statistical data to suggest whether one-person crew operations are generally safer or less safe than multiple-person crew operations.” 84 Fed. Reg. at 24737. FRA observed that several research reports “do not indicate that one-person crew operations are less safe.” Id. at 24739–40.

Other safety regulators have reached the same conclusion. The NTSB Chairman testified before Congress that “we are not finding two-person crews to necessarily be a safety improvement over single-person crews.”4 The NTSB also found in the course of investigating an Amtrak derailment that the data was “insufficient . . . to demonstrate that accidents are avoided by having a second qualified person in the cab.” See NTSB, RAR-16/02, Derailment of Amtrak Passenger Train 188, at 18 (2016).


The California Public Utilities Commission found that a “second set of eyes provides only minimal safety improvement and should be employed only on a temporary basis, given the fact that it could aggravate engineer distraction.” Wilner, *Data Drought*, supra. And as noted, Canada’s Transportation Safety Board found no evidence that the use of a one-person crew was a cause or contributing factor to the Lac-Mégantic accident. 81 Fed. Reg. at 13921. See also id. at 13922.

On this record, the Department’s speculative claim that crew-size requirements “may” prevent accidents or injuries is unsupportable. EIS at 4.

II. **The proposed regulation is federally preempted.**


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The “federal regulation of railroads . . . is both pervasive and comprehensive.” Miami Cnty. Bd. of Comm’rs v. Kanza Rail-Trails Conservancy, Inc., 292 Kan. 285, 297 (Kan. 2011). Indeed, railroads have long been subject to one of “the most pervasive and comprehensive of federal regulatory schemes.” Chicago & N.W. Transp. Co. v. Kalo Brick & Tile Co., 450 U.S. 311, 318 (1981). Three aspects of that scheme preempt the Department’s proposal, which also violates the Commerce Clause.

A. **The Federal Railroad Safety Act preempts the proposed regulation.**

The Department’s proposed regulation is preempted by the FRSA. And even if FRSA preemption did not apply already, it will inevitably apply whenever FRA completes its pending rulemaking on the subject.

1. The FRSA creates a nationally uniform rail-safety regime. It empowers FRA to regulate “every area of railroad safety,” 49 U.S.C. § 20103(a), and mandates that all “[l]aws, regulations, and orders related to railroad safety . . . shall be nationally uniform to the extent practicable,” id. § 20106(a)(1).

   To enforce this mandate, the FRSA allows states to “adopt or continue in force a law, regulation, or order related to railroad safety” only until FRA “prescribes a regulation or issues an order covering the subject matter of the State requirement.” *Id.* § 20106(a)(2). Once FRA has addressed the subject matter, “an additional or more stringent” state regulation can avoid preemption only if it “(A) is necessary to eliminate or reduce an essentially local safety or security hazard; (B) is not incompatible with a law, regulation, or order of the United States Government; and (C) does not unreasonably burden interstate commerce.” *Id.* (emphasis added).
FRSA preemption can take two forms. First, preemption applies if “federal regulations substantially subsume the subject matter of the relevant state law.” CSX Transp., Inc. v. Easterwood, 507 U.S. 658, 664 (1993). Second, FRSA preemption applies if FRA “issues an order” on the subject, 49 U.S.C. § 20106(a)(2)—that is, if the “FRA considered [the] subject matter and made a decision regarding it.” See Burlington N. & Santa Fe Ry. v. Doyle, 186 F.3d 790, 795–96 (7th Cir. 1999). But FRA’s action need not be affirmative. Under the “negative preemption” doctrine, “when a federal agency has determined that no regulation is appropriate” on a particular topic, “States are not permitted to use their police power to enact such regulation.” See Norfolk W. Ry. v. Pub. Utilities Comm’n, 926 F.2d 567, 570 (6th Cir. 1991).

Applying this doctrine, Doyle held that a Wisconsin law regulating train-crew size was preempted, as applied to certain operations, by FRA’s determination that “one-person crews were safe for these operations . . . without added precautions.” 186 F.3d at 802. By contrast, the court found that—as of 1999—FRA had not “considered the issue of one-person crews in other types of operations,” including over-the-road operations. See id. Since then, however, FRA has done precisely that, many times:

- In 2009, FRA denied a union petition to require multiple-person crews, explaining that it had “no factual evidence to support the prohibition against one-person crew operations.” See FRA, Denial of BLET Petition on RCO and Other Single-Person Operations (Nov. 10, 2009).

- In 2012, FRA issued extensive regulations governing remote-control-locomotive operations. See 49 C.F.R. § 229.15. These regulations expressly contemplate and permit single-person crews in various contexts. Id.; see also 66 Fed. Reg. 10340 (Feb. 14, 2001) (safety advisory on operation of remote-control locomotives with single-person crew).

- In 2013, FRA issued a safety advisory requiring railroads to “review their crew staffing practices for over-the-road trains that transport” certain hazardous
materials and “amend existing practices as necessary to ensure safe movement” of such trains. 78 Fed. Reg. 48224, 48228 (August 7, 2013). FRA declined, however, to impose any crew-staffing requirements for other over-the-road operations.

- In 2016, FRA proposed a rule requiring two person crews unless otherwise specifically authorized by the agency. 81 Fed. Reg. 13917 (March 3, 2016). FRA admitted, however, that it “cannot provide reliable or conclusive statistical data to suggest whether one-person crew operations are generally safer or less safe than multiple-person crew operations.” Id. at 13918, 13919. The agency conducted a public hearing and received extensive comments from a wide range of stakeholders on both sides of the issue.

- In 2019, FRA ultimately withdrew the crew-size proposal, explaining that “no regulation of train crew staffing is necessary or appropriate for railroad operations to be conducted safely at this time.” See 84 Fed. Reg. at 24735. The Order concluded that FRA’s safety data “does not establish that one-person operations are less safe than multiperson train crews,” that “existing one-person operations ‘have not yet raised serious safety concerns,’” and that “it is possible that one-person crews have contributed to the [railroads'] improving safety record.” Id. at 24739. (A court later vacated this order for procedural reasons, but as explained below, that fact does not undermine FRA’s consistent finding that crew-size regulations are unjustified.)

- In 2020, FRA issued a separate rule giving railroads the right (subject to FRA approval) to determine how to evaluate and mitigate risk when implementing reductions in crew staffing levels. 85 Fed. Reg. 9262 (Feb. 18, 2020).

- In 2022, FRA issued a new proposed rule that would reverts back to the approach adopted in the agency’s 2016 proposal, and would require two person crews in at least some circumstances. 87 Fed. Reg. 45564 (July 28, 2022). That proposed rule remains pending.

Thus, as things stand now, FRA has repeatedly determined that a crew-size rule is not necessary or supported by safety data. Although FRA has not been totally consistent about whether a federal crew-size rule is needed, its only actions suggesting that such a rule is appropriate are the 2016 proposal, which the agency withdrew, and the 2022 proposal, which remains just that—a proposal. In any event, the agency has been consistent on the key point here: A “patchwork of State laws regulating
crew size in some manner” is improper, in part because it would negatively “impact . . . safe rail operations.” 87 Fed. Reg. at 45570.

In turn, we now have what was missing when the Seventh Circuit decided Doyle in 1999—FRA has now thoroughly “considered the issue of one-person crews” in all rail operations. 186 F.3d at 802. That determination has preemptive effect. See id.; see also Burlington N. R.R. v. Minnesota, 882 F.2d 1349, 1353–54 (8th Cir. 1989) (preemption applied because “FRA concluded that it does not consider the [re- quirement in question] to be a safety issue”); Missouri Pac. R.R. v. R.R. Comm’n of Texas, 850 F.2d 264, 267 (5th Cir. 1988) (same, where “FRA has fully considered the safety aspect” of the issue).

As a result, the Department’s proposed rule could survive FRSA preemption only if it met all three requirements of the FRSA’s second savings clause. See 49 U.S.C. § 20106(a)(2). It does not. Most obviously, the Department’s rule “do[es] not address an ‘essentially local’ hazard because [it] would apply statewide.” 87 Fed. Reg. at 45571; see Duluth, Winnipeg, & Pacific Railway Co. v. City of Orr, 529 F.3d 794, 798 (8th Cir. 2008); Norfolk W., 926 F.2d at 571. In any event, “[t]here is nothing fundamentally local” about crew-size issues. See Nat’l R.R. Passenger Corp. v. Ariz. Corp. Comm’n, No. 01-578, slip op. at 28, 31 (D.D.C. Feb 25, 2004) (“Amtrak”).

And even if the “essentially local” criterion were satisfied, the Department’s proposal would fail the second and third criteria—compatibility with federal law and avoiding an “unreasonabl[e] burden [on] interstate commerce,” 49 U.S.C. § 20106(a)(2)(B)–(C). The proposed rule is not compatible with federal law because it
conflicts with the ICCTA, as explained below, and clashes with FRA’s determinations discussed above. See Amtrak, No. 01-578, slip op. at 29 (FRSA savings clause did not apply to a state law preempted by a different federal statute). And the rule would improperly burden interstate commerce because, if states were allowed to adopt such rules, the result would be “a patchwork of State laws” that would likely cause “significant cost and operational inefficiencies, and even potential safety concerns from a lack of a uniform standard.” See 87 Fed. Reg. at 45565; infra § II.D. The FRSA thus preempts the proposed rule.

2. Even setting aside all of FRA’s actions up until now, the pending FRA rulemaking—whatever its precise outcome—will unquestionably preempt all state laws in this area. One of the proposal’s purposes is “to prevent the multitude of State laws regulating crew size from creating a patchwork of rules governing train operations across the country.” 87 Fed. Reg. at 45565. Thus, “if FRA issues a final rule establishing minimum safety requirements for the size of train crews, it would cover the same subject matter as the State laws regulating crew size, and therefore FRA expects a final rule will have preemptive effect on those State laws.” Id. at 45571. Or, if FRA decides not to require two-person crews—as it did last time it considered such a proposal—it will still “articulate FRA’s preemption of crew size requirements” at the state level “to address FRA’s concern regarding the patchwork of State laws.” See id. Either way, the Department’s proposed rule will be overridden the moment FRA completes the pending rulemaking.
Thus, even if the Department is unpersuaded that FRA’s prior actions have preemptive effect, there is no point in proceeding with the rulemaking now. The EIS appears to misunderstand this point, asserting that the “proposed rule and regulation is not yet mandated by Federal law,” but noting the pending rulemaking. EIS at 2 (emphasis added). But as just explained, whatever FRA’s rule ultimately says, it will not “mandate[]” or even allow state crew-size regulations—it will preempt them.

3. The EIS’s analysis of FRSA preemption is also incomplete. The EIS addresses only FRA’s 2019 withdrawal order, noting that the Ninth Circuit vacated that order in 2021. See Transp. Div. of Int’l Ass’n v. FRA, 988 F.3d 1170, 1180 (9th Cir. 2021). But the Ninth Circuit ruling does not avoid preemption here. The court agreed that FRA can either affirmatively or negatively preempt state law; it held merely that “this [2019] Order” did not do so. Id. at 1179 (emphasis added). And the court’s reason for so holding was procedural—the 2019 order had not adequately explained why state crew-size laws would not satisfy the FRSA’s second savings clause, apparently because the agency relied on “an economic rationale” instead of “a safety consideration.” See id. at 1180. The court did not address (and thus left undisturbed) the settled rule that statewide laws are not eligible for the savings clause. See id. (declining to consider that question). Nor did the court consider whether a patchwork of state crew-size laws would “unreasonably burden interstate commerce,” which is an independent reason why the second savings clause would not apply. See 49 U.S.C. § 20106(a)(2); infra § II.D.
The Ninth Circuit also did not address any of FRA’s other actions in this area, which consistently recognize that crew-size rules are unjustified. As already explained, those other actions conclude that the evidence does not support a safety rationale for two-person crew rules—which is what the court found lacking in the 2019 order. In any event, FRA has now explained in the 2022 proposal that, whatever approach it ultimately takes at the federal level, state crew-size rules must be preempted for both economic and safety reasons. See 87 Fed. Reg. at 45565 (“Such a patchwork of State laws would likely result in significant cost and operational inefficiencies, and even potential safety concerns from a lack of a uniform standard.”). FRSA preemption thus applies here.6

4. Even setting aside everything above, FRA has also specifically authorized—and thus covered the subject matter of—one-person helper service and remote-control operations in yards. See Doyle, 186 F.3d at 801; 49 C.F.R. § 229.15. FRA’s current proposed rule likewise exempts these categories of operations, making clear that (whatever the rule ultimately provides about other operations) one-person crews are appropriate in these situations. See 87 Fed. Reg. at 45,617–18. Union Pacific does not believe the Department’s proposed rule would cover these operations, given the exceptions in subsection (b). But to the extent the Department’s rule would apply to these operations, it is preempted for this additional reason.

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6 Union Pacific does not accept the Ninth Circuit’s reasoning for rejecting FRA’s preemption determination, but for present purposes, it suffices that this reasoning does not undermine preemption here.
B. The ICC Termination Act preempts the proposed regulation.

1. The ICCTA bars states from directly regulating rail operations.

The ICCTA empowers the federal Surface Transportation Board to regulate U.S. rail transportation. See 49 U.S.C. § 10501(a)–(b). The statute gives the STB “exclusive jurisdiction” over “transportation by rail carriers”—which it defines broadly to include any “vehicle . . . facility, instrumentality, or equipment of any kind related to the movement of passengers or property, or both, by rail” and “services related to that movement”—plus the “practices, routes, services, and facilities” of rail carriers and the “construction, acquisition, operation, abandonment, or discontinuance” of tracks or facilities. Id. §§ 10102(9), 10501(b). In all these areas, the ICCTA’s remedies are “exclusive and preempt the remedies provided under Federal or State law.” Id. § 10501(b). “It is difficult to imagine a broader statement of Congress’s intent to preempt state regulatory authority over railroad operations.” CSX Transp., Inc. v. City of Sebree, 924 F.3d 276, 283 (6th Cir. 2019).

This sweeping language categorically “preempts all state laws that may reasonably be said to have the effect of managing or governing rail transportation.” BNSF, 56 Kan. App. 2d at 511 (citation omitted); see also BNSF Ry. Co. v. Hiett, 22 F.4th 1190, 1194 (10th Cir. 2022) (holding a state law preempted because it “effectively regulates rail operations”). In other words, “for a state regulation to pass muster, it must address state concerns generally, without targeting the railroad industry.” BNSF, 56 Kan. App. 2d at 511.
For example, the Kansas Court of Appeals held in *BNSF* that the ICCTA preempts a state law restricting how long trains can block road crossings, because the law “specifically targets the operation of rail carriers” and “has an effect on railroad operations that is more than incidental or remote.” *See id.* at 513–17. Such a state law “infringes on the exclusive jurisdiction of the STB to regulate the rail transportation system in the United States.” *Id.* at 518.

The same reasoning dooms the Department’s proposed crew-size rule, as the Attorney General has explained. Just as the preempted law in *BNSF* “applie[d] only to a ‘railroad company or any corporation leasing or otherwise operating a railroad in Kansas,’” *id.* at 513, the Department’s proposed rule applies only to an “entity operating a railroad in Kansas,” *id.* at 512–13. But while states “have the power to impose ‘rules of general applicability’ that do not target the operation of rail carriers,” *id.* at 511, the Department’s proposed rule would regulate the rail industry and only the rail industry. That is improper. *See 2020 Disapproval Memo at 2* (crew-size rule improperly “targets the railroad industry”).

Nor would the proposed regulation have “only a remote or incidental effect on rail transportation.” *See BNSF*, 56 Kan. App. 2d at 513, 517. Dictating how many “crew members [must be] in the control compartment of the lead locomotive unit of each train,” K.A.R. 36-43-1(a), would *directly* regulate railroad operations. Thus, the effect on rail operations is not merely the incidental by-product of a rule that
“address[es] state concerns generally,” *BNSF*, 56 Kan. App. 2d at 517—it is the entire point of the proposal. *See* 2020 Disapproval Memo at 2 (“K.A.R. 36-43-1 . . . has an effect on railroad operations that is more than incidental or remote”). ICCTA preemption thus applies.

2. **ICCTA preemption is not limited to “economic” or “non-safety” regulation.**

The EIS does not address the “managing or governing” standard applied in *BNSF*. Nor does it acknowledge *BNSF*’s holding that Kansas cannot directly regulate railroad operations. And it does not discuss the reasoning in the Attorney General’s 2020 disapproval memo. Instead, the EIS asserts that ICCTA preemption does not apply because “the ICCTA is limited to economic legislation, not safety.” EIS at 3. That is incorrect, for two reasons.

First, “federal preemption under the ICCTA is not limited only to economic regulations.” *BNSF*, 56 Kan. App. 2d at 515. “[E]ven if an economic focus were in Congress’s mind, it is not in the ICCTA’s text,” which “plainly does not limit preemption to economic regulations.” *Id.* (quoting *Indiana v. Norfolk S. Ry.*, 107 N.E.3d 468, 477 (Ind. 2018)); *see also* *Fayus Enters. v. BNSF Ry.*, 602 F.3d 444, 451 (D.C. Cir. 2010) (citing cases holding that “that the ICCTA ‘does not preempt only explicit economic regulation’”).

Second, even if the ICCTA were limited to economic matters, “safety regulations amount to economic regulation when they stymie railroads’ key operational choices—choices they would otherwise make for economic reasons.” *BNSF*, 56 Kan. App. 2d at 515 (citations and quotation marks omitted). And just as “decisions [about]
train speed, length, and scheduling [are] economic decisions,” see id. at 513, so are decisions about crew staffing.

The EIS also asserts that, “[w]hen it comes to public health and safety concerns, states retain certain traditional police power[s],” and “requiring a minimum of a two-person crew for trains operating in the state is a public health and safety concern for Kansans.” EIS at 3–4. But as the Attorney General explained, “a state maintains its traditional police powers to the extent the laws protect public health and safety concerns and do not target the operation of railroads. Although the intent may be public safety, the plain language of K.A.R. 36-43-1 targets the railroad industry,” which the ICCTA prohibits. 2020 Disapproval Memo at 2 (citation omitted) (emphasis added). Likewise, BNSF explained that the states’ residual “police powers over public health and safety concerns” only allow them to “to impose ‘rules of general applicability’ that do not target the operation of rail carriers.” 56 Kan. App. 2d at 507; see also Emerson v. Kansas City S. Ry., 503 F.3d 1126, 1133 (10th Cir. 2007) (states may enact “generally applicable, non-discriminatory regulations”).

Indeed, both BNSF and the Tenth Circuit’s similar decision in Hiett underscore that ICCTA preemption is not limited to “non-safety” matters. Contra EIS at 3. In BNSF, the court agreed that the blocked-crossing law was “an attempt by the Kansas Legislature to protect public health and safety” and that “trains blocking railroad crossings can be a safety hazard.” 56 Kan. App. 2d at 512. Even so, the law was preempted because it was “not a law of general applicability,” but rather targeted railroads. Id. Likewise, the Oklahoma blocked-crossing law in Hiett stated explicitly
that it was enacted “for the safety and welfare of the people,” but it was still preempted because it “effectively regulate[d] rail operations.” 22 F.4th at 1194.

It also does not matter whether the STB itself regulates crew size. Contra EIS at 3. The ICCTA “preempts [state] regulation” of matters “within the Board’s jurisdiction, without regard to whether or not the Board actively regulates the particular activity involved.” Jie Ao & Xin Zhou—Pet. for Decl. Order, No. FD 35539, 2012 WL 2047726, at *4 (S.T.B. served June 5, 2012). BNSF thus held that state blocked-crossing laws are preempted even though “the ICCTA does not expressly address” the subject. 56 Kan. App. 2d at 517. ICCTA preemption applies here.

3. The FRSA does not create a carveout from ICCTA preemption.

The EIS also says the FRSA, not the ICCTA, is the “relevant statute for any safety preemption analysis.” EIS at 3. That is, the EIS assumes that the FRSA creates a carve-out from the ICCTA’s broadly worded, later-enacted preemption clause, such that safety-related laws authorized under the FRSA escape ICCTA preemption too. See id. But even if that premise were correct, it would not matter because (as explained above) the FRSA itself preempts the proposed rule. Regardless, the premise is wrong; the ICCTA can preempt safety-related laws that would regulate rail transportation.

The EIS points to Tyrrell v. Norfolk Southern Railway, 248 F.3d 517 (6th Cir. 2001), and the amicus brief the STB filed there. As just explained, however, the Kansas Court of Appeals applied ICCTA preemption in BNSF even though it accepted the state’s asserted safety justification, explaining that the ICCTA can preempt “safety
regulations.” 56 Kan. App. 2d at 515. And having held that the ICCTA preempted this “attempt . . . to protect public health and safety,” *id.* at 512, the court found it unnecessary to decide whether “the FRSA also preempt[ed]” the blocked-crossing law, *id.* at 513. *BNSF* thus forecloses the EIS’s assertion that safety-related laws must be analyzed first and only under the FRSA. Likewise, while the Attorney General’s Office recognized that a crew-size rule may be aimed at “public safety,” it analyzed the 2020 proposal under both the FRSA and the ICCTA, concluding that the rule was independently preempted by both laws. *See* 2020 Disapproval Memo at 1–2.

In any event, the sources cited in the EIS are both analytically flawed and out of date. In determining how two federal laws interact, “the statutory text . . . controls.” *POM Wonderful LLC v. Coca-Cola Co.*, 573 U.S. 102, 112 (2014). And nothing in the FRSA’s text “forbids or limits” other federal laws like ICCTA from preempting laws related to railroad safety. *See id.* On the contrary, as noted above, the FRSA’s second savings clause requires (among other things) that state laws be “not incompatible with” other federal laws. 49 U.S.C. § 20106(a)(2)(B). The FRSA’s text thus makes clear Congress’s intent that states cannot adopt rail-safety laws that conflict with other federal statutes—like the ICCTA.

Nor does the ICCTA’s language contemplate a carve-out for state laws subject to the FRSA. Indeed, the STB’s *amicus* brief in *Tyrrell* essentially conceded that the ICCTA’s “plain language . . . is broad enough to reach rail safety regulation.” STB Amicus Brief at 18, *Tyrrell*, 248 F.3d 517 (No. 99-4505), 2000 WL 35595210. But the brief contended that this created “a conflict” between the ICCTA and the FRSA that
should be resolved by “[l]ooking beyond the naked text” of the statutes to adopt a “reasonable” compromise: the ICCTA “applies only to non-safety railroad regulation.” Id. at 18–19. That is not proper statutory interpretation. See POM Wonderful, 573 U.S. at 112. Just as “an economic focus . . . is not in the ICCTA’s text,” BNSF, 56 Kan. App. 2d at 515, neither is a carve-out for laws that address safety concerns.

Regardless, as the STB later admitted, the FRSA’s and the ICCTA’s preemption provisions do not conflict. Each provision simply specifies what the relevant law does or does not preempt. Although the FRSA’s preemption provision describes when a “State may adopt or continue in force a law, regulation, or order related to railroad safety,” 49 U.S.C. § 20106(a)(2), this language does not authorize states to adopt regulations preempted by other federal laws—let alone later-enacted federal laws. This is simply one of two “savings clauses (or exceptions) to the preemption provision,” clarifying the boundaries of ICCTA preemption. See 2020 Disapproval Memo at 1; see Black’s Law Dictionary (11th ed. 2019) (a “saving clause” is merely a “statutory provision exempting from coverage something that would otherwise be included”).

What’s more, the FRSA was originally drafted to preempt all “State laws and regulations affecting safety in rail commerce” starting two years after its enactment; the current savings-clause language was adopted merely to avoid a “lapse in regulation” in case the federal government could not issue comprehensive rail-safety

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regulations in that short time. Since this clause simply ensures that state law can serve as a stop-gap until on-point federal regulations are issued, it makes no sense to read this provision as affirmatively empowering states to issue rules that conflict with other federal regulatory regimes.

The EIS also cites a decision by the FRA administrator, which refers to the STB’s exclusive authority over “the economic affairs and non-safety operating practices of railroads.” EIS at 3 (quoting Petition of Paducah & Louisville Ry., Inc., No. 1999-6138, 2000 WL 34227938, at *3 (FRA Jan. 13, 2000) (emphasis added)). But if anything, that decision underscores that the FRSA should not be read to interfere with the ICCTA—not the other way around. The decision emphasizes the STB’s “central role” in rail regulation and the need for uniformity, notes that the ICCTA “preempt[s] the remedies provided under Federal or State law,” and thus declines to read “an earlier federal statute” as trumping “the recently enacted, unambiguous terms of the ICCTA.” See 2000 WL 34227938, at *3–5. And the references to “non-safety” regulation were beside the point, since the case did not involve a safety issue.

As a result, a given state law can be preempted by the ICCTA, the FRSA, neither, or both—as the respective preemption provisions dictate. And because the two statutes are thus “capable of co-existence,” both must be given full effect. See Morton v. Mancari, 417 U.S. 535, 551 (1974). But even if a conflict did exist, the ICCTA

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would prevail—both because it specifically “preempt[s] the remedies provided under
Federal or State law,” 49 U.S.C. § 10501(b) (emphasis added), and because it is “the
more recent enactment,” adopted 25 years after the FRSA, see In re Fed.-Mogul Glob.
Inc., 684 F.3d 355, 374 (3d Cir. 2012) (citation omitted) (declining to limit the preemp-
tive scope of a later-enacted provision based on the existence of an older statute with
a different preemption clause).

That is presumably why the STB has more recently explained that “[i]n areas
where both the [STB] and FRA have jurisdiction, the later-enacted ICCTA preemp-
tion may impose restraints on state action even where the FRSA preemption does
not.” STB Amicus Brief at 9, Iowa, Chicago & E. R.R. Corp. v. Washington Cnty., 384
F.3d 557 (8th Cir. 2004) (No. 03-3136), 2004 WL 6395939. And the STB has held—in
a formal agency decision—that a District of Columbia statute restricting hazmat
transportation was preempted by ICCTA as a “direct regulation of a railroad’s activ-
ities.” CSX Transp., Inc.—Pet. for Declaratory Order, No. FD 37186, 2005 WL
584026, at *1, *8–9 (S.T.B. served Mar. 14, 2005). Even though the statute was in-
disputably safety-related, “the fact that the preemption contained in [ICCTA] over-
laps with the preemptions contained in FRSA . . . does not lessen the preemptive effect
of [ICCTA] or vice-versa.” Id. at *8 (emphasis added). And in denying reconsideration
of that decision, the Board explained that Tyrrell “does not suggest that particular
state regulations cannot be preempted under more than one applicable federal stat-
utory scheme.” CSX Transp., Inc.—Pet. for Declaratory Order, No. FD 34662, 2005
WL 1024490, at *5 (S.T.B. served May 3, 2005). The Board reiterated that the ICCTA
preempted the D.C. hazmat law even though the Department of Transportation had already concluded that FRSA preemption applied. *Id.* at *6–7. The STB’s more recent pronouncements are thus clear: The ICCTA preempts state or local attempts at “direct regulation of a railroad’s activities,” even if they have a safety rationale. *CSX*, 2005 WL 584026, at *1.

As for the Sixth Circuit’s opinion in *Tyrrell*, the court largely deferred to “federal agency input.” 248 F.3d at 522. Since (as just explained) the STB’s more recent briefs and decisions do not support the result in *Tyrrell*, the court’s decision has little force on this point. And while the court asserted that recognizing ICCTA preemption of safety-related laws “implicitly repeals FRSA’s first saving clause,” *id.* at 522–23, that is incorrect, for the reasons just explained.

And the Sixth Circuit has backed away from *Tyrrell* too. In a more recent case, the court held that a city ordinance governing rail-crossing construction was preempted under *both* the ICCTA and the FRSA. *CSX Transp., Inc. v. City of Sebree*, 924 F.3d 276, 285–86 (6th Cir. 2019). Even though the ordinance was aimed at “safety-related” concerns, the Sixth Circuit analyzed it under the ICCTA, holding that the ordinance “amount[ed] to impermissible [local] regulation of [the railroad’s] operations.” *Id.* at 281, 283–85 (second alteration in original). Only then did the court address the FRSA, finding that it preempted the ordinance too. *See id.* at 285–86.

In short, the FRSA does not save safety-related laws from ICCTA preemption. But even if the ICCTA and the FRSA did conflict—and even if the ICCTA’s text did not simply trump the older statute—the proper resolution would not be to allow a
patchwork of “safety-related” state laws that regulate rail transportation. See United States v. Estate of Romani, 523 U.S. 517, 534 (1998) (“conflicting statutory provisions [should] be harmonized”). Rather, both the FRSA and the ICCTA leave no doubt that (at a minimum) states cannot “unreasonably burden interstate commerce.” Hiett, 22 F.4th at 1194 (ICCTA); 49 U.S.C. § 20106(a)(2)(C) (FRSA). Thus, the ICCTA would still preempt a state safety measure if “the practical and cumulative impact” of allowing such state laws would create such a burden. See CSX Transp., Inc. v. Williams, 406 F.3d 667, 673 (D.C. Cir. 2005) (explaining the unreasonable-burden analysis). And as explained above, FRA has repeatedly found that state crew-size laws would do so. Preemption thus applies, under any analysis.

C. The Railway Labor Act preempts the proposed regulation.

The Department’s proposal is independently preempted by the Railway Labor Act. Almost a century ago, Congress declared the national policy of “avoid[ing] any interruption to commerce” by encouraging the practice of collective bargaining in the railroad industry. See 45 U.S.C. §§ 151a, 152. Congress made it the duty of all railroads and railroad employees “to exert every reasonable effort to make and maintain agreements concerning rates of pay, rules, and working conditions, and to settle all disputes.” Id. § 152.

To ensure a uniform scheme to resolve such disputes, federal labor law preempts “state law and state causes of action concerning conduct that Congress intended to be unregulated.” Metro. Life Ins. Co. v. Massachusetts, 471 U.S. 724, 749 (1985). “Congress struck a balance of protection, prohibition, and laissez-faire in respect to union organization, collective bargaining, and labor disputes.” Chamber of

In distinguishing between permissible workplace standards and impermissible interference in the collective-bargaining process, courts focus on whether a state law is “generally applicable.” See Shannon, 549 F.3d at 1130 (collecting cases). A law that targets “only one occupation … in one industry” is more likely to be “an interest group deal in public-interest clothing.” See id. at 1130–1132. Such a narrowly targeted law also “equates more to a benefit for a bargaining unit than an individual protection” and “serves as a disincentive to collective bargaining” by “encourag[ing] … employers or unions to focus on lobbying at the state capital instead of negotiating at the bargaining table.” Id. at 1132–33. And courts consider whether the law imposes “minimal substantive requirements” or “a low threshold” that can serve as “the backdrop for negotiations” between employers and unions. See id. at 1134. “[A]s a standard becomes more stringent, the state, at a certain point, effectively substitutes itself as the bargaining representative.” Id. at 1136.

9 Originally developed under other labor laws, Machinists preemption applies under the RLA too. See Air Transp. Ass’n of Am. v. City & Cty. of San Francisco, 266 F.3d 1064, 1076 (9th Cir. 2001); cf. Hawaiian Airlines, Inc. v. Norris, 512 U.S. 246, 263 n.9 (1994).
This reasoning supports preemption here. Consistent with the RLA’s collective-bargaining scheme, “collective bargaining agreements typically govern crew size on Class I railroads” like Union Pacific. That has been true for decades, and it remains true now. Indeed, as explained below, Union Pacific has agreed with its labor unions to adopt certain pilot programs to test smaller train crews, while otherwise maintaining two-person crews. Yet the Department’s proposed rule would end-run this collective-bargaining process, imposing a restriction that no one bargained for. The proposal, adopted after a lengthy lobbying effort by certain labor interests, applies to one set of jobs in just one industry. And it imposes a stringent standard with minimal exceptions, thus preventing one-person crew operations even if the union agrees to them (as in the case of Union Pacific’s pilot programs). The proposal thus improperly interferes with the collective-bargaining process.\textsuperscript{11}

D. The proposed regulation violates the Commerce Clause.

Finally, the Department’s proposal violates the U.S. Constitution’s Commerce Clause, which “requires that some aspects of trade generally must remain free from interference by the States.” \textit{Kassel v. Consol. Freightways Corp.}, 450 U.S. 662, 669 (1981). Under the Commerce Clause, states cannot “materially restrict the free flow of commerce across state lines, or interfere with it in matters with respect to which uniformity of regulation is of predominant national concern.” \textit{Southern Pacific Co. v.}

\textsuperscript{10} 87 Fed. Reg. 45585.

\textsuperscript{11} Although a 1931 Supreme Court case says—in a single sentence, without analysis—that the RLA did “not conflict with” state crew-size laws, \textit{Missouri Pac. R.R. v. Norwood}, 283 U.S. 249, 258 (1931), that decision predates all modern labor-law preemption, including Machinists preemption.
Arizona, 325 U.S. 761, 770 (1945). The Supreme Court recently and unanimously reiterated this restriction on “state regulations [of the] instrumentalities of interstate transportation—trucks, trains, and the like.” Nat’l Pork Producers Council v. Ross, 143 S. Ct. 1142, 1159 & n.2 (2023); see id. at 1166 (Sotomayor, J., concurring in part); id. at 1168 (Roberts, C.J., concurring and dissenting). Although states retain some power to enact safety regulations, “the incantation of a purpose to promote the public health or safety does not insulate a state law from Commerce Clause attack. Regulations designed for that salutary purpose nevertheless may further the purpose so marginally, and interfere with commerce so substantially, as to be invalid under the Commerce Clause.” Kassel, 450 U.S. at 670.

Southern Pacific thus struck down an Arizona “safety measure” limiting the length of trains operating in the state. Id. at 763–74. The Supreme Court emphasized that the state law increased “operating costs,” impeded “efficient operation[s],” and required “more manpower.” Id. at 772. And the state’s “attempted regulation of the operation of interstate trains cannot establish nation-wide control such as is essential to the maintenance of an efficient transportation system, which Congress alone can prescribe.” Id. at 782. Against these burdens, the Court weighed the fact that Arizona did not show that the law was “plainly essential to safety.” Id. at 781.

Similar reasoning applies here. As explained below, minimum crew-size requirements increase costs, impede efficiency and innovation, and require more manpower. Infra § III. And as in Southern Pacific, the Department’s proposal “passes beyond what is plainly essential for safety,” 325 U.S. at 781, because—as already
explained—the available evidence shows no safety justification for two-person crew rules. *Supra* § I. Thus, as in *Southern Pacific*, “the nature and extent of the burden which the state regulation of interstate trains, adopted as a safety measure, imposes on interstate commerce” greatly outweighs the supposed local safety benefit, rendering this regulation of interstate commerce improper. *See id.* at 770.\(^\text{12}\)

**III. The proposed regulation would impede technological innovation, restricting safety and efficiency gains.**

Despite lacking any safety justification, the Department’s proposed rule would hinder technological innovation that could increase both efficiency and safety. After deploying a multi-billlion dollar PTC system, Union Pacific is rolling out new programs that would move carefully and safely, but systematically, towards single-person crews—with train-based conductors redeployed to ground-based positions. The proposed rule would counterproductively prohibit even these pilot programs.

PTC is intended to eliminate certain human-error-caused rail incidents. It is a complex, nationwide system of newly developed technologies that continuously relays critical information such as speed limits, train movement authorization, switch positions, work zone locations and other operational data. PTC is designed to use an on-board computer, GPS tracking, and other communications technologies to prevent train-to-train collisions, derailments caused by excessive speed, unauthorized

\(^{12}\) *Southern Pacific* noted that earlier cases had allowed states to regulate crew size because, given the technology at the time, the safety benefits of such laws outweighed the burdens. *See, e.g.*, *Chicago, R.I. Pac. Ry. Co. v. Arkansas*, 219 U.S. 453, 465–66 (1911). But if that was true a century ago, it is no longer the case.
incursions by trains onto sections of track where maintenance activities are underway, and the movement of a train through a track switch left in the wrong position.

Today, many freight train conductors are stationed on locomotives even though most of their work is “ground-based,” such as inspecting the train and preparing it for a trip. The presence of PTC and other equivalent technologies will allow crew redeployment without jeopardizing safety.

Union Pacific has invested over $2.9 billion to implement PTC. Union Pacific PTC Facts, https://www.up.com/media/media_kit/ptc/about-ptc/. FRA’s data shows that 5,115 locomotives are equipped an PTC operable; 182 track segments have been completed for PTC; 839 radio towers have been installed or equipped; over 26,000 employees have been trained; and over 13,000 route miles are PTC-operable. And a substantial record already illustrates PTC’s safety benefits.

Earlier this year, Union Pacific completed negotiations with union leadership, specifically representing a subset of the trainperson craft, allowing us to adopt a ground-based train-service employee role. Initially, this ground-based employee will work in addition to a two-person, train-based crew. With safety as the top priority, Union Pacific will begin to test, measure, and evaluate the ground-based employee’s ability to complete planned and unplanned work. Where weather, grade, and road access are challenging, Union Pacific will use truck-mounted hyrails and other equipment to access a train.

These pilot programs will redeploy existing workers as ground-based crew—covering trains in terminals and on the road. The ground-based crew members will be assigned trucks with various tools, equipment, parts, laptop access, and multiple modes of communications. They will primarily respond to two types of events: Work events, such as the regular need to set out or pick up cars or locomotives to facilitate a train’s movements; and episodic events, such as a broken-down train or safety incident. For an extended period, Union Pacific plans to use both train-based conductors and ground-based crew to collect data on how to best position ground-based employees.

For example, if a train separated due to a broken knuckle, a conductor would need to de-board the train, walk back to the location, determine the need for a new knuckle, radio to the engineer to drop one off the lead engine, ride the last car from the point of separation to where the knuckle was dropped, place the knuckle on the car platform, shove back to the split train segment, replace the knuckle, re-couple the train, walk back to the head end and then proceed with the trip. By contrast, a ground-based crew member could arrive in their truck, assess the need, replace the knuckle in the train using a knuckle from their truck, re-connect the train, and allow the train to immediately restart movement. Similarly, if a blocked crossing required a train cut, a conductor would need to de-board the train, walk back to the cut location, make the cut, and start walking back to the cab before the train can begin movement to clear a crossing. A ground-based crew member could arrive in their truck and make the cut, and then the train could begin to clear the crossing immediately.
A ground-based crew member will also have access to better tools and equipment than is available in the nose of a locomotive, allowing more challenging tasks to be performed safely. Data suggests that in most cases, this will take less time than having the on-board conductor attempt the same tasks, which include train securement, blocked crossings, and rapid emergency response. And with the ground-based crew program, the train can leave as soon as the work is done, while a traditional conductor model requires waiting for the conductor to make the often-lengthy walk back from the work site.\(^{16}\)

This program should be not just more efficient, but also safer. Ground-based crew can often drive right up to the work site in their truck. Their work environment will be safer than the traditional conductor's, since the employee will no longer have to climb out of the locomotive cab and walk long distances on uneven terrain, potentially at night, across bridges and ditch-lines, where service is needed. Reduced time on the ground, walking the right of way, will decrease the risk of injuries and reduce fatigue. And the role will involve better quality of life: Conductors will no longer be on-call, waiting for trains; ground-based crew will be on predictable shifts, and trains will come to them.

Union Pacific is not taking a one-size-fits-all approach. If the pilots are deemed a success, the ground-based crew positions, once fully implemented, will only be employed on railroad territories that have PTC or PTC-equivalent technology in place.

\(^{16}\) A video demonstrating the benefits of this concept is available at https://www.youtube.com/watch?v=6hr15dtWwGU.
Around 90% of Union Pacific’s train miles are covered by this technology. The remaining portion of the Union Pacific network will continue to employ two-person train crews.

These pilots will be implemented in carefully controlled phases with increasing complexity across different parts of Union Pacific’s PTC equipped network. The fourth and final phase of the pilot program includes parts of Herington and Topeka, Kansas. It includes a switching terminal with fueling, work events, unit trains, locals, and considerable intermodal and manifest traffic.

The Department’s proposed rule, however, would substantially impede these pilot programs (or any others like them). The rule’s narrow exceptions do not contemplate test or pilot operations. Nor do they allow ground-based personnel to replace the required train-board personnel under any circumstances. Thus, if the rule takes effect, Union Pacific will be unable to advance its pilot programs in Kansas to the stage where the conductor moves from the train to the ground. In turn, the rule would inhibit Union Pacific’s and other railroads’ ability to determine whether, and under what circumstances, operations can be modernized and streamlined without any loss of safety—or even with improved safety. By the same token, if Union Pacific’s pilots in other states show safety and efficiency gains, the rule would prevent Union Pacific from putting those lessons into practice in Kansas.

IV. The proposed rule would impede railroad competition with trucking, pushing traffic onto the highways.

By improperly targeting the railroad industry, the proposed rule would result in unequal treatment of rail and trucking operations, even though trucks are less safe
and less environmentally friendly than trains. This result is illogical and counterproductive.

Unlike railroad engineers, truck drivers invariably operate alone, in one-person crews. And given their long hours, truck drivers are susceptible to risks of fatigue, distraction, and substance abuse. To try to address these issues, the federal government regularly promotes and even sponsors technological advancements in the trucking industry—including recent studies into driverless trucks and “truck trains,” which require less input and active driving time from truck drivers. See, e.g., Federal Motor Vehicle Safety Standards: Vehicle-to-Vehicle (V2V) Communications, 79 Fed. Reg. 49270 (Aug. 20, 2014). These programs aim to “facilitate market-driven development and introduction of a variety of safety applications, as well as mobility and environment-related applications that can potentially save drivers both time and fuel.” Id.

The Department’s proposed rule would leave one-person trucking operations untouched, while restricting technological advancement and efficiency in the rail industry. The rule would thus put a thumb on the competitive scale between these two modes of transportation, shifting traffic off the rails and onto the highways. And it would do so even though rail operations are safer than moving the same volume of traffic by truck. This is true even for hazardous materials. Nationally, railroads and trucks carry roughly equal amounts of hazardous material, as measured by ton-mileage, but in 2020 there were 374 reportable hazardous materials rail incidents—
compared to 13,992 highway incidents.\textsuperscript{17} Other benefits of transporting freight by rail include reducing the extreme economic costs of highway congestion; fuel saving (on average, railroads are four times more fuel efficient that trucks); less wear and tear on U.S. highways; and reduced pollution through stringent new locomotive emissions standards.\textsuperscript{18}

Without a strong safety justification—which does not exist—the Department should not target the rail industry in a way that advantages a less safer, dirtier competitor industry.

**CONCLUSION**

For all these reasons, the Department should withdraw the proposed rule.

Respectfully submitted,

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July 17, 2023

\textsuperscript{17} National Transportation Statistics 2021, Table 2-6, https://www.bts.gov/sites/bts.dot.gov/files/2021-12/NTS-50th-complete-11-30-2021.pdf.

Dear Ms. Brown:

I am the Vice President of Government Relations for the Wichita Regional Chamber of Commerce, Wichita, Kansas. I write today to strongly urge you not to adopt K.A.R. 36-43-1, which would mandate crew requirements for trains and put the state at a distinct competitive disadvantage as we compete to attract more intermodal, energy and agriculture rail service to our state.

A crew size mandate lacks a safety justification, undermines decades of meaningful collective bargaining, and jeopardizes state’s ability to compete in a rapidly changing transportation space. As the transportation sector rapidly changes, and other modes embrace automation, state policymakers must reject mandates that keep railroads in the past. Failing to recognize the reality and value of safe technological advancement in the rail sector will hinder the long-term viability of railroads and divert traffic from trains to trucks (which are less fuel-efficient) creating additional highway congestion and further damaging the state's highway system.

Intermodal and farm products equal 77% of freight rail traffic that originates in KS and 59% of the freight rail traffic terminating in KS. If adopted, the new regulation would provide a significant disruption to the already fragile national and regional supply chains and reduce the ability of our state to grow.

K.A.R. 36-43-1 is bad for Kansas and bad for Kansas businesses. The state should look for ways to partner with railroads to promote public safety, rather than mandating stiffening regulation that will not improve public safety and put our state at a disadvantage.

Thank you for your consideration and support for Kansas business.

Respectfully,

Toni Porter

Toni Porter
Vice President of Government Relations | Wichita Regional Chamber of Commerce

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Hi Gelene - Following up on the attached comments, I wanted to clarify some of the questions you had during the public testimony and during our discussion on Monday:

The CVR currently operates certain unit train moves with a single engineer in the cab of the locomotive, and a conductor trailing in vehicle. This operation is used for unit trains moving to and from our interchange at Dodge City to Satanta/Hugoton. CVR operates local jobs with two crew members in the cab of the locomotive because they can go on duty and off duty in the same location within their hours of service requirements.

- The CVR safety record is impeccable and has been recognized by American Short Line & Regional Railroad Association by receiving a Jake Award with Distinction, which is given to railroads whose safety performance is better than the industry average.
  - The injury frequency rate of the railroad in 2022 was zero, which is well below the industry average of 2.01
  - The CVR has had no issues with incident response times with our roaming conductor. Because the railroad parallels Hwy 56 for the entirety of the move, the vehicle can maintain a consistent visual when necessary.
- The cost of implementing this proposed rule would run about $400,000 in the first year. That breakdown is roughly as follows
  - 3 new crew members
    - $23/hr * 2080 hours * 45% benefits/insurance = $69,368
    - $69,368 * 3 = $208,104
  - Two additional trucks for transporting the crew from Satanta to Dodge
    - Each truck costs approximately $50,000
    - Routine maintenance ~ $2,000 per truck annually
    - $13,000 in fuel annually
      - Typically fill up twice a week at $125/ fill up making these runs ($250/week * 52 weeks = $13,000)
  - General training, travel, overtime, PPE, etc = $7,000 per team member
  - Total Cost = $208,104 (crew) + $130,000 (vehicles/fuel/maintenance) + $21,000 misc = ~$359,104
- CVR has concern about the general availability of qualified applicants
  - The typical time to hire qualified crew members is 4-5 months. In the last two years, we have had to offer up to $5,000 in signing bonuses in an attempt to find people to move to southwest Kansas. The applicant pool in southwest Kansas is very small, and class I employees who are looking for the stability of a short line are often deterred by the slightly lower pay. If this regulation were implemented immediately, we would have a very difficult time finding three team members to fill these roles given the rural location of our operation and qualifications needed.
  - Once the team members are hired, our training time is three months, with an additional 6-9 months of supervision. Adding unnecessary crew members will not only cost against our bottom line thus money
available for infrastructure and growth projects, but also tie up our experienced existing team who have to train new hires.

Thanks for your consideration on the impact this regulation will have on the short line railroad industry, and feel free to reach out with any questions.

Jeff Van Schaick  
Cimarron Valley Railroad  
Jaguar Transport Holdings  
(m) 202.600.1612
Good afternoon, my name is Dr. Jason Pinder and I am the General Director Network Development for Union Pacific Railroad. I have 18 years’ experience and am a former licensed conductor and remote-control operator. Thank you for this opportunity to speak about safety. Safety is Union Pacific's number one priority. As a company, we continuously look for innovative approaches to enhance the safety of our employees, communities, and the customers we serve. We invest significant resources in training, research and development, and public education; all with the goal of increasing rail safety awareness and improving safety.

The Kansas Department of Transportation’s (KDOT) efforts to require at least two-person crews in the freight rail industry lack a safety justification and ignore the successful use of crew redeployment in the US and globally. Such regulations disrupt collective bargaining and hinder the rail industry’s ability to compete with less climate-friendly transportation methods, while also impeding innovation and harming Kansas businesses.

Freight railroads are the safest way to move goods over land. Safety and technology improvements historically have been the primary catalyst for labor negotiations related to crew size. As a result of these improvements, rail labor and rail management have agreed to reductions in crew size from as many as five persons in the 1980s to two persons today. This was achieved without compromise to safety as witnessed by a decline in rail employee injuries – the injury rate has dropped 63% since 2000 and is at an all-time low. As a result of these efforts and other ongoing safety initiatives, rail hazmat accidents have declined by 78% since 2000 to an all-time low, and more than 99.9% of rail hazmat shipments reach their destination without a train accident-caused release.

There is absolutely no data supporting the proposition that two-person crews are safer than a single-person rail operator. The proposed rule by KDOT provides no independent studies by the state and no empirical evidence to support the proposed rule. Instead, the agency relies on the assumption that a two-person crew is inherently safer than a single-person rail operator and selected anecdotes.

Today, many freight train conductors are stationed on locomotives even though most of their work is “ground-based,” such as inspecting the train and preparing it for a trip. Railroads seek the flexibility to continue working with rail labor under existing collective bargaining procedures to identify when the presence of PTC – Positive Train Control, a
federally regulated set of technologies that prevent the most serious human-error accidents - or other equivalent technologies could allow for a redeployment of crew members without jeopardizing rail safety.

Earlier this year, Union Pacific completed negotiations with union leadership, specifically representing a subset of the trainperson craft, allowing us to initiate a ground-based train service employee. Initially, this ground-based employee will work in addition to a two-person, train-based crew. With safety as our top priority, we will begin to test, measure, and evaluate the ground-based employee’s ability to complete planned and unplanned work. Where weather, grade, and road access are challenging, we will use truck-mounted hyrails and other equipment to access a train.

Also, of importance is measuring the change in quality of life for a large population of our workforce, as today’s train and engine service employees are subject to call, stay in hotels, and have unpredictable days off. Ground-based positions will have regular shifts, regular off days, and the ability to bid on a shift that works best for their personal lives. This new method of operations will be developed with the input of our labor partners and any significant changes to the current method of operations will be subject to collective bargaining. Now is not the time for the State of Kansas to interrupt the rail industries' collaborative and innovative efforts with representation of the train service craft as conceived by the Railway Labor Act.

K.A.R. 36-43-1 is unnecessary. Please consider allowing the forces already within the industry – the collective bargaining process and specialized regulators – to continue to produce ever-improved safety results. Sound safety regulations must be based on evidence, not speculation or a misplaced desire to get involved in issues appropriately placed in the collective bargaining process. Implementing a regulation that upsets these forces may have unintended consequences for railroads to remain a relevant mode of transportation.

Union Pacific, along with other railroads, continues to look for ways to safely improve efficiency and productivity. Union Pacific believes partnerships with KDOT, and not regulatory mandates without sound study or collaboration, is the best path to achieve everyone’s safety goals. Thank you for the opportunity to provide this testimony. I am happy to answer any questions.
July 13, 2023

Office of Chief Counsel
700 SW Harrison Street
3rd Floor West
Topeka, KS 66603

To whom it may concern:

I am writing in strong support for the proposed permanent regulation, K.A.R. 36-43-1, requiring a minimum of two individuals on trains in Kansas. I have heard from countless constituents and industry leaders who have expressed their alarm and concern for safety, derailments, and delays. This regulation is a crucial tool to reduce these harms and keep workers and Kansans safe.

Minimum crew sizes will ensure trained professionals are present and available to address emergency situations, assist first responders, and prevent accidents involving trains and their cargo. This is essential for the safety of all of our communities, as well as for the economy and our overall transportation infrastructure.

Thank you for your attention to this. Please don’t hesitate to reach out with any questions.

Sincerely,

Dinah Sykes
Senate Minority Leader
July 10th, 2023

The Honorable Representative Barb Wasinger
Chair of Joint Committee on Administrative Rules and Regulations
Distinguished Members of the Committee
Kansas State Legislature
State Capitol, Room 582-N
Topeka, KS 66612

Re: KAR 36-43-1, crew requirements.

Dear Rep. Wasinger and Members of the Committee:

The Sheet Metal Air Rail and Transportation Workers (SMART) is a proponent of KAR 36-43-1

KAR 36-43-1 Is much-needed safety oversight when it comes to railroad operations in Kansas. For years, transportation workers have called for a myriad of safety reforms in the railroad industry. Only to be dismissed.

One cannot discuss the state of the rail industry without addressing safety. While the industry has made meaningful progress in this regard over the past 50 years, much more needs to be done. More importantly, the progress that has been made should never be used as an excuse to ignore ongoing safety problems or, worse, roll back and undermine protocols that have delivered these safety improvements. Unfortunately, this is precisely what railroads are currently attempting to do.

To understand the need for this regulation, I want to present a realistic snapshot of the current state of rail safety. At every opportunity, the railroads state that safety in the industry is improving each year. However, the numbers present a different story. When normalized against drastic reductions in employment, the number of trains being operated, trackage, grade crossings, etc., the safety figures are not satisfactory. In fact, in recent years, the numbers are getting worse. Between 2015 and 2018, fatalities on the railroads increased by 13.9%.¹ Between 2017 and 2018 alone, railroad fatalities increased from 821 to 853, and employee deaths increased from 11 to 17 during the same period. Collisions increased from 80 in 2017 to 86 in 2018, an increase of 5.6%. Similarly, derailments increased from 1,263 in 2017 to 1,341 in 2018, an increase of 6.2%.

Without question, one of the biggest threats to railroad safety is the push to decrease the number of onboard personnel trains from two crew members down to one or none. Today, freight trains are operated safely because they have a minimum of two crew members: a federally certified conductor and a federally certified locomotive engineer. This has been standard practice for decades and for a

¹ Data is based upon official statistics of the Federal Railroad Administration's Office of Safety Analysis
good reason. Both conductors and engineers have a long list of responsibilities. They must work together as a team to ensure safety, efficiency, and compliance with regulations while operating freight trains that are over two miles long and often carrying hazardous materials. Unfortunately, driven by hedge-fund investors and multi-national investment funds, the railroad lobby has aggressively fought efforts to require two-person crews across the industry.

KAR 36-43-1 will protect communities and continue to provide a timely response to emergency responders. The regulation requires two crew members in the cab of operating locomotives. Many of our members have experienced an emergency either themselves, such as a heart attack, or responding to a pedestrian the train hit. Had another crew member not been there, the results could have been disastrous.

In Lynchburg, VA, fifteen cars derailed a hazardous material train and sent a giant fireball into the sky. Thanks to the quick actions of the two-person crew, the conductor was able to go back and cut away as many explosive cars as he could. Therefore preventing a major disaster, much like the Lac-Megantic, Canada disaster, which was a one-person operation that killed 47 people.

Despite what major railroads would have you believe, current technology cannot be relied upon; many times throughout a tour of duty, crews have documented several instances where the technology has failed. In many of those cases, the crew is ordered to “cut out” the technology and proceed en route. Our organization is not against technology; we embrace it as it can provide assistance with a safety-sensitive task. We raise a concern about the railroad's full insistence on technology. Mechanical devices fail. To go all in without a human overlay or responder is inviting disaster.

Railroads will also have you believe that the cost of such regulation will have a significant impact on their operations. This could not be further from the truth. ALL CLASS 1 railroads in Kansas currently operate with two individuals on the train. In the extremely rare situation, a short-line railroad is operating 1 crew member, and the 2nd crew member is typically in a “chase vehicle” We have serious concerns about that practice, but staying focused on the cost argument, the shortlines already have the second crew member working. THERE IS NO added cost.

Efforts to irresponsibly reduce crew size are consistent with another troubling trend among railroad operations: operating changes often referred to as “Precision Scheduled Railroading” (PSR). This name is misleading since the goal is not better scheduling or more precision but rather increased quarterly stock market returns. As of today, many railroad customers have filed complaints with the Surface Transportation Safety Board due to lack of access and service, a direct result of PSR.

Not only have Workers and public citizens voiced support of the two-person requirement but Industry CEO’s, shippers, and elected officials have as well. The National Grain and Feed Association, as recently as March of last year, gave testimony to the STB on concerns with crew reductions in the rail industry. In that testimony, NGFA CEO and president. Mr. Seyfert states,

“Our view is that the carriers shed a large percentage of their employees over the past five years and now do not have enough rail workers to service freight demand. These reductions in force have been exacerbated by COVID. We also believe lack of power issues either due to maintenance issues, attrition
or delayed intervals are adding to the problems. These situations apply to the majority of Class I carriers," (Seyfert, National Grain and Feed Association, 2022, pg 4)

His testimony continues

"Due to the insufficient number of employees to handle the additional volumes of non-agricultural products, we recommend the Board request from the rail carriers the targeted number of employees they need to hire to meet the 2022 demand. If the number is short of 2019 levels, we ask the Board to inquire why the rail carriers believe they can handle higher volumes with fewer employees." (Seyfert, National Grain and Feed Association, 2022, pg 5)

"There are many contributing factors to the first and last mile service challenges, such as the lack of adequate crews, lack of locomotives, bunching of cars and trains," (Seyfert, National Grain and Feed Association, 2022, pg 7)

"These factors enable rail carriers to reduce assets and crews to maximize operating ratios at the expense of predictable, reliable service and efficient use of shipper assets" (Seyfert, National Grain and Feed Association, 2022, pg 7)

Former CEO Matt Rose of BNSF gave an interview before he retired in 2019. He warned that the other Class I railroads were inviting regulatory risk by adopting Precision Scheduled Railroading, reducing service, and demarketing some types of traffic in pursuit of higher profits.

"We have this common-carrier obligation to provide freight service to all customers in all markets," Rose told an industry conference in January 2019. "And what we’re doing in PSR is we’re redefining what we’re willing to accept in the freight railroad industry on certain lanes. And I really do believe we’re going to get in a lot of trouble by doing that." (Stephens, Trains, 2022)

"When you start redefining markets," Rose warned, "I think then the federal policymakers will look at this, and quite frankly, they will not be happy with us." (Stephens, Trains, 2022)

Recently Sen Roger Marshal of Kansas was on record

Sen. Roger Marshall,

"I’ve had lots and lots of complaints from the ag (agriculture) world the last two years, that we have grain sitting on the ground that need to be taken off to the ports in California, the ports in Texas, Louisiana as well," he said. "So yes, I think it needs to be examined."  (Hardy, "Is it time for new railroad rules? Critics say U.S. train industry is in crisis," Kansas City Star, Dec 11th, 2022)

"I frequently hear from Kansans that the service of Class I railroads is not living up to the expectations," said Senator Marshall. "These service failures hurt our shippers who use the rail to deliver their products to key export facilities (Sen Baldwin press release June 23rd, 2023)

Railroads have fought for decades not to be regulated. We regulate truck weight, we regulate speed limits; why are they different? Because they are the railroad? No doubt they will do all they can to raise the preemption and interstate commerce smoke screen. But that is something said to get local and state
legislators to drop the issue. 49 U.S. Code § 20106, On preemption states, a State may adopt or continue in force a law, regulation, or order related to railroad safety or security.

We believe the time is now for the State of Kansas to protect and lessen the risks of a serious accident in our state. This regulation is not preempted by federal laws because none exists. Title 49 US Code section 20106 of the FRSA explicitly authorizes state regulation of railroad safety. “A state may regulate railroad safety until such time as the FRA has adopted a regulation covering the same specific subject matter.” As such, we now see Washington, Nevada, Arizona, Colorado, Wisconsin, Ohio, and West Virginia, all with laws and regulations in place. With 16 other states pursuing the same minimum safety standards as Kansas. KAR 36-43-1 is needed in the interest of public safety.

Thank you for your consideration.
Sincerely,

Ty Dragoo
SMART-TD
Kansas Legislative Board
Director/Chairman
BEFORE THE
SURFACE TRANSPORTATION BOARD

Docket No. EP 770
URGENT ISSUES IN FREIGHT RAIL TRANSPORTATION

TESTIMONY OF THE NATIONAL GRAIN AND FEED ASSOCIATION

Good morning, my name is Mike Seyfert, and I am the President and Chief Executive Officer of the National Grain and Feed Association. I am joined by Mr. Tom Wilcox, NGFA’s outside transportation counsel, who will take part in the question-and-answer portion of this panel. I want to begin by commending Chairman Oberman and the Board for holding this hearing to learn about the causes of the current rail service challenges and to help find solutions.

The NGFA consists of more than 1,000 grain, feed, processing, exporting and other grain-related companies operating more than 8,000 facilities. Its membership includes grain elevators; feed and feed ingredient manufacturers; biofuels companies; grain and oilseed processors and millers; exporters; livestock and poultry integrators; and associated firms that provide goods and services to the nation’s grain, feed, and processing industry.

The NGFA’s wide-ranging membership is proud to partner with the railroad industry on almost 15 percent of total U.S. carloads, consisting annually of about 4 million carloads of grain and oilseeds, and related production inputs and products. It is a partnership critical to the U.S.
agricultural economy and one we value.

This past November NGFA celebrated its 125th anniversary. NGFA was founded on five key principles, one of which was improved and reliable rail service. The rail and grain and feed industries have changed considerably over the last 125 years, but the importance of the relationship has not. I expect this partnership to remain in place another 125 years from now. Therefore, solutions to the current rail service challenges should be crafted with the long term in mind.

As stated in the NGFA’s March 24 letter to Chairman Oberman, the NGFA’s preference is to seek commercial solutions between individual rail customers and their rail carriers. However, the recent rail service challenges impacting entire regions of the country have led us to the Board to seek help.

The Agricultural Transportation Working Group (ATWG) also sent a letter to the Board on April 21 signed by 33 national-level agricultural organizations representing producers and agribusiness. The letter highlighted the current inability of several Class I carriers to provide reliable rail service and noted the impact this can have on both producers and consumers. The letter goes on to say that the mismatch between the importance of reliable and cost-effective freight rail transportation to our nation’s economy and the lack of effective competition between the Class I railroads remains of great concern to the ATWG members.

When you consider the domestic and global situations today, the movement of NGFA members’ commodities and products perhaps never has been more important. Almost every shipment made by an NGFA member via rail will be used for either human food, animal food or fuel production in the domestic and international markets.

The challenges NGFA members face are multi-layered. Some members have experienced doubled trip times, such as trips from the Midwest to the West Coast taking 20 days when they
used to take 10 days. One of the primary reasons for the additional trip time is excessive dwell time at origin. We have reports of trains sitting for more than 10 days, when it is customary to have the trains pulled the following day after loading. Some NGFA members last week reported dwell times double what they were in March and triple what they experienced in February. Trains Magazine reported that during the week of March 15 more than 6,500 grain cars in North Dakota and more than 1,500 in Nebraska were more than 11 days behind schedule.

We are aware of origin grain elevators being restricted on their loadouts because loaded trains are occupying their rail sidings. There are instances of origin grain elevators needing to turn away grain sales from farmers because they are full. Some NGFA member companies have put grain on the ground to keep taking deliveries from producers.

Feed mills and integrated livestock and poultry operations have experienced instances in which trains have not arrived, and scheduled feed deliveries have been unable to be made to producers. At grain export destinations, vessels wait to be loaded due to delayed train delivery, and while they wait the grain exporter pays demurrage charges to the shipping company. But the railroad pays no demurrage to the exporter for these delays.

Grain processors, such as flour mills, crushing and biofuels facilities, have experienced rail challenges on the inbound and outbound. On inbound, they have been run short on raw agricultural commodities and have shut down operations. On the outbound their sidings have become full of loaded railcars. Due to their sidings becoming full, they have had to shut down operations due to having no place to load empty rail cars.

As a result of the prolonged trip times, shippers and receivers have booked additional freight in an attempt to move enough volume to keep their operations running. This additional freight from the secondary rail freight market has come at a very high price and is not sustainable
in the long run. NGFA members have reported paying in excess of $500,000 in additional charges per substitute shuttle in the secondary market.

Many NGFA members have a daily risk of slowing or shutting down operations due to reduced and inconsistent rail service. Some individual NGFA member companies report losses and increased costs in the tens of millions of dollars and lost or reduced operating days totaling weeks. Based on reports from members, we conservatively estimate the combined costs to the grain industry due to lost revenues and additional freight expenses in the first quarter of 2022 to be over $100 million.

Depending on the market position of the grain industry participant, these extra transportation costs are either borne by the participant, reflected in the grain basis paid to the farmer, or passed onto the consumer. Not one of these rail service challenges is beneficial for individual Americans or the U.S. or North American economies.

What caused these problems and how do we address them?

Our view is that the carriers shed a large percentage of their employees over the past five years and now do not have enough rail workers to service freight demand. These reductions in force have been exacerbated by COVID. We also believe lack of power issues either due to maintenance issues, attrition or delayed intervals are adding to the problems. These situations apply to the majority of Class I carriers, but we would like to provide credit to those rail carriers that are currently performing and handling the freight demand that has largely returned to pre-pandemic levels.

We are aware that many carriers are projecting year-over-year growth in total carloads in 2022, which will approach 2019 levels. However, it is important to note there are fewer grain exports shipping out of the PNW this spring than at the same time last year. Also, there is less
grain going through the PNW ports than before the trade war with China. I bring this to your attention to let you know the rail service challenges are not due to increased rail service demand from grain.

Due to the insufficient number of employees to handle the additional volumes of non-agricultural products, we recommend the Board request from the rail carriers the targeted number of employees they need to hire to meet the 2022 demand. If the number is short of 2019 levels, we ask the Board to inquire why the rail carriers believe they can handle higher volumes with fewer employees. Once it is known how many employees the rail carriers intend to hire, we recommend the Board require regular reporting on the number of employees they have hired, the number of employees going through training, when the newly trained employees are projected to be able to independently operate and repair trains, and lastly, the number of employees that have quit or retired.

NGFA members understand the employment challenges brought by COVID – every employer is facing similar challenges. The difference is that when NGFA members cannot load a train because a crew is out with COVID, they will be charged demurrage by the rail line and if they cannot unload a train due to COVID, they will pay demurrage and face the risk of penalties or loss of contracts with their own customer. However, if the railroad cannot deliver or move a train due to COVID – or any other reason – NGFA members cannot charge and are not entitled to any demurrage from the railroad.

This leads to several other recommendations. In addition to NGFA’s recommendations to focus on rail employment, we urge the Board to implement the following policy changes to help reduce rail service challenges now and in the future:

The NGFA believes utilizing the same demurrage concepts that railroads use to incentivize
their customers would help prevent rail service challenges in the future. When shippers and receivers do not load a train within the required time, usually within a day, they pay demurrage fees to rail carriers. As a result, shippers and receivers pay extra wages to ensure they have enough labor to load and unload trains quickly. The addition of demurrage fees would increase the resolve of the railroads to ensure they move trains faster.

The NGFA appreciates the Board’s recent decision to accept public comments on the petition filed by NGFA and several other associations in Docket No. EP 768 seeking the adoption of rules to permit rail customers to levy financial penalties on railroads for their inefficient use of private railcars. The NGFA strongly urges the Board also to permit rail customers to charge railroads demurrage when inadequate rail service is provided using carrier-provided rail cars, which make up a large percentage of the rail cars used to haul grain. This may seem like a major policy change, but this recommendation mirrors the policy employed by rail carriers toward their customers.

The NGFA also urges the Board to expeditiously conclude its work in Docket No. EP 711 for the purpose of establishing reciprocal switching rules that enable the creation of rail-to-rail competition at qualifying interchanges between carriers. Recently, our members have told us the ability to interchange trains would help their operations stay running.

The NGFA commends the Board for seeking comments last December on metrics to measure rail service and urges the Board to implement the additional data reporting as soon as practicable. The NGFA believes rail service will improve through additional data reporting, such as first-mile, last-mile rail service reporting. Indeed, we anticipate that many of the railroads will discuss velocity numbers in their testimony. But the real issue is how long it takes to move the trains in that first and last mile of service. When is the train in place for loading or unloading and
when is it hauled away? Is it a matter of hours or days?

There are many contributing factors to the first and last mile service challenges, such as the lack of adequate crews, lack of locomotives, bunching of cars and trains, lack of any financial penalties for poor service, inadequate communication, and lack of market constraints such as competition that would incentivize railroads to provide better service to their customers. These factors enable rail carriers to reduce assets and crews to maximize operating ratios at the expense of predictable, reliable service and efficient use of shipper assets. The present lack of transparency regarding the specific factors that cause first mile, last mile service breakdowns help to insulate rail carriers from Board oversight and responsibility for harm to their customers.

The NGFA recommends expediting the additional first mile, last mile data reporting requirements and adding trip plan reporting. NGFA also recommends requiring reports to the Board and directly to individual shippers. This data would help shippers and receivers more efficiently plan operations and more accurately gauge when contingency plans are needed.

We also encourage the Board to develop guidance on the Board's expectations for rail carriers in meeting their statutory obligation to provide service upon reasonable request. Exactly what is meant by the “common carrier obligation” has long been undefined. The service issues highlighted by NGFA members and others testifying today indicate the time has come to put real meaning in that definition.

Additionally, we believe some rail service challenges can be forestalled by requiring all the Class I railroads to develop annual rail service assurance plans, which will provide a basis for the Board and industry stakeholders to conduct annual assessments of intended service versus actual service, and to identify and address potential issues that otherwise may result in future service deficiencies.
I want to thank the Board for the recent announcement to begin a rulemaking on emergency service orders and to encourage the Board to follow it up with other announcements to help improve rail service. The emergency service order rulemaking has the potential to help particularly difficult, individual situations.

Finally, NGFA recognizes these are not challenges with easy answers, and there is not a single, individual tool in the toolbox that can solve them all. We encourage the STB to use all the tools available to you to improve service. If there are tools you need that you do not have, we encourage you to make that known to the Congress and the appropriate committees of jurisdiction.

Mr. Chairman and members of the board, thank you for your time and attention today and for holding this hearing on these critical issues. The more than 1,000 members of NGFA thank you. I respectfully request that my full prepared statement be included as part of the record. Tom and I would be happy to answer any questions you may have.
Analysis: Former BNSF executive Matt Rose’s 2019 warning comes true

By Bill Stephens | July 22, 2021

Railroads become a target for regulators

The railroad industry’s chickens have come home to roost.

Before he retired in 2019, BNSF Railway Executive Chairman Matt Rose warned that the other Class I railroads were inviting regulatory risk by adopting Precision Scheduled Railroading, reducing service, and demarketing some types of traffic in pursuit of higher profits.

Matt Rose, retired BNSF Railway executive chairman, speaks at the 2019 NRC Conference in Florida. (Trains: David Lassen)

“We have this common-carrier obligation to provide freight service to all customers in all markets,” Rose told an industry conference in January 2019. “And what we’re doing in PSR is we’re redefining what we’re willing to accept in the freight railroad industry on certain lanes. And I really do believe we’re going to get in a lot of trouble by doing that.”

“When you start redefining markets,” Rose warned, “I think then the federal policymakers will look at this, and quite frankly, they will not be happy with us.”

That day of reckoning is here.

Last week, Surface Transportation Board Chairman Martin J. Oberman questioned whether railroads are shirking their common-carrier obligations due to pressure from Wall Street.
“I have wondered ... whether the combination of the reductions in workforce, the interruptions in service, the demarketing all implicate the common-carrier obligation that railroads have and have had really since the beginning of the railroad industry,” Oberman told the Midwest Association of Rail Shippers. “And it's something that I continue to focus my attention on.”

Oberman said he fully supports the White House's call for increased competition in the rail industry. The Biden administration's July 9 executive order, which aims to limit the dominance of large corporations, dovetails with efforts already underway at the STB. “There are just many, many parts of the country ... where there's just not real effective competition among rail carriers,” Oberman says.

Surface Transportation Board chairman Martin Oberman addresses the Midwest Association of Rail Shippers meeting. (Trains: David Lassen)
The STB chief says his agency will take a look at hot-button issues like reciprocal switching, lifting exemptions on the regulation of certain commodities, and ways to more easily settle rate disputes.

Reciprocal switching, which allows captive shippers to seek access to another nearby railroad via interchange, has been on the board's back burner since 2016. U.S. railroads vigorously oppose reciprocal switching, but Oberman wants action. “I have talked about it a lot. And it's not just talk,” he says. “The concept of more competition ... is something very high on my list of concerns, and I hope we will be able to move forward in some fashion in that area.”

What we don't know, of course, is what shape regulatory reform ultimately may take at the STB. The devil is always in the details. But it's clear that Oberman is likely to get the ball rolling — and that the Class I railroads won't like it much.
"I am frequently reminded by my friends in the railroad industry that we should butt out and the market should regulate rates and service. And I agree. I think the market should regulate rates and service," Oberman says. "But ... for that to happen there has to be a market. And so to me, it is far better if we have more competition in the shipping and freight industry so we don't have to get involved."

It's unclear whether the Big Is Bad mood in Washington may affect the proposed Canadian National-Kansas City Southern merger, the first between Class I systems in two decades. CN and KCS seem to have broad shipper support for their deal, and that's important. But obviously talk of reducing railroads' market dominance does not help a merger's prospects of winning regulatory approval.

The STB has become more activist in the past couple of years and has increased its scrutiny of all sorts of transactions.

Among them: CSX Transportation's plan to sell its line linking Montreal with Syracuse, N.Y., to Canadian National fell apart after the board insisted on one condition involving interchange. The board upgraded CSX's proposed acquisition of New England regional Pan Am Railways to a "significant" transaction requiring a more thorough review, then rejected CSX's merger application as incomplete and told the railroad to do its homework and come back with a more detailed filing. And the STB is taking a closer look at CN's sale of branch lines in Wisconsin and Michigan to shortline operator Watco, the kind of deal that's usually been rubber-stamped.
I work near a railroad track and know many people who live near railroad tracks. I know serious train accidents are not common but as crews and staff dwindle they will happen more. There is a huge difference in the judgment and problem solving capacity of a duo compared to a solo crew. Rail wants to be cost competitive but if we let cost make all decisions, safety will suffer. Rail must be safe if allowed to continue to operate through our cities and farm land. Let's keep East Palestine in Ohio, please. And let's respect the safety of those who work on the trains too, ensuring they have the resources and regulations to keep corporations honest and responsible.

Sincerely,
Reid Kaufmann
Hello,

I am employed by BNSF as a Locomotive engineer.

I can not stress the importance of 2 person crews on ALL trains operating on main lines through our country. Two sets of eyes, 2 minds and just plain personal presence for crews in the locomotive cab are essential to moving our nations freight safely and efficiently, not only for the crews but as well as the communities, large and small. A single crew member can very easily develop any kind of medical emergencies at any given point and time, which could quite probably result in the certain death of said single crew or add to an already unsafe condition to the communities in which these trains travel.

Please help us slow down the corporate greed that is driving this issue. They want more work performed with less crew members, only to support higher profits for corporate management and stockholders. They have no concerns for the crews performing our duties in a very dangerous line of work. We are begging for your help!

Thank you for time
Sincerely,
BNSF Locomotive Engineer

Sent from Mail for Windows
I would like to impress upon the K. Dot board that this is a vital part of the safety of railroad. We have seen too many railroad accidents that could’ve been possibly prevented if there had been another person there to take over, or at least speak to the engineer about the speed of the train and things like that. One person running a train, the weight and size and length of the ones that are currently on Kansas railroads and throughout the United States are unsafe without a second person and I think things would be better if it was even a conductor at the end of things again but for right now I’m throwing my support for having two people running a train when they are crossing Kansas.

Thank you
Pamela McElvain

Live, Love, Laugh to the Max!!
Pam McElvain
Please complete the following
Name: Mary Walton
Regulation Number: k.a.r. 36-43-1
Crew Requirements for Railroads operating in the state of Kansas
Comments

It is absolutely preposterous for the railroad to begin operating their locomotives using a one man crew. While I understand that this conserves more money for the railroad, investors and management, but it causes a huge safety issue for the transportation of goods on the rails. Operating a one man crew is a bad idea for many reasons. First, what happens if the person in charge of operating in the locomotive falls ill, falls sleep or loses control of the train? While I understand they may have some sort of computer backup system, we know from history that no system is safe. Computers go down, can be hacked, can fail and not operate properly. Just watch the movie Unstoppable, where there was a runaway train that was heading for a Town at full speed. Are we really willing to take the risk? A train could wipe out a whole town, without the people even knowing. All you have to do is refer to history. Not to mention a typical train can weigh anywhere from 4000-20000 Tons. The other aspect of this case, are the engineers driving the train. These people work around the clock, in some cases they are not the best of health, and have a massive amount of stress put upon them. I know this for a fact because I have had family work for various railroads. I believe that having another crew member in the cab helps the engineers stay awake, alert, and may notice things that the engineers missed. Having these checks and balances system is crucial for the proper execution of successful freight transportation. Also, this alleviates some of the stress but not all of it off the engineer. In some cases there are medical episodes that happen to people and they have no idea it could happen to them. Like having a heart attack, or stroke or seizures. You could be in good health and not know that these medical episodes will occur. The other Major safety concern is, if something were to happen medically to the engineer, there’s needs to be someone in the cab to assist. Now Airplanes from major airlines, are flown with two pilots for these exactly safety reasons. Why should trains carrying thousands of tons of freight being transported across the country be treated any differently? To save a couple dollars for railroad investors?!

Making the trains, a one man crew would leave that only crew member vulnerable to possible attacks or hijackings. This in no way makes me feel confident about the rail system in the United states. If anything, let’s just tell everybody, that we’re gonna remove the safety of transporting these large potential bullet like vehicles across the country. How does this even make sense? When any other vehicles are transporting goods across the country they have to adhere to the safety regulations. If the railroad goes to a one man crew, that would be like lifting a major safety regulation And letting them operate in this manner in my opinion is a disaster waiting to happen. I would not take the chance to even risk loss of life if God forbid something were to happen.
Mary Walton
Please complete the following
Name: Kyle Hickman
Regulation Number: K.A.R. 36-43-1
Comments: I am in favor of a requirement of 2 crew members on every train in the State of Kansas. Safety of crew members and the general public is potentially compromised if only 1 crew member. Mechanical problems or issues with the train need to be addressed and fixed as soon as possible to keep the trains moving and the public crossings open. Thank you

Sent from my iPhone
Please complete the following
Name: Marc Protheroe
Regulation Number: K.A.R. 36-43-1
Comments: I send my Support for a minimum of 2-man crews for all railroads on every train operating within the state of Kansas. I have worked nearly a decade as a Locomotive Engineer for BNSF Railway and know that it is essential to safety and well-being for the State of Kansas and it’s residents that all Railroads should be required to have a minimum of 2-man crews consisting of 1-Locomotive Engineer and 1-Conductor on every train in the cab of the locomotive.

Very respectfully,

Marc Protheroe

Cell: [Redacted]
Email: [Redacted]
To whom it may concern,

I’ve been a railroader (conductor) for 27 years and currently a resident in Kansas and going to 1 man crews (engineer only) is a horrible idea and dangerous road to travel. I’ve work in over a dozen states in the country for a class 1 railroad not to mention I’ve also been a dispatcher. Everywhere I’ve work there has consistently been fatigue issues that the railroads just can’t seem to get a grip on. The class 1 railroads manipulate our RISA so the fatigue issues have never been resolved not to mention the lack of manpower, now less people are working more hours and less rest which is a recipe for disaster. If you watch much news you see almost on a daily basis another train derailment, explosion or collision and this is not a fluke as it’s a result of PSR, fatigue, longer trains etc. In the event of any of these occurrences the conductor is the first – first responder on the scene. Conductors are the first person to lay eyes on the satiation and access what the issues are not to mention communicating to the first responders so they know what they are walking into. In my years of service I have hit cars, pedestrians and I’ve also had an engineer have a heart attack on the train and I was there to render aid to him. I can go on and on about with stories where a conductor was essential. We are also not considering the financial impact on all these people that will lose careers. Argentine yard is 13th largest rail yard in the country and 1st biggest rail yard in Kansas so the economic blow to the state of Kansas will hurt everyone. For my safety and the safety of fellow railroaders not to mention the cities and towns we travel through please pass 2 man crew it’s a must for safety and even though the railroads will never say this it helps their production, safety records and their pocket books.
Please complete the following
Name: Shad Bremer
Regulation Number: 36-43-1
Comments: I am a locomotive engineer for Union Pacific working out of Herington, Kansas. This regulation is common sense regulation for the safety of all Kansans. We have seen a massive increase of train size over the past several years to the point that we are now running trains that stretch up to 3 miles long and some weigh over 20,000 tons. To allow for a single employee to operate trains of that size, or any size for that matter, while traveling over public crossings and through towns, is reckless. Having the second set of eyes and ears is imperative. One of the biggest reasons in my mind for having two people on the train is that everything always happens at once. I'm trying to whistle for crossings while watching out for cars or pedestrians, while driving the train constantly thinking about where I'm at right now, what's coming up ahead of me, and where the rear of my train is and what it is doing compared to my head end, and at the same time as all of that I'm trying to listen to what is being said on the radio that could pertain to my train. Also at the same time as all of that the dispatcher may be calling to have us copy a restriction coming up. It's way to much for one person the handle safely by themselves.
Thank you for you time. I strongly recommend that this common sense safety regulation be implemented.
Thank you,
Shad Bremer

Get Outlook for Android
Name: Keith Hernandez
Regulation Number: 36-43-1
Comments: I have been an engineer at BNSF Railway for 13 years now and I can't explain how important this is to me and my family. Having 2 people on a train is not only smart but safe. I have had countless nights and days that I have relied on my coworker (conductor) to help us move the freight across our territory. There are times where I am absolutely exhausted from going to work every 10 hours along with being a father and husband at home and taking care of my duties at the house. I find myself getting about 4 to 6 hrs. of sleep and having to be back at work to provide for my family. The safety reason also has a huge role in this. We ship and haul very valuable merchandise that not only fills the store with good but also things that like we say at work go BOOM! We haul through big cities and small towns that have populations that rely on those people of that city. Family and children that have no say in what goes on in this world or who's life may be cut short cause we have train that derailed and wipes out a city. All I ask for is that I'm given the opportunity to have a conductor sitting next to me while we move america's freight. Thank you for your time have a great day and I hope that you think about the people of this country.
From: [Redacted]
To: Emily Brown [KDOT]
Subject: Comments on Kansas Department of Transportation proposed regulations for 07-17-2023 public hearing.
Date: Wednesday, July 12, 2023 6:49:24 PM

EXTERNAL: This email originated from outside of the organization. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

Please complete the following
Name: Sam Vail
Regulation Number: 35-43-1
Comments: I am a locomotive engineer and consider having a conductor in the cab with me invaluable. Being able to communicate safely concerns and other restrictions with them keeps the public safe beyond measure.

Please Vote in favor of this legislation.

Sent from my iPhone
EXTERNAL: This email originated from outside of the organization. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

Please complete the following
Name: Andrew Chandler
Regulation Number: 36-43-1
Comments: The Railroad always preaches SAFETY. 1 man crew is NOT safe. From the outside looking in, it may seem like no big deal. But im a conductor a qualified class 1 engineer. If a train breaks or has problems my boots hit the ground to go fix the problem. What if its YOUR loved one whose life is lost because the train breaks on a crossing with only 1 man crew so medical care has to go the long way!? What about the engineer? What if he/she has a medical emergency!? By the time someone found out and got the..it would be too late. Its not about safety at all..its about money.

Sent from my iPhone
From: Emily Brown [KDOT]
To: [Redacted]
Subject: Comments on Kansas Department of Transportation proposed regulations for 07-17-2023 public hearing.
Date: Wednesday, July 12, 2023 10:33:56 AM

EXTERNAL: This email originated from outside of the organization. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

Please complete the following
Name: Rachel Pharris
Regulation Number: 36-43-1Crew Requirements
Comments:
Having two crewman on the engine is not only crucial for their safety, it is crucial for the safety of the community. Medical emergencies happen and when trains run through the middle of no where the engineer/conductor need another person to be there to aid in emergencies. These situations have happened where one crewman saved the life of the other. It will continue to happen.
It is also crucial in the safety of the community. If there is a derailment and only on crew member is manning the train they cannot leave the engine to fix the problem. This can lead to long waits for a response. This leads to towns having blocked crossings for long periods of time. This leads to emergency personnel not being able to access crossings.
When trains hit cars or people typically the conductor can leave the engine to aid in first aid while the engineer contacts authorities. Increasing the chance of the car/person being hit getting immediate first aid. In the case of one crewman they cannot leave the engine or give immediate aid.

As a railroad wife I take comfort in knowing my husband has another person with him in case of emergencies. These workers are over worked and fatigued they need another person with them for not only safety reasons but to help keep them awake on trips lasting 12-14 hours.

Rachel Pharris
Please complete the following
Name: David Huff  
Regulation Number: K.A.R. 35-43-1  
Comments: After over twenty years on the railroad I have witnessed many changes. Most recently the cuts to labor and the increase in train size, both in tonnage and length. Two person crews are an absolute necessity especially after these cuts as well as the increase in train size. Train make-ups are now commonly mixed. Paperwork is extensive and railroads are pushing crews onto trains as crew shortages continue. Public safety as well as crew safety is already a low priority for railroads. That second person is the extra set of eyes, ears, and knowledge that must be maintained if there is to be any chance of safety across the entire country’s infrastructure.
re: Regulation Number: K.A.R. 36-43-1 - Crew requirements

Ms. Brown,

Thank you for taking a moment to read my comments regard Crew Requirements for K.A.R. 36-43-1.

I am writing in support of a requirement for two person crew on all freight trains in Kansas. Undoubtedly, the railroads will try to make the argument that they’re safer than they’ve ever been. That argument is consistent with currently having at least two fully qualified and properly trained crew members on their trains. In the event of an emergency and there is a sole crew member on board, how does the railroad expect for the train to be secured against additional movement while the sole crew member responds to an emergency situation?

Additionally, due to the unpredictable schedules that the railroads have, the additional properly qualified crew member serves as a backstop for fatigue and other related issues. In any safety sensitive environment such as commercial aviation, there are always at least a crew of two in the cockpit of any aircraft. The aviation industry fully understands this concept.

The price of maintaining the current standard of two is a known quantity. The railroads may make the argument that the additional cost will be passed along to the customer, however these rates are set in two primary ways. One is through the use of a tariff - a public pricing document. The other is through direct negotiations. The current standard of tariffs and direct negotiations has a known set of costs based on currently having two fully qualified crew members in the cab of a locomotive.

As a passenger locomotive engineer, it personally scares me to know that a train that I could potentially have a one person crew on board to deal with the many tasks required to safely and efficiently operate a train.

Respectfully submitted,

Clem Harris
New Mexico State Legislative Board Chairman
Brotherhood of Locomotive Engineers and Trainmen
Please complete the following

Name: James Hoffman

Regulation Number: 36-43-1

Comments: There is nothing more important than safety. Safety comes is numbers, the more eyes and ears you have the better protected we are. From being on call 24/7/365 with very few hours of and very long tours of duty. This is a no brainer for the State of Kansas and its constituents safety. We need 2 persons in the Cab of all locomotives.

Sent from my Verizon, Samsung Galaxy smartphone
Get Outlook for Android
Please complete the following
Name: Brandon Nunnenkamp
Regulation Number: 43-36-1
Comments:
I am a locomotive engineer on the BNSF railway for over 25 years. The safety factor of having a certified locomotive engineer and a certified conductor on every train is not measurable by any numbers. Not only for the safety of the crews that work for the RR’s but the safety of the residents of Kansas. I have been involved in 6 crossing accidents and in every case having 2 people working as a team to direct emergency personnel to the exact crossing, which side to access from, cutting the train in 2 pieces for full access to the victims if needed and the severity of the situation. Then a part that is never talked about is the ability for the 2 crew members involved to rely on each other for support, to talk through the accident and be a listener for the other if needed. The ability to fix cars, set out bad cars, inspect their train for defects and inspect passing trains for defects also requires 2 people on the train. If any of these things occur and there is only 1 person the train the RR stops, supply chain backups occur, crew run out of hours they can work creating crew/manpower shortages because new crews need to be put on the train.
In cab communication is something the RR pushes and says creates a safer work place and we all 100% agree. By having 2 persons in the cab we double check each other on what signals we see in the field, work gangs fixing the rail, speed restrictions and possible trespassers. They say there are no numbers that state 2 person crews are safer than 1 but I disagree. I say that every train that makes it across Kansas without incident with 2 person crews supports that scenario. They don’t keep stats on when the conductor says don’t forget to slow down up ahead to prevent a possible derailment or the engineer tells the conductor a hazmat car is out of place before leaving on the trip.. No one keeps stats on comments made between crew members that saved a possible accident.
Sent from Mail for Windows
Please complete the following
Name: Timothy Pool
Regulation Number: 07-17-2023
Comments: Being a railroad engineer I support 2 person crews. Thank you.

Sent from my iPhone
Please complete the following
Name: Chris Walton
Regulation Number: 36-43-1
Comments: Minimum crew requirements for railcar operators should be no lower then 2. With the difficulties, amount of proper training, and the sheer amount of multitasking that comes with operating a locomotive. There should never be any less then 2 persons operating a railcar at anytime. There are 2 operators for a reason. What would happen if there was some sort of situation on board? What if the locomotive needed to be stopped quickly? What if there was some sort of mechanical fault that a requires 2 people to safely execute a procedure? There are many what-ifs, but the problem is, you never know what will happen until it happens. 2 crew members are there to make sure each other stay in check and doing procedures by the book, safely and efficiently. The problem with 1 crew member, when there becomes a situation and the human factor kicks in, not knowing what to do next, panicking, etc. 1 crew member can possibly handle all of the tasks but maybe not safely and procedurally especially if there is an emergency. I can go on and on about this topic but hopefully this has opened eyes and persuasive enough. Thank you
Please complete the following
Name: Kathryn Ortiz
Regulation Number: 36-43-1
Comments: A two person crew should be required for various reasons. The most important reason is to help one another, in multiple ways. First example if one person on that crew does not feel well, and passes out someone needs to be with them to help them. Many reasons could cause someone to pass out. Heat is a big one or low blood sugar or high blood sugar, lack of water as well. Another reason is what happens when something goes wrong they could work together. The old saying two brains are better than one. Another reason is it definitely helps mental health working with someone can help combat mental health issues.
Please complete the following
Name: Joshua Silvia
Regulation Number: 36-43-1
Comments:
Hello, I currently work as a locomotive engineer and I am based out of Kansas City. I have worked in the railroad industry for twenty years. Ten of those years as a locomotive engineer, nine years in three separate management roles, and one year as a conductor. I left management five years ago, and have been once again a locomotive engineer for the last five years.

This is why two people in the cab of a locomotive is essential. I like to look at this as an equation. The conductor, engineer, are coefficients, and they always have been. They are always in place to determine the constant when weighed against the variables. The every day life, and everything beyond two crew members is a variable. Train length, train makeup, trackside obstacles such as work groups, pedestrians, automobiles, onboard technology, and failed grade crossing safety devices are all variables.

Positive train control is also a variable. It becomes a variable because it does not always work as intended, and what electronic device does? Our main field fix for Positive train control is to shut down the computer system, wait, and turn it back on with the hopes all is well. I will agree the Positive Train Control is fairly reliable, but when it isn’t the show will go on. What I mean by that is in this situation the dispatcher will give the crew the initials of a higher ranking supervisor and instruct the crew to proceed without Positive Train Control. Now we are proceeding without track flags, which mark the location of disturbed track, because they were deemed unnecessary.

It is impossible to quantify how many accidents or incidents having two members in the cab has prevented. We don’t have those numbers because the two crew members overcame the variables for a favorable outcome. Having two people in the cab of a locomotive is essential because if we eliminate one crew member we are eliminating one of the coefficients in the equation, and relying on a single person to take on the awareness, and ability to act quickly and decisively that was once shared between two people. That math does not work.
Shelly M Harrington
Regulation Number: KAR 36-43-1

The fact that we’re even discussing one man crews is incredibly concerning. Safety of railroad employees is obviously not a concern for those wanting to impose this new rule. I’m sure with enough thought I could come up with +30 reasons this is absolutely asinine. Let’s focus on the obvious.

What if the engineer has a myocardial infarction? (Heart attack) sure the train will go into suppression, and it will stop. But the engineer will be deceased upon first responder arrival. If his conductor (me) were on that engine, I would be able to administer BLS (CPR) and administer crushed aspirin sublingual (under the tongue) and save his/her life. Being a nurse and the second individual of a 2 person crew gives me an opportunity to use my skills. I believe all crew members should possess certification of BLS (CPR) for instances just like this.

How about when a train breaks in half? Kansas already doesn’t give a crap about train lengths. We’re dragging 18,000’ trains daily. This is also asinine. Do you mean to tell me, that an engineer can safely stop the train, assess the issue, call for help and WAIT an unknown amount of time for a ground conductor to fix the problem? And not melt down the entire subdivision? That’s laughable at best.

What about areas that a ground conductor can’t get to? Are you gonging to helicopter drop them to these trains? Again, laughable at best.

I really hope you take into consideration these points and dozens of others that I’m sure have been brought to your attention. THIS IS A RECIPE FOR DISASTER AND UNBELIEVABLY DANGEROUS. Stop with the one man crews. It’s not good for ANYONE involved.

Shelly Harrington
Emily,

My name is Clint Kniep and I am a locomotive engineer for BNSF Railway in KCK. I’m writing in hopes of encouraging the passage of the 2-person train crew bill. This is all about safety, for the public as well as the train crews. Two people will always be better than one when it comes to emergency situations…..here is an example….. I become incapacitated while at the controls of the train….maybe a heart attack…the train will stop itself as we know…but who’s gonna help/save me if I am the only one in the cab?? It’s a lot to think about for sure. Thank you for your time.

Sincerely

C.E. Kniep

Sent from my iPhone
My name is Brandon Nunnenkamp I am a locomotive engineer of 25+ years on the BNSF RR out of Kansas city Kansas. I operate trains between Argentine Yard in KCK and Wellington Ks via the BNSF Transcon. I also represent the Brotherhood of Locomotive Engineers (BLET) in the state of Kansas and we support K.A.R 36-43-1 and the requirement of 2 person crews on trains operating in Kansas.

I want to discuss a different aspect of why 2 person crews should be required and are needed, and that's what happens inside the cab. This picture I submitted was taken by me on one of my recent trips. This train was nearly 3 miles long and had locomotives on the front, in the middle of the train( nearly 1 1/2 miles away) and on the rear of the train, nearly 3 miles away.

As you can see my control stand to my left has my throttle, brakes, train horn which is blown nat nearly 400 public crossings between Kansas City and Wellington Kansas.

The screen to the top left is the PTC (positive train control) screen. This tells me upcoming speed restrictions, signals and anything else that might affect my train within 6 miles.

The screen in the middle has 3 columns. The left column displays my lead locomotives and what they are doing. The center column displays the locomotives in the middle and what they are doing. The column on the right displays the locomotives on the rear of the train and what they are doing. This screen also allows me to control the locomotives in synchronous mode (all locomotives mirror the led locomotive) or in independent mode (each locomotive operates independently according to my selection) depending on terrain.

The screen on the right is currently displaying the Distributive Power (DP) screen.
It will show any faults occurring and also the air brake information of the trailing locomotives. This screen will also display the Trip optimizer screen when selected. Trip optimizer is the RR's fuel saving program and displays what they believe is the appropriate speeds for maximum fuel savings.

Then there is the RR issued iPad to the far right. This has all of our operating rules, train list, hazmat info in addition to my general track bulletins which show all current restrictions I will encounter throughout the trip.

Once our trip starts we have to continually make sure the Ipad, PTC, trip optimizer screens and their restrictions all match. The locomotives are operating properly and according to the RR'S fuel saving program. We are also tasked with reviewing and accepting new and expired restrictions taking down information from dispatchers, work groups we are approaching or any other info that is given to us.

Finally I want everyone to notice the limited view from the engineer's side of the cab. The safety factor of having the conductor with their full visibility out of both windows to alert engineers of anything taking place outside of our view.
Brandon Nunnenkamp
Chairman
BLET Kansas Legislative Board
Travis Bastien  
K.A.R. 36-43-1  
Hello Emily, my name is Travis Bastien and I would like to comment on the K.A.R. 36-43-1 Regulation.  
I have been a conductor on a Class 1 railroad for more than 20 years and as resident of Kansas. I think it is of utmost importance that the State of Kansas should have a two person crew on a train. As a member of a two person train crew my engineer and I have to make sure that we monitor the train as we ply the rails through Kansas. We make sure we are alert to the dangers and how unforgiving the consequences can be if there is any trespassers that we could encounter along the right of way of the railroad. Unfortunately twice in my career I have stuck a trespasser that resulted in two deaths, in both situations I had to make the long sad trek back to see the deceased. With a one person crew the engineer might have missed the trespasser. The result may of been the same but with one person at the controls and the other checking on the victim there is still a possibility of rendering aid to the injured individual.  
I have been very fortunate that I have never experienced a derailment that could have resulted in a hazardous material release. The railroad I work for handles a lot of hazardous materials though Kansas and we do it safely. A two person crew can help prevent derailments and catastrophic accidents because of the training and experience we have. If the cars in the East Palestine, Ohio train derailment were set out of the train after a wayside detector had notified the train crew, the outcome would of been a lot different and the town wouldn’t of made the news. I would not wish the outcome of the accident that happened to East Palestine to happen in any community in Kansas. As a proud train conductor I take pride in the job I do to make sure the communities we run though in Kansas stay safe.  
I hope you will consider supporting K.A.R. 36-43-1 to keep two person crews in Kansas.  
Thank you for your time,  
Travis Bastien  

Sent from my iPad
Esteemed Kansas Lawmakers;
Please consider my support for K.A.R. 36-43-1 – Crew requirements. My spouse is a Railroad Engineer and Conductor who works through Kansas. His job is very dangerous and I appreciate your efforts to keep him and others safe by mandating 2 person crews in the state. The folks who work on trains are always on call and work very hard to move freight safely and efficiently. If you've ever had to drive while tired, you know how valuable a second person in the cab can be. There are also multiple sets intricate safety rules and it takes two heads working together to make safe decisions. Considering that train engineers are driving vehicles that can be a mile in length and carry the most hazardous materials throughout the country, its clearly vital to protect these safety conditions.
Thank you again for your careful consideration of the safety of both railroaders and the communities they work in.
Sincerely,
Elizabeth Walker
Good afternoon,

Attached is my comment on the proposed regulation K.A.R. 36-43-1.

Please let me know if you have any questions.

Thanks,

Senator Dinah Sykes
Emily Brown, KDOT
July 13, 2023

Counsellor,

Many years ago, while part of the BNSFRR, I was part of the field support, design, and repair team improving automated testing for EOT devices and their head end counterparts (vernacularly known as Fred and Mary). By the time I came onto the scene, these devices had long eliminated most of the brakemen and cabooses from American trains (though there were still a few exceptions at that time; long gone now). As controversial as that was, our job was to make the system as safe as possible. To this day, I still think there is room for argument for the return of three person crews in some circumstances. However, there is no way the railroad companies are going back to paying three salaries per moving train instead of two.

Today, I am abhorrently aware that in the name of profit, the industry salivates at the idea of one person crews, or even Zero person crews, replaced by automation. It’s on the horizon, and I believe Kansas can at least make our state insulated for years to come by implementing this regulation. For the relatively small service affecting impact this will have now, it can have huge effect tomorrow.

My children and family live here. I live here, in rural Kansas. No one should be killed in an accident, brought forth in the name of profit, ever, under any circumstances. They already went that far, but no further. The line must be drawn here!

I wish to record my strong support for this action.

Sincerely,
Lassey Murphy
Emily,

Please find our public comments, and I would like to request time to present our views orally.

We are also sending out an email action to families across the state to submit their names to your office as supporters.

--

Ty Dragoo
SMART Kansas Legislative Board
Kansas Legislative Director & Chairman
523 SW VanBuren Suite 100
Topeka, Kansas 66603
Phone 785.817.9607
Fax 785.286.7521
Email ty@smartks.org
To whom it may concern,

I am writing today to express my strong support for the proposed permanent regulation, K.A.R. 36-43-1, requiring a minimum of two individuals on trains in Kansas. This regulation is crucial to safety, and considering the increase of recent train derailments in the state, including those transporting hazardous materials, it would be irresponsible and downright immoral to reduce current safety precautions in any way.

Furthermore, train accidents and crossing accidents are unfortunate incidents that do occur and with a required minimum crew size, these trained professionals can take swift action to address any issues, minimizing inconvenience to the public and enhancing the overall efficiency of our transportation system.

Our rail system is such an integral part of our infrastructure and railroad workers play a crucial role in ensuring safety not only to their fellow workers but to the community. Listen to the dedicated railway workers and stand up for their rights and safety by making K.A.R. 36-43-1 a permanent regulation.

Kristina Davis
Good Afternoon,

My name is Chris Sheble, I’m a Locomotive Engineer for BNSF Railway out of Kansas City Missouri. I’ve been a railroader for a decade now, hiring out in 2013. I’m writing in regards to Kansas’ two person crew legislation, or rather, in support of it. I’ll try to keep my comments quick and concise. The notice of public hearing states two important things is like to bring attention to. Firstly, that this Legislation would not impose anymore labor costs on railroads than they already incur. Meaning, it costs them no additional money to provide a safer work environment for railroaders, the company itself, and the public at large. And with trains being built bigger and bigger, and block more crossings, the public nuisance this creates can have dire affects on public safety itself. In accidents, response time is critical. As an engineer, by federal regulation, I’m not allowed to leave the control stand of a locomotive unattended. Having a conductor on board allows incidents and delays to be expedited in a manor that puts safety first. If not, I would have to report an incident, then the railroad would have to send someone out to my location. We have no idea how long that would take. Having been involved in a collision with a car in May of this year, I can tell you that having two people in the cab made a world of difference with being able to relay information between ourselves, first responders, and the railroad. Thankfully, no fatalities occurred. This is just one example. This isn’t something that affects bigger cities either. Smaller towns would be impacted in an exponentially greater manner.

Secondly, I would like to make the point that railroads seeking one person crews are doing so for the sole purpose of cutting labor costs. We saw what happened during the pandemic. They cut a third of their workforce and couldn’t keep up with the demand when the economy opened back up. As it currently stands, the railroads sole motive is profits and they see labor as their main cost to maintain their record profits, not investing in customer service and growth with new business.

I admit that I am biased as a locomotive engineer and union employee. But that doesn’t mean that I cannot see the impact of removing the one person in the cab that is and should be seen as a first responder. The conductor is a critical component in the way the railroad functions and responses to delays and incidents. I hope this sheds some light on the issues currently surrounding two people in the cab of a locomotive. If there are any questions about my email, do not hesitate to respond. I’m always open to discussing these issues.

Thank you,
Chris Sheble

Sent from my iPhone
I am writing this letter to express my strong support for the proposed permanent regulation, K.A.R. 36-43-1, requiring a minimum of two individuals on trains in Kansas. This regulation is crucial for the safety and well-being of our communities, especially when it comes to trains transporting dangerous hazardous materials (Haz-mat) across the state.

Train accidents and crossing accidents are unfortunate incidents that do occur, leading to delays, disruptions, and, in some cases, emergencies requiring immediate attention. With a minimum crew size, these trained professionals can take swift action to address any issues, minimizing inconvenience to the public and enhancing the overall efficiency of our transportation system.

Furthermore, the presence of first responders, such as train crew members, at accidents involving trains and crossings is essential. Their expertise and familiarity with the train's cargo (especially Haz-mat) enable them to provide critical assistance to first responders. The collaboration between these professionals can ensure a well-coordinated response, leading to improved outcomes in terms of mitigating risks, providing timely medical attention, and securing the affected area.

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Thank you for considering my input and for your commitment to ensuring the safety of our communities.

Sincerely,
Nathan Griffin
To Whom it may Concern,

I am writing this letter to express my strong support for the proposed permanent regulation, K.A.R. 36-43-1, requiring a minimum of two individuals on trains in Kansas. This regulation is crucial for the safety and well-being of our communities, especially when it comes to trains transporting dangerous hazardous materials (Haz-mat) across the state.

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Thank you for considering my input and for your commitment to ensuring the safety of our communities.

Sincerely,

Elspeth Haire
It is my understanding that management is attempting to run trains with only one crew member. I come from a railroad family of two generations and heartily oppose this concept. The length of current trains is such that I support retaining a two person crew for safety considerations, not only for the workers but for the communities that trains pass through.
EXTERNAL: This email originated from outside of the organization. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

Hello,

I am writing this to express my deep concern at the possibility of making reductions in the number of required crew members to operate freight trains in Kansas.

Giving the idea of reducing the number of required crew members on trains in Kansas any breath is frightening and reckless. I have one question for anyone reading this letter, you would not get on a Boeing 777 without a minimum of a pilot and first officer to safely get you to your destination, right? Why would you permit trains to operate with just a “pilot” when they weigh so much more and can cause so much havoc if mistakes are made by overworked and tired crew members? You would never get on a plane with just a tired, overworked pilot so don’t ask our trains and crews to operate in similar conditions!

Thanks,

Michael Armstrong

--

Thanks,

Michael Armstrong
Would you fly on a commercial plane without a co-pilot. Am guessing not. Would you want to live in the flight path of airlines with 1-man crews? Am guessing not. My grandfather, his 3 sons and some of their sons were all railroad men. Most of these men died suddenly of massive heart attacks. Fortunately none was at work on a train at the time. Had they been at work and "driving" a train as a single crew member, it would have resulted in catastrophic loss, not only for the train, but any other "innocent bystanders", as well as possibly horrific environmental damage depending on the cargo of the train. The notion of a one-man train crew is insanity and driven purely by greed.

Roxanne Mettenburg
It’s all about the almighty dollar with corporate America. I am not understanding how a one person crew would REDUCE accidents?? The rail companies preach safety and now want to have one person man the train? Please ask any railroad employee about reduced accidents and let me know what the actual truth is from the people on the front line. This is very scary for anyone working the rail system. OSHA better be ready if this is passed!

What a sad world when we value the dollar over lives.

Sent from my iPhone
I support keeping 2 person railroad crews.

Anna Wilhelm
Please make K.A.R. 36-43-1 permanent to have a two person crew. Airplanes have a pilot and co-pilot. This is for the employees safety and all our citizen's safety.

Recently, there have been several disastrous situations/accidents mainly out east and reducing employees just sounds dangerous. Trains carry toxic materials and incase of an accident, who better than a 2 person crew to respond and keep all safe. There is a new series on CBS TV about a California fire crew that also uses inmates for help in mainly wildfires there, but I remember vividly an episode with a "train accident" and the havoc on the community in the "show", but I'm sure this stuff happens.

For thirty years, I've lived north of Topeka by North Hiway 75 and NW 46th Street and on a still night, I can hear the trains by Good Year at night and it is kind of a smooth "hum" that the trains are running and all is safe. Lets keep it safe!

Thank you for considering my input and for your commitment to ensuring the safety of our communities.

Christine Huntsman
I am concerned about the welfare and safety of individuals who work on or with railroads--as well as the safety of towns and residences that are near railroad tracks. Kansas needs to act and assure citizens in and visiting the state are safe while on the trains or being in their vicinity. Safety must be a priority--for employees and their incomes as well as Kansans in general.

--

JoLene Rae Bloom, Retired English Educator, Nemaha County Democratic Chair, Kansas Democratic Caucus of County Chairs, Treasurer
Land line with recorder: [redacted] Cell for texting: [redacted]
Railroad systems are an essential part of transportation in the US. Many, if not all, railroad companies seem to be putting a higher and higher priority on profits over the safety of both crew and passengers, depending on the type of transportation (products versus passengers) being provided. Any action by railroads to further compromise worker safety (or passenger safety or infrastructure integrity) needs to be stopped by state and federal agencies. I encourage Kansas entities related to railroad safety to stand up for the safety and rights of the workers and halt the current effort by railroad companies to enhance their own bottom line.

Thank you for your efforts on this issue.

Sandy Sanders
Dear Emily,

It’s imperative that trains operate with a MINIMUM of 2 certified crew members. Our trains are long, experience frequent delays across the state, and the workforce is middle aged men with limited access to healthcare (per recent federal level regulations).

Kansas community train tragedies are preventable, by ensuring proper workplace safety with appropriate staffing levels.

- Melinda Lavon, living next to a tight curve on a BNSF line, have to cross UP lines frequently.
Dear Ms. Brown: Thank you for your commitment to ensuring the safety of our communities. I am writing to express my strong support for the proposed permanent regulation K.A.R. 36-43-1, requiring a minimum of two individuals on trains in Kansas.

This regulation is crucial for the safety and well-being of our communities, especially when it comes to trains transporting dangerous hazardous materials (Haz-mat) across the state.

Implementing K.A.R. 36-43-1, is crucial to enhancing community safety. By having at least two individuals on trains, we can better address hazards associated with the transportation of dangerous hazardous materials and respond more effectively to train and crossing accidents. It is also essential to have first responders, such as train crew members, at accidents involving trains and crossings. Their expertise and familiarity with the train's cargo (especially Haz-mat) enable them to provide critical assistance to first responders.

This regulation not only safeguards Kansas citizens but also strengthens the resilience of our transportation infrastructure.

Thank you for considering my input.
Christina Miller
Dear KDOT:

I am writing this letter to express my strong support for the proposed permanent regulation, K.A.R. 36-43-1, requiring a minimum of two individuals on trains in Kansas. This regulation is crucial for the safety and well-being of our communities, especially when it comes to trains transporting dangerous hazardous materials (Haz-mat) across the state.

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Sincerely,

George King
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Sincerely,

Drew Couch
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Sincerely,

Danny Shanno
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Sincerely,

Nathan Huffman
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Sincerely,

JAMES CROSBY
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Sincerely,

Chad Shibe
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James Sauerwein
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Brad Calovich
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Adam Parsons
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Richard Davis
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Steven Mallon
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Sincerely,

Buddy Rasnic
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Roger Barr
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Bhaskar DasGupta
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Kathryn Waters
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Sincerely,

Michelle Connealy
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LINCOLN MEYERKORTH
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samuel habjan
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Sincerely,

Meldon Battin
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Justin Henderson
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Keel Middleton
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Chelsea Smotherman
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Joshua Willard
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Pat McCurdy
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Sincerely,

Mike Scheerer
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Roni Schwartz
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Kenzie Singleton
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Susan Elkins
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Lucille Barish

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Jason "Carter" Kline
EXTERNAL: This email originated from outside of the organization. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

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Sincerely,

Derek Alexander
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Paula Mallon
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Benjamin Poersch
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Sam Vail
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Edward H. Sewell, II
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Cyndi Clough
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melissa Armstrong
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Sincerely,

David Kish
From: [Redacted] on behalf of [Redacted]
To: Emily Brown [KDOT]
Subject: Support for Proposed Permanent Regulation K.A.R. 36-43-1
Date: Wednesday, July 12, 2023 9:50:20 PM

EXTERNAL: This email originated from outside of the organization. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

Dear [Redacted] KDOT:

I am writing this letter to express my strong support for the proposed permanent regulation, K.A.R. 36-43-1, requiring a minimum of two individuals on trains in Kansas. This regulation is crucial for the safety and well-being of our communities, especially when it comes to trains transporting dangerous hazardous materials (Haz-mat) across the state.

Train accidents and crossing accidents are unfortunate incidents that do occur, leading to delays, disruptions, and, in some cases, emergencies requiring immediate attention. With a minimum crew size, these trained professionals can take swift action to address any issues, minimizing inconvenience to the public and enhancing the overall efficiency of our transportation system.

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In conclusion, implementing the proposed permanent regulation, K.A.R. 36-43-1, is crucial to enhancing community safety. By having at least two individuals on trains, we can better address hazards associated with the transportation of dangerous hazardous materials and respond more effectively to train and crossing accidents. This regulation not only safeguards Kansas citizens but also strengthens the resilience of our transportation infrastructure.

Thank you for considering my input and for your commitment to ensuring the safety of our communities.

Sincerely,

Leigh Barrett

[Redacted]
Dear KDOT:

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Shawn McMahon
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David Claflin
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Stanley Siglinger
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Russell Pataky
Dear Emily Brown [KDOT]:

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Justin Newbanks
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Jessica Dragoo
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Michael Turner
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Richard Hensley
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Tom Kirkland
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Scott Dunbar
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Anna Dresner
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Tana Mossman
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John Estes
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Joann House
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Dana Dike
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Valetta Seymour
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Robbin Dunbar
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Linda Murphy
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Dennis Blevins
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JONATHAN NEWMAN
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Joe Lopez
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Thank you for considering my input and for your commitment to ensuring the safety of our communities.

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Janet Carpenter
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Jeffrey Anderson
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Sincerely,

Trevor Stevenson
EXTERNAL: This email originated from outside of the organization. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

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Furthermore, the presence of first responders, such as train crew members, at accidents involving trains and crossings is essential. Their expertise and familiarity with the train's cargo (especially Haz-mat) enable them to provide critical assistance to first responders. The collaboration between these professionals can ensure a well-coordinated response, leading to improved outcomes in terms of mitigating risks, providing timely medical attention, and securing the affected area.

In conclusion, implementing the proposed permanent regulation, K.A.R. 36-43-1, is crucial to enhancing community safety. By having at least two individuals on trains, we can better address hazards associated with the transportation of dangerous hazardous materials and respond more effectively to train and crossing accidents. This regulation not only safeguards Kansas citizens but also strengthens the resilience of our transportation infrastructure.

Thank you for considering my input and for your commitment to ensuring the safety of our communities.

Sincerely,

Joe Lopez
Regarding KAR 36-43-1, I am in agreement with the 2 person crew size. I have been a locomotive engineer for 19 years. The other person in the cab of the locomotive has caught my mistakes. Some of these avoided mistakes could have taken out some of our communities. Thankfully I had another set of eyes helping me run the trains carrying some real nasty HAZMAT and they called my attention to my possible mistake. One instance occurred near Paola Ks and because the other crew member doubted what I perceived we took the safest course and stopped our train with an emergency application of the train’s brakes. We stopped 15 feet short of passing a signal. Had we passed the signal without authority, we would have collided lead engine on lead engine with another train. Had the other crew member not been there that day, I would have been killed and there would have been a HAZMAT incident involving 2 trains and the community in which I have lived. The safety records businesses brag about are because the rules we are required to follow are written in blood. The safest course rule is the first rule in the GCOR General Code of Operating Rules. The 2 crew members in the cab of the locomotive work as an integrated system for the safe movement of freight of all kinds. Without the other crew member in the cab, my life would have been forfeit many times over the last 19 years. The new technology only goes so far and is programmed by another human who is just as capable of making an error. A computer cannot replace the extra eyes and logic another crew member brings to table. The job is hard enough with the lack of a sleep schedule. To take away the other crew member is inviting disaster. Thank you for your time and devotion to safety.

Respectfully,
Roger Huggins
Sent from Mail for Windows
Ms. Brown,

I am writing to express my opinion that two-person crews on trains should be the minimal safety practice.

Trains travel 24 hours a day, through long isolated expanses as well as congested towns and cities. Having at least 2 crew members will increase the safety involved in: staying awake, staying alert, troubleshooting, and responding to quick decision-making or actual emergencies.

I'm aware that cutting crew member numbers can save the railroads money in this time of high costs and tight labor markets. I'm also aware that more and more machines are being run autonomously. Cutting costs should not mean cutting safety; and self-driving machines have not yet proven accident-proof.

Safety of the crew as well as of the citizens around the railroad right-of-way is better served with at least 2 crew members on each train.

Thank you for your attention to this matter.

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If you have integrity, nothing else matters. If you don't have integrity, nothing else matters........Senator Alan Simpson
Our railroads are a vital part of our transportation network not only in Kansas but throughout our nation. Over the decades we have grown to depend more on their service and computers and technology have allowed railroads to be more efficient by carrying larger loads. Progress has allowed train crews to be reduced to only two railroad workers which is a number which should not be reduced further. Covid convinced us that our internal supply chain is not only vital to all of us but can also be fragile. Let's maintain the safety of our railroads for our railroad workers, communities that railroads pass through each day, and our supply chain. Keep two railroad workers per train as a minimum.

--

Joe Kennedy
I must admit I have never worked on railroad specifically. My past experience in construction tells me, however, that any number of unexpected situations can arise which call for two people. In a situation where no help is immediately available, stretching or out right ignoring safety regulations may become a requirement. It may become necessary to move forward or actually protect others from harm.

Please keep this valuable investment by the railroad companies protected by keeping work teams at a minimum of two people.

Sent from my iPhone
This bill is vital for the safety of the residents of the state of Kansas. The train crews are overworked and fatigued and expecting one person to be responsible for over 3 miles of train is insane. As a railroad employee I have seen first hand the results of the lack of preventative maintenance not only to the track but the cars and engines. We MUST hold the railroads accountable for their greedy business model and do everything we can to protect the citizens of the great state of Kansas. We do not want to end up with a tragic accident that will affect this great state and the residents of it for years to come.

The railroads say that they need a 1 person crew to stay competitive but take a look at the financial reports and ask yourself if they are struggling to stay competitive or are they being greedy and wanting to further increase the record setting profits they have been making.

Kind regards,

James Hobbs
Locomotive Engineer
Emily,

My name is Shawn Glore and I am a conductor for Union Pacific railroad. Regarding K.A.R. 36-43-1, as a conductor, we ARE the first responders to an accident. The railroads would have you believe that there are safe and efficient ways to use just one man in the cab of a locomotive. This is completely false. If there is ever an accident or derailment, the conductor is the only “body” available to investigate. The first thing I do when there is an emergency brake application, a rail defect, or crossing collision is get on the ground to check out the situation. The engineer is not allowed to leave the control stand.

The new plans that the company has about truck based conductors is laughable at best. Just from personal experience, the Hiawatha branch which runs basically from St Joseph mo, to Marysville ks, is pretty much in accessible with a vehicle. You can get to a train at crossings only for the most part. It has been my experience that when things go wrong, it does not happen conveniently at a crossing. The only way in and out of these locations is to walk. A conductors react time would be dramatically less than someone coming from miles away in a vehicle. It’s common sense.

The railroads are looking to cut cost to make their shareholders happy and do not care about the employees or the public. Everything has a dollar amount out here. Is there a dollar amount on public safety? I don’t think so, but theses large railroads do.

Thank you

Shawn Glore
Sent from my iPhone
I have nothing to do with public safety, I am in construction. But I want to help. The rail system is a direct transport lifeline for our country. In my opinion it has the least concern by department of transportation and department of Labor. What can I do to help?

Jeff Spoor
Emily,

I work for a railroad. I would like to touch on a couple of items on 2 man crew size. I have always been told that 4 eyes were better than 2. Secondly, If something were to happen to the single person on the train, It would take a while for the railroad to realize that there is a problem. If something were to happen, the other crew member could radio or even call help which could save the individuals life. The last item that I would like to bring up is putting a single person on a train is it really a safer situation than having 2 crew members or is it Wall Street getting more greedy than they already are. It was my understanding was that having PTC operative on our trains was not to eliminate people, It was added to our trains to enhance safety. Reducing crew size does not make railroading safer. The powers that be are worried about there wallet size

Raymond Marquardt
As a locomotive engineer I believe it the safest route to have two people in the cab. Not only it’s it safer for the community but it’s safer for railroad workers. Thank you
Hi Emily, I am in support for 2 person train crews in Kansas. I currently work for BNSF, made the switch just about a year ago from a class 3 railroad in Southeast Kansas. There were times that I would work by myself and the engineer on the train out ahead of me would work by himself as well. Communication is very important and is fundamental to safety on the railroad. There were times I was allowed to run my train at restricted speed with a track warrant following the train ahead of me. We had some steep grades with curves and our radio communication and communication with dispatchers at times could be nonexistent. The engineer ahead of me most nights, had kidney stones, I have seen the guy laying on the floor in pain, what if he were to pass out while running the train ahead of me, or hit a semi truck at a crossing and derail and get knocked unconscious. That is setting me up for a potential disaster. 99.999% of the time nothing is gonna happen, but if that 0.001% were to happen you are looking at the potential for a serious train collision with possible death and destruction. If you keep the second person aboard, you have an extra set of eyes, an extra way to communicate, someone who might save a life when minutes count and no one else is there.

Thank you for your time and fight.

Darin Grundeman
Sent from my iPhone
Safety safety safety, when there is two people on train it is two pair of eyes focusing on the mission of moving the train across the territory. Also if one of the crew members has a medical issue there is a person on the spot to get medical and render aid.

Sent from my iPad
Emily,

I work as a locomotive engineer for the BNSF railroad, and I would love to see the mandate of two man crews. For me it is a very personal issue and a safety issue...it's very hard to pay attention to everything that is going on inside the cab, and everything else that's going on outside the train as well, such as people, or vehicles near the tracks. We engineers have multiple things that we need to focus on in order to handle the train safely and in accordance with FRA and BNSF rules. Secondly, as a personal issue, I do not feel that as a human being it is a reasonable requirement that one person should spend so much time alone. You potentially could be on a train 12 hours or more, then be expected to go spend time in a hotel for 12-24+ hours, then back on a train for another 12 + hours. Mentally I don't think that it is healthy or enjoyable to be alone all that time. Lastly there are so many rules and train makeup exceptions that there's no possible way that one person should be expected to remember and ensure that all makeup exceptions amd rules are being followed. I think that it is completely unreasonable for the railroads to expect one person to be responsible for so much. I feel that it is also just a money thing for the railroads trying to cut as many jobs as they possibly can, which endangers the safety of the public, the railroads, and myself. Corporate greed has gotten out of control in this country and the fight for two man crews has gone on for far too long, and caused many hardships for all trainmen. The only way for everyone to be saved from the corporate greed is for the government to step in and protect our jobs and mandate two man crews. They have reduced trainman already from five man crews to two man crews, when they did this they agreed to a moratorium that crew size would never be negotiated again. Now, they received a favorable ruling in a federal court from a judge who formerly worked for the law firm which represented BNSF...which I feel like is a conflict of interest and this judge should have never been allowed to decide this crucial decision. If this decision had not been wrongfully granted this wouldn't even be an issue, but since it was made it has wreaked havoc on railroader lives, including recent contract negotiations. Railroads have consistently made billions of dollars in profits on the backs of the train crews, who sacrifice so much time away from their families in order to provide for them. Railroad greed has gotten out of control and needs to be regulated. Please make two man crews mandatory.

Thank you for your consideration

Wesley Nellis
This legislation is a necessity for public safety in our state. The risk involved to the crew and the public would be much greater with one man in the cab. Today’s trains are longer with even more dangerous cargo. The ability to respond to any issue with the train would be greatly inhibited with one crew member.

Daniel E. O’Neil
Brotherhood of Locomotive Engineers & Trainmen
Division 224 Local Chairman

Cell Phone: [redacted]
I am writing you in support of the two man crew bill in your state. Seems unrealistic that this is a thing. The railroads have been making record profits for years. The crews are worked to death terrible hours and mundane schedules. The crews get tired I cannot tell you how many times I woke an engineer up or kept them awake with conversation. The technology fails all the time. How many times have you lost cell phone service? The technology works on the same signal. I am a conductor at CSX and I have been living the lifestyle for 12 years. The railroads know it’s safer with the rule of two. What are we doing next 1 airplane pilot. It’s not safe with one. Two people are twice the eyes ears and experience. Watch the movie unstoppable it’s hollywooded up a bit but based on a true story. I personally work with Mr. Forson and proud to call him a friend. He’s one of the heroes that put his life on the line to stop the unmanned train carrying molten fenol headed for a small town in ohio. Mr. Forson testified before Ohio legislators stating it could happen again (same scenario). As the railroads were testifying it couldn’t. Mr. Forson testified it wasn’t supposed to happen that time. The technology doesn’t work at slow speeds. And it won’t keep you from running into a train ahead of you. Stop the madness please look up east palistine ohio! It’s your job to save people’s life’s. As a conductor I am the first responder in a train car accident. I hope and pray it’s not your family at train crossing needing a first responder and you voted to take me off the train!! Thank you for your time I have no doubt you will do the right thing.
EXTERNAL: This email originated from outside of the organization. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

Please pass the mandatory 2 person crew size on trains. It’s about safety!!
Good morning,

Please vote in favor of 2 persons crews. As a locomotive engineer my task are endless on here and I can’t stay focused on the public safety as I am trying to weed through mandatory directives amongst everything else my job entails. As a person who has hit a car, the accident would have been much worse if there hadn’t been 2 sets of eyes up here. This crew size was 5 and they cut it to 3, we are now 2 man and they are wanting to go to one. Please look at the incident in Palestine Ohio as a reference of how bad a train accident could be. Please consider things I’ve listed as you try and decide.

Thank you,
Brian Layton

Brian Layton
Local Chairman
SMART-Transportation Division

"The Carriers maintain that capital investment and risk are the reasons for profit, not any contributions by labor."
Page 32 of 119, National Carriers Conference Committee statement to Presidential Emergency Board 250, 2022

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Good afternoon,

I am writing on behalf of my husband who is a conductor with BNSF railway stationed in Newton, KS.

These men need 2 person crews period. For safety for themselves, the men they work with, the towns that the trains go through.

If people really knew all the chemicals that trains carried through their small towns they would be screaming "2 person crew" at the top of their lungs.

One man alone can not operate and run a train smoothly or efficiently. Each man has duties specific to their job title and description. This needs to be protected for them.

At the end of the day we all want our husband's, dad's, brothers and family to come home safe after each trip.

Please make this a law in Kansas to keep 2 person crews.

Thank you

Jessica Pickney
Railroad wife of 15 years
I am in favor of legislation supporting 2 person crews on all freight trains. Having worked for the railroad nearly 12 years I can assure you that when it comes to public safety and the safety of all railroaders there is no substitute for having 2 people on freight trains.

Sent from my iPhone
I strongly support 2 person crews in Kansas. As a railroad engineer I have seen a lot of instances that would have been way worse for public safety had I been the only person on the locomotive. I have worked for BNSF railway for 18 years and they preach a lot of safety but when it comes time to spend money on it for the public they skimp every time. This will force their hand.
Russell Zeka

Sent from my iPhone
Hello

My name is Jarrod Hobbs, I have worked for BNSF for the past 17 years as a conductor.

The thing about 2 person crews or multiple person crews that not many people have pointed out is BNSF over the course of my career has had at least 1 sometimes 2 officials or managers in the cab of the leading locomotive anytime the executives were out and about on their officer trains. They do so that all rules are adhered to and safety safety safety. Why should those standards ever change, officer or executives or freight that could potentially harm civilians.

The brass tax is they understand multiple people in the cab is safer, they just don't want to pay for it.

Thank you for your time
Jarrod Hobbs
Absolutely ridiculous!! The safety of not just employees but general public is jeopardized. The railroads complete lack of maintenance with psr only makes 1 man crews even a more ludicrous concept. I’m astounded that this is even being considered given what everyone has seen in congress and the news! Common sense!
Please continue to have 2 person crews. People outside the RR environment, have no understanding the value of having both a conductor and engineer on all trains. Imagine the thought of working 12 hour days, starting at any hour of that day, and staying attentive, safe and efficient all that time. As a practicing engineer for over 20 years, I can tell you that it is quite taxing, and difficult. The value of having a conductor right there with you is immeasurable! He/she is also aware of safety measures we endure and what it takes to deliver trains in safe and timely manner every day.

Thank you,
Michelle Bruggeman
I feel 2 person crews are necessary for the safety of the public.
Brooks Young
Working as a conductor for Bnsf Railway I can not see how anyone could possibly think that less than two people in a cab is safe whatsoever. I have been in countless accidents where I have to get out and go back to see if anyone was hurt or worse!! Trains brake and trains derail and the fact that railroads think a conductor god knows how many miles away in a truck would be quicker is completely ridiculous!! I can guarantee I can get off of a train and go fix a knuckle and continue on before anyone in a truck would show up. You have ethanol trains that go through towns and large cities which are basically a rolling bomb and you only want one person on that train who can't get off to fix it when it brakes?? They are only worried about saving money and filling stockholders pockets by getting rid of another position. Please keep railroad workers safe, cities and communities safe.
I want to show my support to require that railroads continue to have 2 person crews. Lowering the requirement may help with profits, but I believe it is shortsighted in that it does not account for the work conditions of the people on these crews. Being alone increases the potential for error and burnout. Both can decrease the overall safety. Please let me know if additional information is needed.

Thanks!

Kathryn L. Tolle, Ph.D.
Manhattan Mental Health Services, LLC
Licensed Psychologist
She/Her/Hers

***Email is not a secure or timely form of communication and should not be used to contact in case of emergency.***
Two people are needed on every freight train. Any reason to go one man crews is motivated by greed from the carriers. I know this because I am on freight trains hundreds of hours every month. It is not safe to only have one man on a freight train. Not safe for the general public, and not safe for the railroad employees.
Dear Emily Brown,
I’m writing you in support of two person rail crews in Kansas. Would you want your beloved family members, children or friends to get on an airplane with only one pilot? What if he/she had a heart attack? Stroke? Or other medical emergency? Don’t we all take comfort in knowing there’s a pilot as well as a co-pilot in the cockpit helping to ensure a safe flight? The same goes for trains. Many of the freight trains haul dangerous chemicals and are miles long. It doesn’t make sense to have only one individual on a train. What if they have a medical emergency? That would put so many innocent lives at risk, especially if a train carrying hazardous cargo derailed or crashed near a residential area. It only makes sense to support 2 person crews, just like a plane needs a pilot and co-pilot, trains need an engineer and a conductor to ensure not only the safe and efficient transport of cargo and essential goods that keep our country going but also for the safety of millions of people that live and work near railroad tracks. Thank you so much for your time,
Cindy Harrison
(Railroad wife and healthcare professional)

Sent from my iPhone
Dear Ms Brown

I have worked on the Railroad for over 17 years. Of that time I’ve been an Engineer for 12 of those years. I have been and work with conductors everyday of working career. That said, no decision has ever been made with out joint collaboration. It is necessary, I’d say imperative to safe rail operations to have 2 qualified, licensed professionals on all trains operating in our state. This is at its core how trains operate.

2 people are critical for our authority, safety of equipment, and identification of defects found. Also, we work as a team to ensure that all rules of the GCOR, ABTH, our railroads safety rules, General Track bulletins, Track Charts and Timetables, and Train Make Up. This is a volume of information that we need to know and find at any given moment.

The real secret sauce is the years of experience, area knowledge, and constant training on conducting safe rail operations. We are 2 professionals who safeguard the public, rail equipment, the railroads themselves and our own safety. We already have unsafe train length, weight, disintegrating equipment and lack of maintenance on track, bridge and rolling equipment.

If you allow a further disintegration of safety for profit of the railroad, I assure you the next disaster may be in our state. How is that working out for Lac-Megantic or the residents of Ohio. We are team, dont allow moneyed interests to cause the next disaster in OUR state so investors and get more profit. Those investors don't care about Kansas or the people that live here.

Richard Tevis
Bnsf locomotive engineer
BLET 777
Writing to ask you to support the 2 person crew bill for railroad trainmen. K.A.R 36-43-1

It is so important to have 2 people in the cab at all times. What if there is a medical emergency with the person in the cab? The other crew is there to get them help.

If something happens to the train one of the crew members have to get off and walk the train if there is only one person in the cab then they have to wait until emergency personnel gets there. With two in the cab someone could get off and help with anything that needs done before emergency crews get there.

Jodi Wallace
Hi Emily,

I’m reaching out today to offer comment in support of two person crews.

My husband is a railroad engineer and also works as a conductor in Kansas. He will be sending in his own comments from that perspective. I offer mine as a wife and as a citizen concerned for his life as well as those of the community. I can think of many scenarios which would pose a safety concern for both.

Take, for example, simple fatigue. It’s no secret that absent a consistent sleeping schedule, fatigue can be a very real problem. While this issue is really another matter, entirely, it is also applicable here. I believe that it would be exceedingly difficult to maintain a consistent and sustained state of vigilance for upwards of 16 hours at a time absent any other human interaction at all.

Another big concern is quite simply, health of the crew member (would they even be called that anymore? Probably not). But, suppose the sole operator on the engine had a health emergency. How long would it be before anyone would be aware enough to stop the train and send help and assistance? What would this delayed response to a medical emergency cost? Not in terms of a revenue line, but the cost to that operator’s life, the lives of their family, their kids and friends, any resulting detriment to the community they may have been passing through (via blown signals, failure to yield to speed restrictions, resulting derailments, etc.)?

Or, what if that sole operator were to have to walk the train to inspect some coupling a mile back and injure themselves along the way? What then? Should they administer their own first aid, supposing they could even make it back to the engine without assistance?

There are so many different scenarios that run through my mind and not one of them supports a single man or woman on that engine. The fact that we are even entertaining this sort of proposal defies any reason short of corporate greed, because it sure doesn’t appear to support the best interest of anyone else.

Sincerely,

Jessica Barnard

Sent from my iPhone
Good morning.. please reconsider the safety aspect on having just one person in the cab.. I love my job and working with a conductor is the biggest part of that.. Keep two men crews... Please!!
Dear Ms. Brown,

As I have served as an engineer for nearly 25 years, I am fearful learning of the possibility that I could be running a train by myself. Safety is always my number one priority in the cab, and I depend on an extra set of eyes focusing out of the cab's windshield while I operate the locomotive and focus on what's ahead. The engineer has immense responsibility. I can't even tell how many times the conductor has seen someone trying to beat the train before I see them. Such a scenario is a weighted safety issue, which stresses why the more eyes in the cab can do so much more than any technology.

When there is an accident, the conductor can be the first one on the scene and may have to be a first responder. The conductor may have to help the person in the wreck and give first aid until the paramedics arrive. The conductor may have to separate the train so the paramedics can get to the accident scene. If there was no conductor, the first responders may have to drive several miles around the train to get to the accident. That is precious minutes that could be used to help the people in the accident.

There is so much the conductor does in that cab that is not acknowledged by the railroad. This is not only for the safety of the railroad, but for public safety.

Thank you for your time.

Ryan Lautzenhiser
Locomotive Engineer
Kansas City, Ks.

To whom it may concern,

I have recently become aware that the Union Pacific RR in Kansas wants to institute a new 1-man crew rule.

I believe this would set an incredibly dangerous precedent and as the mother of a UP conductor, I cannot imagine the ramifications of such a risky decision should an emergency arise.

Not only is it incredibly dangerous but UP will be opening themselves up to a litany of lawsuits if anything happens to a solo employee. Especially something that could have easily been prevented by maintaining 2-person crews.

I urge you to reconsider and DO NOT put my loved ones life, and the lives of countless others, at risk!

Josie Harrington

Sent from my iPhone
I am a locomotive engineer with 28 of service. I am firmly in support of two person crews. We work on call 24/7 and it is impossible to be completely alert and at the top of your game at all times. A second set of eyes and ears is vital to the safe transport of freight. Please come down on the side of safety and require two people on each and every train.

Thank you,

Brad Grimes
Ms Brown:

I am writing to show my support for K.A.R. 36-43-1, Proposed Permanent Regulation to require a minimum of two-person crews for railroad transports.

Railroad workers bear an enormous responsibility while transporting goods and passengers across our nation. Their jobs involve numerous risks which could impact their ability to respond in an instant and/or overcome challenges to ensure the safe and timely transport of passengers and goods.

We join in with others to support and uphold the rights for our dedicated railroad crews in Kansas communities. This will ensure our railroad transportation is staffed to ensure transports, whether persons or goods receive the appropriate attention to detail for better, safe and expedient delivery of services. Let’s protect our railroad crews – it’s a win-win for all!

Ruby Powell
To whom it may concern,

I am writing this letter to express my support for keeping 2 person crews in Kansas. While I do not live in Kansas, I have relatives in Kansas City whom I talk with often. After reading your proposed administrative regulation on K.A.R. 36-43-1 – Crew requirements, I am curious. What did you base your opinion on when you stated, “One person crews will likely see reduced accidents, which will likely reduce operating costs and offset any increased labor costs”? The following paragraph you seemed to switch to fear mongering by saying the customer will foot the bill. If I read correctly, wasn’t there only one conductor on train that derailed in East Palestine Ohio? Who’s footing that bill?

I am the Assistant Supervisor for the Metropolitan Sewer District in Cincinnati. I oversee day to day operations, purchasing, training, planning large-scale off-road projects, fabrication and most importantly, Safety. I do not pretend to know what a conductor does or is responsible for. However, in my line of work, we will NEVER send an employee out to do a job alone. The risk is too great if something were to happen to them. We ALWAYS send at least a 2-person crew out every time to not only ensure the task is completed efficiently and on time, but also safely.

Unless I am totally off base here, I would like to see any data that you have studied to come up with your conclusion on this matter. Can you give one good reason to go to one person crews without mentioning “Costs”? Seems to me this is just more corporate greed by the railroad. Cutting spending to further pad their pockets, while turning a blind eye on safety.

Regards,
Randy Rinear
Dear Ms. Brown

Please find attached my supporting written testimony in support of KAR 36-43-1

Thank you

Kathleen Bisbikis
BLET Auxiliary
National President
Good afternoon, I would like to extend my support for 2 person crew with class 1 railroads. Safety is of the utmost importance and class 1 railroads have way too much faith in technology that does fail from time to time. Safety in making sure train is in compliance, following all rules, navigating dark territory, GTBs, weather related occurrences, and communication with dispatchers when anything out of the ordinary arises which is often.

How much trust do you put in one person operating a train going through a HUTA that is carrying a loaded hazmat train carrying ethanol basically a rolling bomb in the middle of the night on broken sleep? 2 set of eyes are much better than one set.

Thank you,
Michelle Arroyo Hanson

--
Michelle Arroyo Hanson
I'm writing to show my support of at least a 2 person crews on every train. From a safety point of view its imperative that every train has 2 people not only for crew safety if one person has heatlh problems, but also a huge concern for the publics safety.

Please vote to have at least 2 crew members on every train.

Thank you,
Ted Fatzer
Hello,

I’m writing today to add additional comments on the 2 person train crew legislation. I live and work in the state of Kansas and have been a railroad engineer for the last 17 years. I will anonymize my email so I am not retaliated against by a railroad for my comments.

Without a doubt, I whole-heartedly believe that train operations, the employees who work them, and the communities that trains run through are safer with 2 crew members in the cab.

With more and more technology introduced into the cab, the railroad engineer is busier than ever. While some of the technology (PTC) is a good thing, there’s still very dangerous situations that it can’t see or address. Even the railroads maintain that the engineer is ultimately responsible for the handling and safe operation of the train. With the technologies introduced into the cab, the engineer is responsible for monitoring a minimum of 3 computer screens, 4 if a train has engines on the rear or somewhere other than on the head end. Add a 5th screen to reference rules and regulations on a iPad for when unusual situations, extreme weather, or defects occur. All of this takes away from the attention of the most important screen, the 6th screen, the front window. This is where an engineer reacts to prevent catastrophe, stop off crossings to minimize impact to emergency vehicles and the public, and tries to stop short of vehicles or pedestrians on the tracks. All of which railroad technology can’t do.

This is where the importance of the conductor comes in. The conductor is an extra set of eyes watching out the window, reading rules and regulations when necessary, keeping cab members alert, reacting quickly to medical issues, minimizing the impact of delays to the public, and responding to accidents and emergency situations promptly.

Despite the railroad propaganda, in most cases, a conductor in the cab can respond to situations faster than a conductor who is not in the cab. Most of the time railroad tracks run through open country with limited access from a vehicle. If an incident
happens with the conductor in the cab, he/she is able to start walking towards the problem immediately. If a conductor is staged remotely he/she will have to drive to the location of the train and most likely still have to walk to the problem.

Reducing crew size to 1 in the cab is just a cost cutting measure to reduce manpower making more money for share holders and stock buybacks. Crazy how last year railroads were testifying in front of congress because cuts to manpower impacted their ability to service customers, while they made record profits.

Make no mistake, if the railroads win, there will not be an equal shift in jobs from the cab to the ground. Great paying Kansas jobs will be lost.

This is a simple case of railroads putting profits over safety.

Thank you for your time,

Kansas Resident
Please accept this as my comments on the 2 person crew bill.

I work for the RR and see first hand what another set of eyes in the cab of a locomotive can accomplish. As an engineer I have my eyes on my Trip optimizer screen, my PTC screen, working the throttle, air brakes and watching out the windows for main line obstructions along with having to think of what my "up to" 3 mile long train is doing behing the engines and thinking what is going to happen up to 5 miles ahead of my train. I have to know what my train is doing or going to do every mile of the trip so I can plan accordingly to the safe operation.

My conductor, who is my second set of eyes, assists me in keeping up with anything that might come up along our trip that I might be distracted from catching due to the many duties I am assigned.

If I was in the cab of a locomotive by myself, for up to 12 hours not counting any wait time for a van ride, you could consider me as the same as a prisoner in solitary confinement for the rest of my career.

Please, pass this legislation so we, as railroaders, are not up in the cabs of an up to 70 m.p.h. locomotive with numerous hazardous chemical cars by ourselves.

This is a safety measure as my conductor is the first responder to crossing accidents, derailments or any type of defect along our route. If the conductor position is set to a ground based position this same response time will be greatly exaggerated as most of our tracks go through areas that there are no access to.

Thanks you,
Dear Ms. Brown,

My Name is Natalie Miller. I am the National BLET Auxiliary 2nd Vice President and Legislative Representative. I am writing to you today on behalf of the spouses and families of the BLET and SMART-TD Union members in Kansas, to respectfully ask you to support and help pass K.A.R. 36-43-1. While I will never claim to be an expert on the actual “on the job” safety issues that a train crew faces every time they board and run a train, as the daughter of two retired locomotive engineers, who is now the wife of a third-generation locomotive engineer with 27 years on the job, I am every bit an expert on railroad life, and the effects it has on the employees and families.

As I stated, I am the daughter of two retired locomotive engineers. Both my Dad and my Mom were employed by BNSF Railway, and both worked over the road on runs that would keep them on a train or at the away from home terminals for a combined 36 to 48 hours at a time. They would be home for 12 to 24 hours, and then called back to work and gone for another 2 days. Back then, they could lay off without an attendance penalty if they needed a day off for a doctor’s appointment, an important school activity or a birthday or holiday. They both hired on during the hiring boom in the 70’s, my Dad started first on the Bridge Gang and then transferred to engineer and my Mom started as a brakeman. When she started, there were six crew members on every train. She moved up the ranks to conductor rather quickly as the railroads abolished the caboose in exchange for the “Rear End Device” and the crew size shrank from 6 to 3, and then to 2. In 1991, when they abolished the brakemen position and forced brakemen to promote to conductor, my Mom promoted to engineer in order to protect her seniority. But with the smaller crew sizes, I could see the stress of the job taking a greater toll on the physical and mental health of my parents.

When my husband was hired by the BNSF in 1996, having both grown up with engineers as parents, we were both well aware of the strain that this lifestyle has on families. We knew that meant my husband was going to have to be on call 24-hours a day, 7 days a week, and would be gone every bit as much as our parents were, but the benefits of the job outweighed all of that. My husband took pride in his job and honestly for the first 23 years of his career, he really enjoyed going to work. Even after the implementation of Positive Train Control, he was still happy in his career. Then the Pandemic happened, and train crews were deemed “essential workers,” and that gave him, and all
of his coworkers, an even greater sense of pride and purpose than you could even imagine. They felt that, after all of the sacrifices they had made over their careers, they were finally being recognized for the important contributions that our railroad workers make to the economy and keeping our country's energy supply and commodity chains rolling.

Keep in mind, their contract expired around that time as well. But they all kept working on the good faith that, because they were essential workers, and because they kept the railroad industry running and making record profits when the rest of the world had shut down, a contract would get negotiated properly as soon as the Pandemic would allow. But instead, the Class 1 railroads started implementing Draconian attendance policies that punish employees for taking a lay off day. They fought against every lifestyle improvement or safety point that our Unions were negotiating for at the bargaining tables. They took the good faith that their employees had been working on, and basically wadded it up and threw it in the trash. They refuse to give their employees even a handful of paid sick days without making them trade personal leave days for them.

In the wake of the loss of employees and manpower due to their own attendance policies, they have started making mega-trains that are up to 3 miles in length and come with a whole slew of mechanical problems and safety issues. And now, the railroads want to try to make engineers run and control trains, including these mega-trains, alone. My husband’s run from Alliance to Grand Island, Nebraska is 272 miles. There are a lot of small towns and crossings to watch out for in 272 miles, and there are also spots where he is over an hour away from the nearest first responders or emergency service. And while I could write a book about all of the things that could go wrong having only one person running trains, I am going to address an aspect of it that not very many people are aware of.

Being an engineer or a conductor is already a very high stress, demanding, and isolating job. When they get off of a 12-hour shift on a 272-mile run, they are physically and mentally exhausted. The majority of their 12-24 hours off at home is spent sleeping in the quietest part of the house, away from the noise and hubbub of the family. They get called at literally all hours of the day and night and can spend hours “first out” waiting to get called, so they often miss family events or activities because they are trying to get or stay rested to go to work. After getting to work and spending 8 to 12 hours on the train and all that that entails, they spend most of the 12-24 hours off on the other end of the road alone, resting in a hotel room. Now the railroads are asking them to spend their 12 hours on duty alone too. This would be the equivalent of sentencing them to a lifetime career in isolation. How can that not have detrimental effects on their mental well-being? They need a second crewman in the cab of that locomotive if for nothing else, for mental health of the employees at the very least. They need a second crewman to help them stay ready and alert. They need a second crewman to help watch signals, crossings and to help resolve mechanical issues as quickly as possible. They need a second crewman to act as a liaison to the public at blocked crossings because they cannot leave the controls of the train. And they need a second crewman to, God forbid, act as a first responder when necessary. They just need a second crewman, period.

Over my lifetime, I have seen first-hand the deterioration of morale due to the increasingly more aggressive attacks on union employees’ rights and benefits by the railroad companies. I have witnessed the strain that the Draconian attendance policies and bitter contract negotiations have
put on the crews. I can say without a doubt that implementing a one-man crew will cause more safety issues than any community or state will ever be prepared to handle, and we will see events more frequently and even more catastrophic than the derailment in East Palestine earlier this year.

Please, for the health and mental well-being, and for the safety of the people manning the trains, for the safety of the people working the rails and sidings along the main lines, for the safety of the countless commuters, pedestrians and residents of the communities we roll through, and yes, even for the safety of the trains and equipment, and for the safe and timely delivery of the cargo and passengers we carry, we ask that you support mandating 2-Person Crews on the trains running and operating in the state of Kansas. We ask that you support K.A.R. 36-43-1.

Thank you for your time and consideration.

Your Sister in Solidarity,

*Natalie Miller*
National BLET Auxiliary
2nd Vice President & Legislative Representative
BLET Auxiliary Division 622 President
To whom it may concern,
This is to show my support for K.A.R. 36-43-1. A bill that would keep 2 persons in the cab of a locomotive. The passing of this legislation is critical to the safety and lives of all the great people and communities of Kansas. It is imperative that second person be in the cab to help monitor the safe movements of the train moving through our great state. It is the second set of eyes looking down the rails, the reminding voice of track conditions and the freight (most of the time carrying hazardous material) we pull through the state. With the engineer now having more focus on monitoring up to 3 computer screens to operate these longer and heavier trains the engineers eyes are not constantly looking out the window. That second person is crucial to the safe movements through the state. The removal of the conductor from the cab of the locomotive is no more than a ploy for these companies to enhance their bottom lines. It is no more than simple corporate greed in which they are willing to put the safety of not only their employees but the people of Kansas at risk in order to line their pockets. Thank you for you time.

William J Rice
Engineer Union Pacific Railroad 25 years and a lifelong Kansan.

Sent from my iPhone
Ms. Brown,
This letter is to show my support for K.A.R. 36-43-1, the two man crew bill. As a former conductor and now an engineer for 25 years, I can’t express enough the need for two people in the cab of a train. I have seen many changes over my 28 years on the railroad, some for the better, but too many just for the sake of eliminating employees to increase profits.
The conductor is another set of eyes on me as well as all of the ever changing surroundings we encounter every day and night. The conductor is the first responder to a crossing accident. The conductor is in charge of the handling and placement of cars (many hazardous) in each train. The conductor physically walks, inspects and repairs the train which allows the movement of freight to continue. I have personal experience of when I was a conductor and my train derailed west of Pratt, KS. I was the first one on the scene. I was the eyes and ears to my supervisors. I had the train list for first responders, with the specifics of the dangerous cars on our train. Would first responders have gotten the information if there was no conductor available? Yes, eventually, but what have we learned from the derailments of late. Time is of the essence. The derailment in East Palestine, OH should scare us all into making the railroads more safe.
Let me give you a background of the railroads. The only thing they care about is money. If they preach safety, it’s because an accident will cost them money. They don’t care about you, me, the community, the environment or the state of Kansas. Just look at how they’re operating now. PSR (precision scheduled railroading) is their mantra. I/ we operate trains in excess if 16,000 feet daily with no regard to the welfare of the community’s we block. They have gotten rid of trained car men with 25+ years of experience that inspect these cars and replaced them with new hire trainmen that are clueless to what they are looking for. Why? Money.
In summary, the reasoning the railroads argue for one man crews is again a simple argument of money. They will use words like “efficiency”, “technology”, and “shareholder value”, but they all mean the same thing. Cutting vital employees for the sake of profit.
The conductor job is a good job. They make a decent wage, pay taxes and support their communities and schools. To me that is itself a form of “efficiency” for the state of Kansas.
Respectfully,
Daniel Ring
Engineer Union Pacific Railroad
I would like to state my opposition to 1 person railroad crews. My husband is an engineer with BNSF in Missouri and does work in Kansas occasionally. It is a safety issue first and foremost. What happens if he were working alone and had a heart attack or some other life threatening health issue? No one would know until it was too late! What if the train was hijacked? Or any other situation that would benefit from a 2 person crew. Please make sure to vote in favor of keeping the 2 person crews!

Thank you,
Kelly Creed
K.A.R. 36-43-1. As a wife of a railroad engineer, I implore you to make 2 person crews mandatory. When you take a flight anywhere, do you question why there is 2 pilots? If not, why? The reason there is 2 pilots is the same reason there needs to be 2 for the railroad: incase of a mechanical malfunction, a health crisis, or communication issue. Let's be part of the solution to taking steps for a safer rails which affect alot of your big cities and small communities a like by making 2 man crews mandatory.
Dear Ms. Brown:

I am writing to you about KDOT regulation on the number of members a crew should have on a train. I live in the Argentine section of Kansas City Kansas just blocks from the BNSF rail yard. When the wind blows from the north I hear the train cars crashing together as the workers “build” the trains. If there were a derailment, those same winds would bring whatever toxic chemicals into my home.

I hear from friends who work for the railroad how little the carriers care for the health and safety of their workers. My observation over the years that I’ve lived here – over 40 – is that BNSF also cares little for my community as monitoring of the air has shown that we are frequently breathing diesel exhaust spewed out by the locomotives kept running constantly at the BNSF repair shop with no system to filter the exhaust.

For these reasons I am extremely interested in railroad safety for the workers on the trains and in the yards and also for us neighbors. I’m therefore very alarmed that the rail carriers are campaigning state-by-state to cut crews by 50% to one worker on a train and most likely in the future to driverless trains. As many of the recent disasters and frequent derailments show, especially the ones in East Palestine Ohio and Lag Megantec Quebec, having at least one conductor in addition to the engineer who monitors the train and its movement can save lives and protect us from the very dangerous chemicals so often hauled on trains and protect passengers as well on Amtrak.

Therefore, I strongly urge the Kansas Department of Transportation to maintain a requirement for at least two workers on a train throughout the state and in fact to strengthen rail safety rather than to weaken it.

Sincerely,

Judith Ancel
My name is Bill Booton. I work for Bnsf and have for over a year now. I see all of the materials that are shipped by rail. 1 of the busiest tracks in the country runs through the town I currently live in. I am completely for 2 certified crew members on every train. I know accidents happen and would rather have 2 certified crew member to atleast start working at minimizing damage at every train derailment. Time is of the essence when dealing with some of the materials that we ship, when accidental spills happen. 2 sets of eyes are better than 1. It takes a long distance to stop trains so the sooner the brakes are set, the better, for avoiding or minimizing accidents. Thank you.
I'm all for 2 men crews because that's a lot of responsibility to be put a single person especially on a run that I have. I run as an engineer from wellington ks to Amarillo TX. Computers can only do so much but they will never have the human factor involved. Things can happen at any time to someone while on a train. So what am I suppose to do if I had a medical emergency on the train and I'm all by my self? Hopefully I can get the train to a spot that I can get help if I'm coherent. Another reason for a 2 man crew is for if anything happens to the train there is someone already there to fix it or at least identify the problem a lot quicker then waiting for a responder to show up. What always gets me about this company is all the do is say safety safety safety. In my opinion they don't practice what they preach. 2 men should always be on a train for safety purposes. I want to thank you for taking time to read this email and hopefully it means something to someone

Patrick Hale
Good morning Emily,

Attached is a public comment I wish to submit for KDOT and the public record concerning K.A.R. 36-43-1, concerning the 2-person crew minimum for train cabs in Kansas.

I plan to attend the hearing this morning by Zoom to make an oral statement.

Sincerely,
Zack

Zack Pistora
State Lobbyist for the Kansas Sierra Club
Hello, I’m Dan. I work as an engineer at BNSF Newton, Kansas. My résumé includes a B.S. in economics from Emporia State University, a 4 year stint with the Kansas Highway Patrol, and a host of railroad safety projects. I also have taught recertification classes for my coworkers.

As an engineer, I do the “driving”. I’m proud of my ability— I’m a good Engineer. I also have some veto power on my train, i.e. I may refuse to move if asked to do something unsafe or unwise.

Operation of a freight train with only one person is foolish. Trains require constant concentration because they take so long to stop. Currently, we do this well. I rely on my conductor to keep me alert, sharp.

I’ve never done anything on my train that I consider unsafe or stupid. I take my responsibility for safe operations seriously. Two-man crews are essential for safety. The men who do this work know the consequences of train crashes. My coworkers and I rely on each other. It is essential that both the railroad corporations and the state understand this, and act to ensure two crewmen are on our trains.

DW McNeil
I support two-crew railways. Look at what happened in Ohio.

Sent from Mail for Windows
Good morning, after a more careful reading of K.A.R. 36-43-1, I would like to revise my initially submitted comments. Changes incorporated into the text below.

(-----Original Message-----
From: Jessica Barnard
Sent: Tuesday, July 18, 2023 8:48 PM
To: emily.brown@ks.gov
Subject: Comment on 2 Person Crews K.A.R. 36-43-1)

Hi Emily,

I’m reaching out today to offer comment in support of two person crews.

My husband is a railroad engineer and also works as a conductor in Kansas. He will be sending in his own comments from that perspective. I offer mine as a wife and as a citizen concerned for his life as well as those of the community. Although he has not yet been confronted with the forced position to work as a sole locomotive operator, it’s been a fear of ours that he eventually will be. I can think of many scenarios in which this would present for safety concerns.

Take, for example, simple fatigue. It’s no secret that absent a consistent sleeping schedule, fatigue can be a very real problem. While this issue is really another matter, entirely, it is also applicable here. I believe that absent regulation to restrict less than a two-man crew, a sole operator would find it to be exceedingly difficult to maintain a consistent and sustained state of vigilance for upwards of 16 hours at a time absent any other human interaction at all.

Another big concern about sole operation of a train is quite simply, health of the operator. Suppose the sole operator on the engine had a health emergency. How long would it be before anyone would be aware enough to stop the train and send help and assistance? What would this delayed response to a medical emergency cost? Not in terms of a revenue line, but the cost to that operator’s life, the lives of their family, their kids, their friends, any resulting detriment to the community they may have been passing through (via blown signals, failure to yield to speed restrictions, resulting derailments, etc.)?

Or, what if that sole operator were to have to walk the train to inspect some coupling a mile back and injure themselves along the way? What then? Should they administer their own first aid, supposing they could even make it back to the engine without assistance?

There are so many different scenarios that have run through my mind as the concept of one person to run a line route has gained traction with Railroad carriers - and not one of them supports a single man or woman on that engine. We fully support K.A.R. 36-43-1 as a regulatory protection in the best interest of the lives of railroad employees, their families, and the communities in which they live, travel and serve.

Sincerely,

Jessica Barnard
Sent from my iPhone
Good day,

I am writing you as an employee that works for a carrier that goes through Kansas. I am a Locomotive Engineer out of Kansas City and I go to Wellington, Newton, and Arkansas City for my route. Safety is always in our minds with the job we do and a 2-person crew in important aspect of that. Our routes take us through areas that most of the public does not see nor access and if a medical situation arises with one of us then help is able to be directed. In emergency services they always talk about the Golden Hour for emergency response in order to have the best outcome for a patient. If there was only 1 person on the train then the time frame for a response would be greatly increased.

Having that 2nd person on the train helps to keep the communication going, quick response for emergencies with the train, the ability to cut crossing for emergency vehicles and regular public access when stopped for extended periods.

I am completely for a rule in the State of Kansas to have 2 persons in a cab of a Locomotive at all times.... it is safe for the employees, the public, and for the transportation of goods.

Thank you for your time,
As a railroad engineer for 45 years I've watched the railroad degrade in personal, maintenance, and moral. No longer is it safe to operate equipment that is not maintained or neglected. Without carmen inspections it's Russian roulette when a significant accident will happen; with insufficient staff pushed to build trains quicker, it is easy to overlook dangerous conditions to train, track, and personal.

With that being said, two person crews afford the check and balance to comply with safe movement of trains. PTC does not provide the feedback to safe operation. It is only a tool to prevent catastrophic miscalculation. A two person cab allows decision making for planning and rules observation. With a 3 mile train you can take my word this is imperative.

All railroads are trying to do more with less. When anything happens it's almost always determined operator error to transgress from proper training or safe precautions. A two person crew is a safe precaution. The conductor is in charge with the engineer providing experience or advice for aid in many situations. Your going to have longer delays with the problems we're facing without proper personal available to determine or correct seriously deficient operations.

Eduardo N Quintana
Union Pacific Railroad Engineer
Dear KDOT:

I am writing this letter to express my strong support for the proposed permanent regulation, K.A.R. 36-43-1, requiring a minimum of two individuals on trains in Kansas. This regulation is crucial for the safety and well-being of our communities, especially when it comes to trains transporting dangerous hazardous materials (Haz-mat) across the state.

Train accidents and crossing accidents are unfortunate incidents that do occur, leading to delays, disruptions, and, in some cases, emergencies requiring immediate attention. With a minimum crew size, these trained professionals can take swift action to address any issues, minimizing inconvenience to the public and enhancing the overall efficiency of our transportation system.

Furthermore, the presence of first responders, such as train crew members, at accidents involving trains and crossings is essential. Their expertise and familiarity with the train's cargo (especially Haz-mat) enable them to provide critical assistance to first responders. The collaboration between these professionals can ensure a well-coordinated response, leading to improved outcomes in terms of mitigating risks, providing timely medical attention, and securing the affected area.

In conclusion, implementing the proposed permanent regulation, K.A.R. 36-43-1, is crucial to enhancing community safety. By having at least two individuals on trains, we can better address hazards associated with the transportation of dangerous hazardous materials and respond more effectively to train and crossing accidents. This regulation not only safeguards Kansas citizens but also strengthens the resilience of our transportation infrastructure.

Thank you for considering my input and for your commitment to ensuring the safety of our communities.

Sincerely,

Shelley Kite
Dear KDOT:

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Thank you for considering my input and for your commitment to ensuring the safety of our communities.

Sincerely,

Chad Smith
I would like to extend my concern about having only one person in the controlling cab of locomotives. Due to the enormity and weight of the average freight train it seems dangerous for only one employee to be in the position of overseeing its operation.
Dear Ms. Brown:

We strongly support two (2) person railroad crews in Kansas!

Sincerely,

Joyce and Forrest Fee
the two-man crew is the only sensible answer, what happens if the engineer becomes disabled? There will be numerous times it takes at least 2 people to correct a problem. What happened to safety first, we all know that is a bullshit answer the company us...
Good morning or evening Emily, whenever you receive this note. I was sitting on my porch this evening and heard the train passing thru Hiawatha, which reminded me of Steve Titus' text requesting comments regarding having two engineers on trains. As I heard the trains hooting as it passed the crossings, I was reminded of the evening when I was returning home from a BSP meeting and waited a very long time for the train to go by the crossing. And then, as I was mumbling to myself about the long train, here came an engine, in the middle of the train and it continued on for what seemed like forever. I was thankful that I wasn't in an ambulance headed for the hospital.

But, I am off the subject of my note to you. It doesn't seem possible to me that anyone would consider it wise to have only one person on board responsible for handling the train. I'm assuming that technology has greatly improved the ease and management of the operations of a train. But, considering the value of the train and its cargo, and the potential damage that an accident can cause to the communities it's passing through, it's stupid not to have a back-up resource for the engineer. If she/he has a medical emergency or if, heaven forbid, the technology fails, there needs to be more than one person in the engine room.

I am not overly impressed with the railroad's ability or interest in improving services. I would hope that the engineers would be able to monitor the various functions of the train and report issues that need to be handled to improve the functioning of the train, including the screeching wheels. I have twice reported the terrible condition of the RR crossing on Linden Road here in Hiawatha. Linden Road is black-topped, well travelled and goes past the Country Club. My neighbor, who lives closer to the crossing, has actually put gravel on the crossing, hoping to improve the smooth crossing.

Hoping you will consider my strong recommendation that there always be two engineers on the trains in Kansas.
Hello
Being a locomotive engineer for almost 23 years for the Union Pacific Railroad, I feel it is imperative to have Two person crews on every freight train. Due to safety and the increasing train sizes. Please do everything possible to make it a requirement and law to have two person crews
Thank You
Mike Lostroh
Member of BLET Div 81

Sent from my iPhone
I would like to voice my support for two person crews on all trains traversing the State of Kansas. As a retired locomotive engineer with nearly 43 years of service, I cannot fathom the idea of a one person crew being considered as a safe operating practice. There is too much going on in the cab of a locomotive for one person to attend to without sacrificing the safety of the train and the general public. One person crew is solely for the benefit and profits of the carriers, not the public. Thank you.

Randy Raney

Olathe, KS

Sent from my iPhone
Representative Brown,

I am a conductor that works out of Argentine Yard in Kansas City, KS. I have experienced many different situations that have proven to me that two person crews are absolutely necessary for safety. I have seen the second crew member save another crew member's life. I have seen them save the lives of the public. I have cut trains to allow vehicles through crossings.

Unfortunately, I have railroaded long enough to see the corporate railroad's concern (or lack thereof) for safety. Unfortunately profit always reigns supreme in Class I rail operations. If shorting safety makes them a dollar more, they are willing to make that sacrifice. The only protections that save our public from disaster have been through regulation and the proactive fights of unions. Months and I believe even up to a year before, unions warned of an event like the East Palestine's derailment. Railroad companies were and continue to increase train length, decrease inspections and push increased hours while they decrease man power. Only through disaster have they considered changing their ways. Let us all hope that Kansas and Missouri can avoid the disaster and keep two person train crews and other important safety regulations.

Thank you,

Wes Ekstedt
SMART-TD Local 0445
Fight for Two Person Crews
Hello, my name is Tim Briggs. I worked for UPRR for 25 years out of Portland Oregon and am now retired. I worked one year as a conductor and 24 as a locomotive engineer with BLET 236.

To me this is a very personal and important issue that the company continues to push. It is a dangerous decision that if implemented will have grave consequences. As mentioned it does help to respond to situations that arise in a timely manner when needed. It is common for a handbrake to be left on or to have a hot bearing or hanging equipment from a car. Many times trains are not easily accessible because of the terrain they travel making it very difficult for someone to drive up and walk in. Throw in adverse weather conditions and it might be next to impossible. The railroad is only setting themselves up for huge delays and are fooling you when they make it sound like this is a good working solution.

The number one reason I oppose one man crews is because of safety. It is absolutely essential that there are two people in the cab. You need two sets of eyes and two minds assessing the situation and ensuring that the decisions made help that train make it over the road safely. The train crews are expected to know thousands of rules. They are expected to be fully certified and knowledgeable in these rules and their territory they are traveling. They are subject to fatigue everyday. They are subject to constantly changing sleep and eating times. They do not have a regular circadian rhythm. There is no other company I know of that would knowingly subject their employees to that while also being responsible for millions of dollars in equipment and freight. They travel through city streets 24/7 in this manner with hazardous materials.

Because of these facts alone it is imperative that there are two people in the cab that can talk and help each other, look out together for hazard's, to make sure the train makes it over the road safely. Also, I want to say that PTC should not be a factor either for the company to use. PTC is only a wonderful safety tool that finally helps to ensure that the train crews get home safe.

I speak from personal experience and I hope and pray that my personal experience helps you decide and agree that two people in the locomotives are absolutely essential to safe passage of all road crews. We should never think that one person in the cab will ever be acceptable practice.
Dear Emily Brown,

We need to have two person crews on all trains! It’s never a good idea to be out there all alone! I worked for the Union Pacific for 38 years as an engineer. There is no reason to be out there by yourself. There are multiple reasons for this, emergency involving the public would be the upmost concern. This is when you’re going to need all hands on deck for this problem, more help the better! Another problem is running these trains so long that the radios don’t work that far of a distance, for you to hear the guy on the ground. Also, it makes it impossible to stay off crossings with these long trains! Also, you can have medical problems with one of the crew, this is another reason to have two people! Somebody had to call for help!!! This is a good thing for everybody involved even the railroad, but their eyes are clouded by dollar signs! One person crew will bring this nation to a stand still, you can count on that! Two person crew is the only way to go!!! If you would like to discuss further give me a call! Thank you!

Kevin D. Eichelberger
Sent from my iPhone
I'm name is Jim Grimes. I am a locomotive engineer for Union Pacific Railroad. My run is from Kansas City to Marysville, Kansas.

I fully support two person crews, because I don't ever want to be alone inside the cab of a locomotive. Even with all the technology we have on board a second set of eyes and ears is a necessity.

Technology fails. I've personally seen mistakes in PTC (Positive Train Control). I have had a conductor point an error out to me and it was the difference between me going 45mph over track that was only good for 25mph.

Engineers get tired. We work on call 24/7. We don't have set schedules, call times, or assigned days off. Our entire life can't be the railroad we have marriages, relationships, children, friends and family that all deserve our attention. Because the railroads are so incompetent or just flat out refuse to give us accurate train line ups, it is very rare that I know when I'm going to work within 6-8hrs of the actual time I get called. Most of us sacrifice sleep to make sure we give our loved ones the attention they deserve and the time that we need with them, because it's the only thing we can do. This leads to late nights on short sleep. If my conductor catches me nodding off he can alert me. If I'm alone there is no question that I would dangerously run my train over crossing without providing warning or have my eyes closed at a crucial moment that could avoid a derailment or prevent the loss of life.

Our lives are not easy. Most of us feel the emotional strain. I personally have had to start taking medication for depression and anxiety due to the constraints of this job and the effects it's had on my personal life. I am not one of a minority either.

Imagine a person who just found out they are getting divorced. They are desperate and afraid. The thought of suicide pops into their head. They are on a 50mph, 15k ton bullet and all they have to do is disengage ptc or not log into it in the first place. The next step is taking a turn too fast, and a derailment not only ends his life but impacts the surrounding area. A second person in the cab could talk him/her down and prevent a tragedy.

Another reason for keeping a second person in the cab is national security. The most dangerous chemicals get hauled by rail. If a terrorist want to take out a major city hijacking a key train with explosives, an ethanol or crude oil train is much easier if only one employee has to coerce or overpower.

It's an over used phrase, but two heads are better than one.

I've included my contact information if you have any questions or wish to discuss this further.

Thank you for your time.

James Grimes
Sent from my T-Mobile 5G Device
This bill is vital for the safety of the residents of the state of Kansas. The train crews are overworked and fatigued and expecting one person to be responsible for over 3 miles of train is insane. As a railroad employee I have seen first hand the results of the lack of preventative maintenance not only to the track but the cars and engines. We MUST hold the railroads accountable for their greedy business model and do everything we can to protect the citizens of the great state of Kansas. We do not want to end up with a tragic accident that will affect this great state and the residents of it for years to come.

The railroads say that they need a 1 person crew to stay competitive but take a look at the financial reports and ask yourself if they are struggling to stay competitive or are they being greedy and wanting to further increase the record setting profits they have been making.

Kind regards,
James Hobbs
Locomotive Engineer
I am a locomotive engineer with 28 of service. I am firmly in support of two person crews. We work on call 24/7 and it is impossible to be completely alert and at the top of your game at all times. A second set of eyes and ears is vital to the safe transport of freight. Please come down on the side of safety and require two people on each and every train.

Thank you,

Brad Grimes
I'm all for 2 men crews because that's a lot of responsibility to be put a single person especially on a run that I have. I run as an engineer from wellington ks to Amarillo TX. Computers can only do so much but they will never have the human factor involved. Things can happen at any time to someone while on a train. So what am I suppose to do if I had a medical emergency on the train and I'm all by my self? Hopefully I can get the train to a spot that I can get help if I'm coherent. Another reason for a 2 man crew is for if anything happens to the train there is someone already there to fix it or at least identify the problem a lot quicker then waiting for a responder to show up. What always gets me about this company is all the do is say safety safety safety. In my opinion they don't practice what they preach. 2 men should always be on a train for safety purposes. I want to thank you for taking time to read this email and hopefully it means something to someone
Patrick Hale