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May 2019

RAIL SAFETY

Freight Trains Are Getting Longer, and Additional Information Is Needed to Assess Their Impact

Accessible Version

GAO-19-443

GAO Highlights

Highlights of GAO-19-443, a report to congressional requesters

May 2019

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Freight Trains Are Getting Longer, and Additional Information Is Needed to Assess Their Impact

Why GAO Did This Study

In 2017, the U.S. freight rail system moved over 1.5-billion tons of goods. The largest freight railroads—Class Is—dominate the industry and account for more than 90 percent of its annual revenue. In recent years, railroad workers and local communities have expressed safety concerns related to longer freight trains, and recent accidents involving such trains are currently under investigation by FRA. FRA does not currently place limits on freight train length.

GAO was asked to review the safety and other impacts of longer freight trains. This report examines: (1) changes in freight train length over time, (2) safety considerations for operating longer freight trains, and (3) the extent to which FRA is assessing any safety risks. GAO reviewed relevant statutes, regulations, and federal agencies' reports and plans; analyzed available data on freight train length from railroads; and interviewed federal officials and various stakeholders, including state and local officials and first responders from five states (selected to represent different railroads and regions), and officials from the railroad industry, unions, and advocacy groups.

What GAO Recommends

GAO recommends that FRA develop and implement a strategy to share the results of its study on longer trains and work with railroads to engage state and local governments to identify and reduce impacts of longer freight trains on highway-railroad crossings. FRA concurred with GAO's recommendations.

View GAO-19-443. For more information, contact Susan Fleming at (202) 512-2834 or flemings@gao.gov.

What GAO Found

Freight train length has increased in recent years, according to all seven Class I freight railroads. Data on train length are not publicly available; however data provided to GAO by two Class I railroads indicated that their average train length has increased by about 25 percent since 2008, with average lengths of 1.2 and 1.4 miles in 2017. Officials from all seven Class I railroads said they are currently operating longer than average trains on specific routes, although some said such trains are a small percentage of the trains they operate. One railroad said it runs a 3-mile-long train twice weekly. Officials identified increased efficiencies and economic benefits among the advantages of longer freight trains.

Stakeholders said that the arrangement of train cars and locomotives—known as "train makeup"—and the potential for blocking highway-railroad crossings are issues to consider to safely operate longer freight trains. To prevent derailment, stakeholders said it is important that longer trains are arranged appropriately and that crews are trained to operate them. While Class I railroads and others said that longer trains may decrease the frequency of blocked crossings, some state and local officials said these trains can prolong their duration, posing challenges for emergency responders unable to cross the tracks.

Emergency Vehicle Blocked by Freight Train at Rail Crossing

Source: National Industrial Transportation League – Photo by Bruce Ridley. | GAO-19-443

The Federal Railroad Administration (FRA) is studying the safety risks of and strategies for operating longer trains. As part of the study, FRA plans to analyze train-handling and braking capabilities under varying conditions. FRA officials said they plan to share their research results with relevant stakeholders; however, FRA currently has no documented strategy for sharing the results of its research. FRA officials are also analyzing which parts of the country are reporting frequently blocked crossings. However, FRA officials said they do not plan to use information from either of these efforts to determine whether longer freight trains might contribute to increases in blocked crossings, and the officials believe the issues are unrelated. Developing and implementing a strategy for sharing FRA's research results and identifying any potential impacts of longer freight trains on highway-railroad crossings would enable FRA and stakeholders to better determine what, if any, actions are needed to ensure the safe operation of longer freight trains.

Contents

Abbreviations

AAR	Association of American Railroads
DOT	U.S. Department of Transportation
DP	distributed power
FRA	Federal Railroad Administration
NTSB	National Transportation Safety Board
STB	Surface Transportation Board

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May 30, 2019

The Honorable Peter DeFazio
Chairman
Committee on Transportation and Infrastructure
House of Representatives

The Honorable Daniel Lipinski
Chairman
Subcommittee on Railroads, Pipelines, and Hazardous Materials
Committee on Transportation and Infrastructure
House of Representatives

The Honorable André Carson
House of Representatives

The Honorable Jim Cooper
House of Representatives

The Honorable Terri Sewell
House of Representatives

The nation's freight railroad network is vital to the functioning of the economy. In 2017, the United States' freight rail system moved over 1.5-billion tons of goods across the country, including hazardous materials, bulk goods such as grain and coal, and consumer goods. Generally, railroads transport these goods safely. While freight-rail traffic has grown following the 2008 recession, train accidents have declined, according to the Federal Railroad Administration's (FRA) data,[1] with train accidents per million-train-miles decreasing by about 14 percent between 2008 and 2017.[2]

In recent years, railroad workers and communities have expressed concerns regarding the safety of railroads operating longer freight trains, some of which are nearly 3 miles long. These concerns include whether

[1]As one of nine U.S. Department of Transportation operating administrations concerned with intermodal transportation, FRA's mission is to enable the safe, reliable, and efficient movement of people and goods.

[2]According to FRA, a train-mile is the movement of a train—a locomotive or locomotives with or without railcars—the distance of 1 mile.

train crews are adequately trained to operate longer trains, the ability of long trains to effectively activate brakes, and the impacts on highway-rail at-grade crossings, also known as “grade crossings”—where streets and highways intersect with train tracks at the same level.[3]

Some recent accidents involving longer freight trains are under investigation by FRA, the federal rail-safety-regulating agency, and the National Transportation Safety Board (NTSB), an independent federal agency that investigates serious transportation accidents, including those involving rail. For example, in 2017, a freight train over 2 miles long consisting of 178 railcars of mixed freight—including flammable and hazardous liquid—derailed in Hyndman, Pennsylvania causing significant damage. NTSB is currently investigating many factors associated with the cause of the derailment, including the length, makeup, and operation of the train. Although FRA oversees various aspects of freight railroad safety, it has no specific regulatory requirements that limit train length or define what constitutes a “long” train.

You asked us to review the potential impacts on railroads, workers, and local communities of operating longer freight trains. This report examines

- what is known about changes in freight train length over time,
- views of selected stakeholders on safety considerations for operating longer trains and the potential impact of these trains on communities, and
- the extent to which FRA is assessing any safety risks of operating longer trains.

To address these objectives, we analyzed data provided by Class I railroads on average train-length in feet over time and reviewed documents and interviewed officials from all seven Class I railroads regarding their operation of longer trains.[4] As data on train-length in feet

[3]As of March 2019, more than 211,000 at-grade crossings existed in the United States, according to FRA.

[4]Freight railroads are classified by operating revenues. At present, Class I railroads are those having annual carrier operating revenues of approximately $447.6 million or more, of which there are currently seven: BNSF Railway, Canadian National, Canadian Pacific, CSX Transportation, Kansas City Southern, Norfolk Southern, and Union Pacific. This report is limited in scope to Class I freight railroads because they account for more than 90 percent of annual railroad-freight revenues and employ 90 percent of railroad employees.

are not publicly available, we requested information from these railroads. Five of the seven railroads provided data on average train-length in feet over time; however, only two railroads provided data for a period of at least 10 years.[5] We also analyzed data from the Association of American Railroads (AAR) to determine average number of railcars and weight per train for calendar years 2008 through 2017, the most recent year for which data were available.[6] These data are the only publicly available data on the number of railcars per train, and there are limitations to how the data can be used. For example, the average number of railcars per train cannot be used to precisely estimate train-length in feet due to variations in cars' lengths. According to our review of the data, relevant documentation, and conversations with staff responsible for the data, we determined these data were sufficiently reliable to describe what is known about changes in freight train-length over time.

In addition, we reviewed relevant statutes, regulations, our prior reports, and documentation of federal agencies' actions and plans and interviewed a variety of stakeholders. Specifically, we reviewed documents and interviewed officials from federal agencies—including FRA, NTSB, and the Surface Transportation Board (STB)[7]—and a variety of other relevant stakeholders, including officials from national associations representing railroad employee unions, shippers, cities and towns, emergency managers, and emergency responders. We also reviewed relevant studies and interviewed academic researchers and other experts and individuals knowledgeable about freight train

[5]More specifically, two Class I railroads provided data on average train-length for at least 10 years, 2008 through 2017 and 2004 through 2017, respectively. Three Class I railroads provided average train lengths for 4 calendar years or less; however, one of these railroads provided data in a format that was not easily comparable with the others. Two Class I railroads declined to provide information on average train length over time.

[6]AAR is the trade association for the largest railroads in the United States and publishes a variety of railroad industry and economic reports, such as the annual publications *Freight Commodity Statistics* and *Railroad Facts*, and trend reports such as *Railroad Ten-Year Trends*. AAR's data are based upon public information that Class I railroads submit to the Surface Transportation Board. For example, every Class I railroad operating in the United States is required to submit an annual report (R-1) that includes a variety of information such as data on freight car-miles (a way to measure the movement of various types of freight car equipment a distance of 1 mile), train-miles (a movement of a train the distance of 1 mile), and ton-miles (a representation of the number of tons of revenue and non-revenue freight moved 1 mile in a train). 49 U.S.C. § 11145 and 49 C.F.R. § 1241.11.

[7]STB is an independent federal agency that regulates the freight railroad industry from an economic standpoint, including railroad rate reasonableness, railroad service and mergers, new rail-line construction, and associated environmental analysis.

operations, including officials from Canada's rail safety agencies[8] and representatives from companies that manufacture braking equipment for the rail industry. In addition, we selected a non-generalizable sample of five states in five of FRA's eight geographic regions, based upon a variety of factors, including locations where Class I railroads are known to operate longer trains, grade-crossing complaints, and variation in FRA region and geographic location. Based on these criteria, we selected the following states: Florida, Illinois, Ohio, Texas, and Washington. We reviewed documents and interviewed relevant stakeholders from all of these states, including state-level transportation and emergency management officials, state rail-safety inspectors,[9] and local officials, including emergency responders.

We identified standards for generally accepted research practices[10] and good practices for risk management.[11] We also identified best practices for strategic planning[12] and applied relevant federal standards for internal control that are key to helping agencies achieve their missions and desired results.[13] We evaluated FRA's efforts to assess safety risks of longer trains using these standards and selected strategic planning, research, and risk management practices from our prior work.

[8]More specifically, we spoke with officials from Transport Canada, which is responsible for transportation policies and programs in Canada that promote safe, secure, efficient, and environmentally responsible transportation, and the Transportation Safety Board of Canada, which is an independent agency that advances transportation safety by investigating occurrences in the marine, pipeline, rail, and air modes of transportation.

[9]The Railroad Safety Act of 1970 authorized states to work in partnership with the FRA to enforce federal railroad-safety regulations. Pub. L. No. 91-458, §§ 206 and 207, 84 Stat. 971, 972.

[10]We previously identified generally accepted research standards that are relevant for sound, complete studies. For our purposes, we determined that the standards related to presentation of results were relevant for our evaluation of FRA's actions. See GAO, *Defense Transportation: Study Limitations Raise Questions about the Adequacy and Completeness of the Mobility Capabilities Study and Report,* GAO-06-938 (Washington, D.C.: Sept. 20, 2006).

[11]GAO, *Enterprise Risk Management: Selected Agencies' Experiences Illustrate Good Practices in Managing Risk*, GAO-17-63 (Washington, D.C.: Dec. 1, 2016).

[12]GAO, *Managing for Results: Critical Issues for Improving Federal Agencies' Strategic Plans*, GAO/GGD-97-180 (Washington, D.C.: Sept.16, 1997).

[13]GAO, *Standards for Internal Control in the Federal Government*, GAO-14-704G (Washington, D.C.: September 2014).

We conducted this performance audit from February 2018 to May 2019 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

The U.S. Freight Rail System

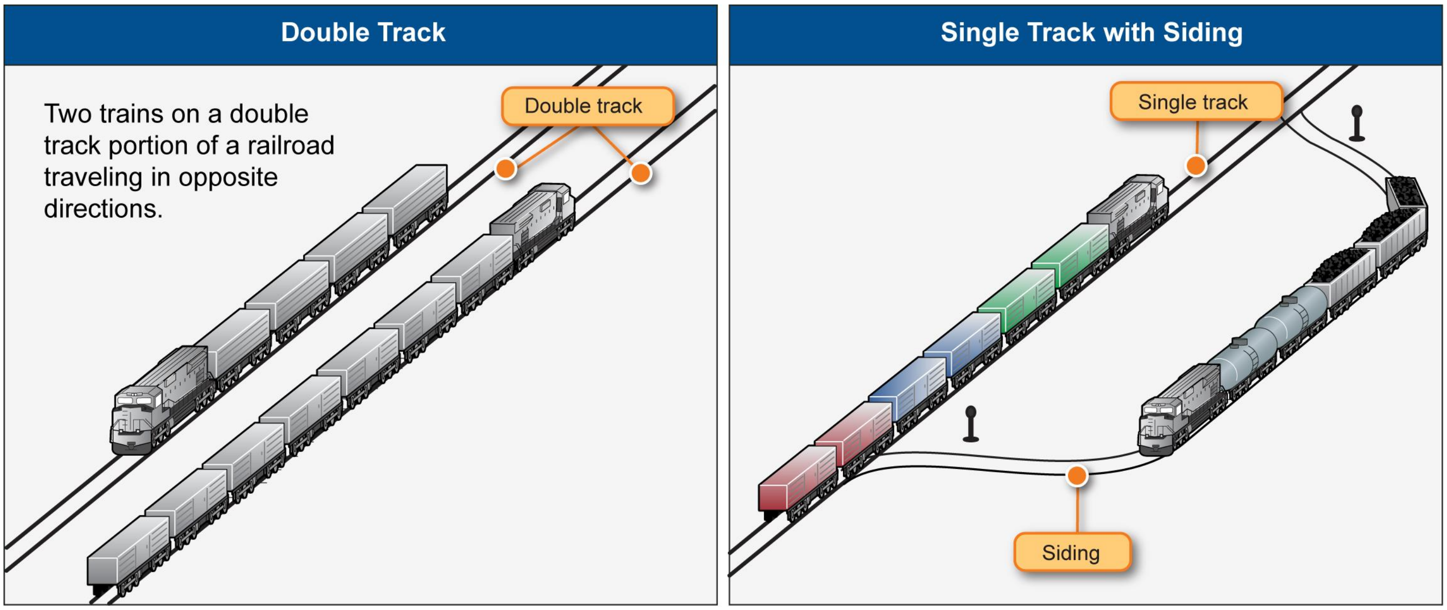
The U.S. freight rail network is a private industry that moves about 40 percent of U.S. freight across about 140,000 miles of track. Freight railroads are responsible for the safety of their trains, tracks, and personnel. These railroads rely on their revenues for funding to perform track inspections and maintenance. Close to 600 freight railroads operate in the United States, and they are divided into three classes according to revenues. The seven Class I freight railroads, those with approximately $447.6 million or more in annual revenue over 3 consecutive years, account for more than 90 percent of the annual revenues of the railroad-freight industry and employ 90 percent of railroad employees. Class I freight railroads move freight over long-haul routes and face competition from each other and from other freight-shipping modes, such as trucks and barges. Class II and III railroads tend to operate over much smaller geographic areas than Class I railroads and employ fewer people.[14]

Trains operate on different types of train tracks, including main line tracks—the primary rail arteries trains use to travel—and sidings, which are primarily auxiliary tracks for trains to pass one another. Trains can be stored, sorted, and assembled in railyards. Railroads use main line and sidings to enable trains to enter and leave the yard. Outside railyards, some sections of main line track have sidings that lead to a parallel set of rails to allow trains to pass one another. In addition, some portions of

[14]At present, Class I railroad carriers include those having annual carrier operating revenues of approximately $447.6 million or more (as noted earlier). Class II railroad carriers are those having annual carrier operating revenues of less than $447.6 million but in excess of approximately $35.8 million. Class III railroad carriers are those having annual carrier operating revenues of $35.8 million or less. 49 U.S.C. § 20102(1) and 49 C.F.R. § 1201-1.

main line track consist of two or more parallel sets of track to allow trains to pass one another or travel in opposite directions. See figure 1 for an illustration of different track types and siding.

Figure 1: Track Types and Siding



Source: GAO. | GAO-19-443

Freight Train Operations

Train Makeup and Handling

Train makeup refers to the placement of individual railcars that make up a train. A typical train consists of a locomotive—the power and control unit where the train operator sits at the front of the train—followed by connected railcars. The lead locomotive pulls the train and provides control for other functions, including braking. Freight trains carry a variety of freight using different types of railcars that vary in capacity, length, and weight. When assembling a train, railroads consider a variety of factors—such as each car's weight, length, freight, and whether it is loaded or empty—when determining its position in the train. Train make up is also dependent on external conditions, such as variations in terrain and weather conditions. Railroads can place radio-controlled locomotives, called distributed power (DP) units, throughout trains to spread out pulling and pushing power, which we discuss in more detail below.

Proper train makeup is critical for ensuring a train is able to effectively negotiate track and prevent derailment, according to FRA. Improperly assembled trains are more susceptible to derailment, in part because of vertical, longitudinal, and lateral forces throughout the train—also known as “in-train” forces—that can affect the stability of a train on its tracks, depending on a variety of factors, including the train’s speed and terrain. For example, excessive “in-train” forces can cause a long, heavy train to pull apart or climb off the track upon a change of grade (e.g., going up or down hills) or when the train enters a curve.[15]

“Unit trains”—which carry a single commodity, such as coal or oil, to one destination—experience in-train forces that are easier for railroads to model and engineers to predict because the railcars are generally uniform in size and weight. In comparison, determining train makeup is more complex in mixed freight trains, which can experience more unpredictable in-train forces resulting from railcars of different weights, lengths, and freight (e.g., bulk goods such as grain and coal, consumer goods such as automobiles, or hazardous materials). For example, if a train is assembled in a manner in which empty railcars alternate with loaded, heavy railcars, braking can create compression at the couplers and cause “buckling”—when an empty train car is compressed between heavier railcars and derails from the train tracks.[16]

Braking and Distributed Power

Freight trains in the United States utilize air-braking systems to control speed and stop. A conventional air-braking system is controlled by an air pressure signal from the leading locomotive, which sends a signal through the train to engage brakes. Because each railcar receives this signal sequentially, it takes multiple seconds for railcars at the end of the train to receive the air pressure signal and begin braking, depending on the train’s length. The application of air brakes generates in-train forces,

[15]According to FRA, in-train forces include train resistance (which is the force of grade and speed changes, curves, and rolling resistance); force at the coupler (which is the connection that joins railcars); braking; and slack between railcars (which is the distance one railcar can move independently of the railcars ahead and behind it). See FRA, *Safe Placement of Train Cars: A Report* (June 2005).

[16]FRA and AAR have both issued non-binding guidance on train makeup. See FRA, *Safe Placement of Train Cars: A Report* (June 2005) and AAR Research and Test Department, *Train Makeup Manual Report No. R-802* (January 1992).

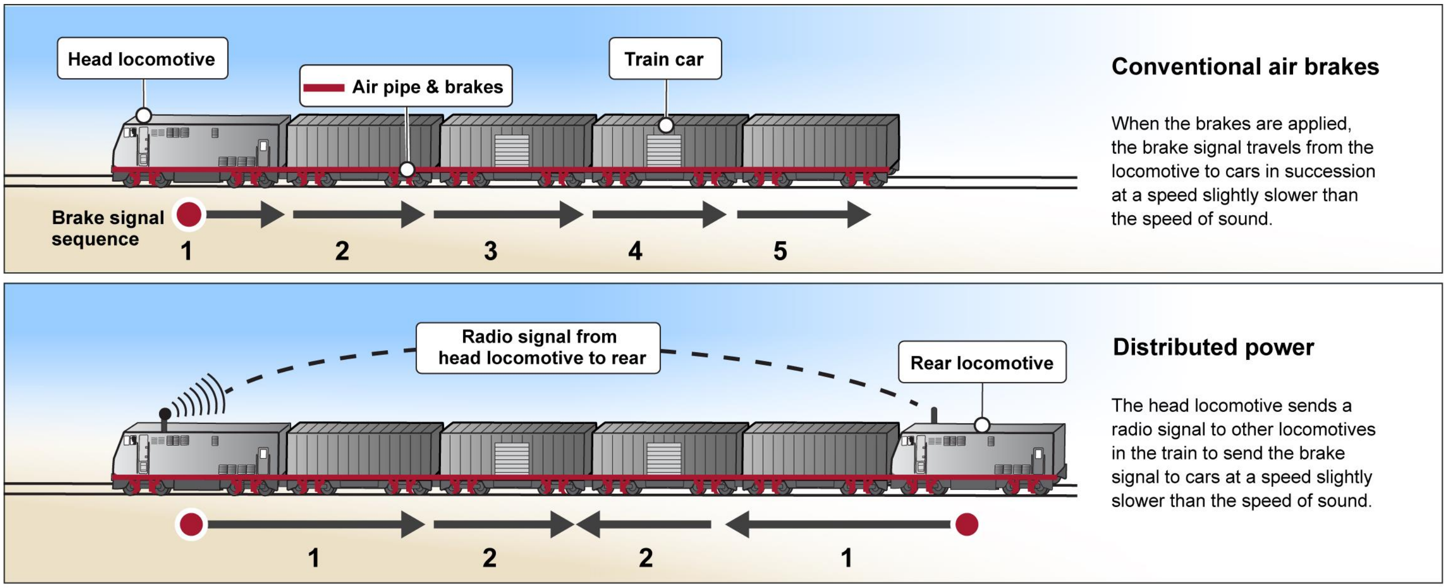
as railcars at the front of the train that have applied brakes will be pushed by railcars further back that have not yet received the air signal.

Other technologies, including two-way end-of-train devices and DP, are frequently used by U.S. railroads in conjunction with conventional brakes to provide improved braking performance or other benefits. End-of-train devices measure brake pressure and transmit this information via radio signal to the front of the train. An end-of train-device can also engage air brakes at the rear end of a train in an emergency to decrease the time required to apply the brakes on all cars.[17] As previously mentioned, railroads can also place radio-controlled locomotives, called DP units, throughout trains to spread out pulling and pushing power and improve braking. For example, engineers can engage a DP locomotive's air brakes at the same time as a leading locomotive to decrease the time needed to activate brakes throughout the train. (See fig. 2.) Engineers can also use a locomotive's dynamic brake system, which uses traction generated by the engine, to slow a train.[18]

[17]FRA regulations address situations where radio communication is lost between an end-of-train device and the front of a train. Federal regulations require that if a radio signal is lost for more than 16 minutes and 30 seconds between the lead locomotive and end-of-train device, the grade trains may traverse is limited and trains may travel no more than 30 miles per hour until the signal returns. 49 C.F.R. § 232.407(g).

[18]Dynamic brakes cannot be used as a substitute for air brakes. 49 C.F.R. § 232.109(j)(1).

Figure 2: Brake Signals on Trains with Conventional Air Brakes and Distributed Power



Source: GAO analysis of information from the Department of Transportation (DOT). | GAO-19-443

While most railroads employ conventional brakes, railroads can also employ electronically controlled pneumatic brakes—which provide an electronic brake signal instantaneously throughout a train—allowing railcars to brake faster than with conventional air brakes. As we previously reported, electronically controlled pneumatic brakes reduce the in-train forces that occur during braking when individual cars push and pull against one another.[19]

Train Crews

Freight trains in the United States generally operate with two crew members—the conductor and the engineer. The conductor is responsible for the train, freight, and crew. The engineer operates the locomotive, including application of air brakes, dynamic brakes, and any radio-controlled DP locomotives. Train crews use hand-held radios to communicate when they are working in different parts of the train. For example, if the crew detects a train maintenance issue, the conductor may need to leave the locomotive and walk the length of the train to

[19]For more information, see GAO, *Train Braking: DOT's Rulemaking on Electronically Controlled Pneumatic Brakes Could Benefit from Additional Data and Transparency,* GAO-17-122 (Washington, D.C.: Oct. 12, 2016).

address the problem. In these situations, the conductor may use a hand-held radio to communicate.

The Role of Federal Agencies and States

FRA and States

The U.S. Department of Transportation (DOT) is responsible for ensuring the safety of the transportation system. Within DOT, FRA is the primary federal agency responsible for formulating railroad safety policies and regulations and for monitoring and enforcing railroads' compliance with requirements. FRA's mission is to enable the safe, reliable, and efficient movement of people and goods.

FRA provides regulatory oversight of the safety of U.S. railroads, including both passenger and freight. FRA issues and enforces safety regulations including requirements governing track, signal, and train control systems, grade-crossing warning systems, mechanical equipment such as locomotives and railcars, and railroad-operating practices. In developing most of its regulations, FRA seeks input from the railroad industry and other organizations through its Railroad Safety Advisory Committee.[20]

FRA provides oversight of railroad safety through a variety of activities, including periodic inspections and enforcement actions. FRA has safety inspectors and specialists in eight regional offices that are primarily responsible for the enforcement of federal laws and regulations related to railroad safety. FRA conducts inspections of railroads to monitor compliance with safety regulations, such as those governing the transport of hazardous materials, among other issues. In addition, 31 states conduct inspections for compliance with federal safety regulations. FRA

[20]To adopt a participatory approach to rulemaking, in 1996, FRA first established the Railroad Safety Advisory Committee, which is designed to bring together all segments of the rail community to provide advice and recommendations to FRA on railroad safety issues. The committee includes representatives from railroads, labor, shippers, industry associations, and other government agencies. The committee provides recommendations to FRA on issuing and updating regulations and identifies non-regulatory approaches to improve safety. According to FRA, the full committee last met in April 2019. In addition, FRA added it fully complies with the Administrative Procedure Act requirements for notice and comment from the public, and benefit-cost, small business, and other analyses.

trains state inspectors to enable them to conduct inspections according to FRA's standards.[21]

In addition to these activities, FRA conducts other types of safety oversight to reduce train accidents, such as analyzing railroad safety data, investigating accidents, and reviewing complaints. FRA also funds research and development to support its safety oversight. FRA's Office of Research, Development, and Technology conducts research to understand railroad safety risks and improve safety. This work contributes information used to inform FRA's development of regulations, standards, and best practices.

Other Federal Agencies

Other federal agencies also have roles in overseeing freight railroads, such as through promoting safety or regulating railroad industry economics. For example, NTSB is an independent federal agency that produces safety studies and investigates transportation-related accidents across all transportation modes to determine probable causes, identify safety issues, and make recommendations to prevent recurrences. STB oversees significant rail-service matters and resolves rate and service disputes between railroads and their customers, known as "shippers." Class I railroads report data to STB on the amount and type of freight they transport. STB produces and releases statistical data derived from the railroad's submitted data.

[21] In 2013, we examined how FRA, the states, and railroads work together to ensure rail safety and identified any challenges to FRA's safety framework. We found that FRA faced several rail safety challenges, including adjusting to changing rail traffic flows and ensuring it had enough inspectors for its current and future oversight workload. We recommended that FRA develop a plan for issuing its risk reduction rule—which will require Class I railroads to identify and mitigate risks through risk reduction programs—and further, to review and approve railroads' risk reduction programs once completed. These programs are designed to provide a comprehensive process for the application of criteria and techniques to help railroads proactively manage safety. FRA has implemented this recommendation; however its risk reduction rule has not yet been finalized. See *GAO, Rail Safety: Improved Human Capital Planning Could Address Emerging Safety Oversight Challenges*, GAO-14-85 (Washington, D.C.: Dec. 9, 2013) and 80 Fed. Reg. 10950 (Feb. 27, 2015).

Freight Train Length Has Increased, and Railroads Identified Advantages to Operating Longer Trains

According to officials from all seven Class I freight railroads and representatives from AAR, FRA, STB, and other stakeholders we interviewed, freight train-length has increased in recent years; however, the data are limited. According to data that two Class I railroads provided to us, their average train length increased over the 10-year period of 2008 through 2017 by about 1,500 feet for one railroad (from about 6,000 to 7,500 feet, or up to about 1.4 miles) and about 1,200 feet for the other railroad (from about 4,900 to 6,100 feet, or up to about 1.2 miles). These data represent an increase in the average length of a train of about 25 percent for both railroads.[22] Two additional Class I railroads reported average train lengths between about 5,800 and 6,600 feet for the year 2017.[23] However, we were not able to verify increases more broadly because FRA, STB, and AAR do not collect comprehensive data on train-length in feet, and while such data are collected by Class I railroads, they are not publicly available. Officials from two Class I railroads stated that operating longer trains is not a new practice, and one official noted that the railroad has been operating trains in excess of 10,000 feet in selected rail corridors for almost 30 years. Officials from AAR added that increases in train length over time have likely been gradual.

While two Class I railroads provided data on average freight train-length over time, officials from each of the seven Class I railroads stated that they operate longer trains. Railroad officials said they operate these trains in certain rail corridors that have the capacity to accommodate longer trains, and not over their entire rail networks. For example, officials from one Class I railroad said they are running on a daily basis a 12,000-foot train—which is about 2.3 miles long—and another reported that twice

[22]Although we received data describing average train length from five of seven Class I railroads, we are reporting data for the two Class I railroads that provided data with a sufficient number of years to describe a trend. These two railroads represented about 6 percent of all Class I's revenue-ton-miles in 2017. Each Class I railroad is unique, and the information provided by these railroads over time is used for illustrative purposes only and is not representative of all Class I railroads.

[23]These two railroads represented about half of all Class I's revenue-ton-miles in 2017. While these data do not describe trends over time, they provide information on average train-length in 2017 for additional Class I railroads.

weekly it operates a 16,000-foot train—which is about 3 miles long—on a route linking the mid-west to the west coast. Both of these Class I railroads noted that longer trains such as these are a small percentage of the trains they operate. More specifically, one of these railroads reported that over the previous 24 months, about 1 percent of its train-miles were traveled by trains over 10,000 feet long, and the other reported that about 2 percent of its current train-miles were traveled by trains over 10,000 feet long.[24]

Other data describing the average number of railcars per train and average weight of trains indicate an overall increase over the past 10 years. However, these measures are not proxies for freight train-length since the length and weight of railcars can vary significantly depending on their design and freight.[25] Class I railroads are required to report data, such as the freight car-miles, to STB annually,[26] and AAR aggregates and makes this information publicly available in various publications.[27] We analyzed these data and found that the average number of railcars per freight train across all Class I railroads increased from 71.0 to 73.2 railcars per train (an increase of about 3 percent) from 2008 through 2017. Additionally, FRA and some Class I railroad officials stated that railroads operate freight trains that have more than twice this average number of railcars—including trains with 150 railcars or more. Similarly,

[24]These two Class I railroads reported that trains between 6,000 and 8,000 feet in length comprised the majority of their train-miles traveled (about 67 percent and 55 percent, respectively).

[25]For example, according to one Class I railroad, their boxcars (i.e., covered railcars with sliding doors that carry a wide range of products) may range in length from 50 feet to 86 feet and can carry from 70 to 100 tons apiece. In contrast, their hoppers (i.e., covered or uncovered railcars into which bulk commodities are loaded from the top) range in length from 39 feet to 65 feet and vary in capacity from 70 to 110 tons. As a result, a 100-car train composed of “standard” box cars (e.g., 50-foot cars) would be shorter than another 100-car train composed of “jumbo” hopper cars (e.g., 65-foot cars).

[26]49 U.S.C. § 11145 and 49 C.F.R § 1241.11. As previously mentioned, every Class I railroad operating in the United States is required to submit an annual report (R-1) to STB that includes a variety of information such as data on freight car-miles (a way to measure the movement of various types of freight car equipment a distance of 1 mile), train-miles (a movement of a train the distance of 1 mile), and ton-miles (a representation of the number of tons of revenue and non-revenue freight moved 1 mile in a transportation train).

[27]As previously mentioned, AAR publishes a variety of railroad industry and economic reports, such as the annual publications *Freight Commodity Statistics* and *Railroad Facts*, and trend reports such as *Railroad Ten-Year Trends*.

the average train weight increased from about 5,978 tons to 6,577 tons per train (an increase of about 10 percent) from 2008 through 2017.

Class I railroad officials said that there are advantages to operating longer freight trains in some rail corridors and that operating longer trains is part of strategic planning for many railroads for a variety of reasons. Officials from all Class I railroads stated that they operate longer trains in some rail corridors as a way to increase efficiencies, such as fuel efficiency, and decrease costs by reducing the number of train crew and other costs. Additionally, railroad officials said that running longer trains can mean that they do not need to operate as many trains—officials from six Class I railroads specifically indicated they are operating fewer shorter trains as a result of operating longer trains. Further, Class I railroad officials stated that market forces, such as competition from the trucking industry, create an incentive for them to increase efficiency. Class I railroad officials also stated that the use of certain technologies, such as DP locomotives, enables them to operate longer trains more safely. Other Class I railroad officials attributed their increased usage of longer trains to capital improvements on railroad tracks, such as lengthening the sidings to accommodate longer trains.

Stakeholders Identified Considerations for Safely Operating Longer Freight Trains and Potential Impacts on Communities

Considerations for Operating Longer Trains Include Train Makeup and Handling and Crew Training

Train Makeup and Handling

While the need for proper train makeup and handling are not unique to longer trains, it is particularly important for their safe operation, according to stakeholders we spoke with. As previously discussed, the length of each train and its makeup—the manner in which its cars and locomotives are arranged—can affect the forces involved on a moving train.[28] Stakeholders we spoke with said that the consequences of improper train makeup may be more pronounced in longer trains—especially in situations with extremes in track grade, curvature, or weather conditions—and may add to the challenges of operating longer trains. For example, FRA has investigated accidents in which it determined that train makeup and handling were the probable cause and contributing factors in train derailments of longer freight trains.[29] According to officials from FRA, NTSB, railroad employee unions, and other stakeholders, longer mixed-freight trains may be more difficult to handle than unit trains in certain

[28]See FRA, *Safe Placement of Train Cars: A Report* (June 2005).

[29]More specifically, one such derailment in Atlanta, Georgia in October 2017 involved a train with 197 railcars that was nearly 2.4 miles long. In other examples, FRA investigations have identified problems with couplers—the connection that joins railcars—associated with long, heavy trains traveling through undulating terrain. According to FRA, train makeup accidents are not new to the industry or to longer trains. Further, FRA stated that train makeup accidents occur on all trains and all train lengths and that most Class I railroads use computer programs that evaluate an individual train's car makeup and warn of placement errors.

circumstances due to variations in car length and weight and the extent to which additional DP locomotives are employed.

Stakeholders noted that placing additional DP locomotives within a train can improve train handling and prevent train separations and derailments. Stakeholders added that using DP can also help improve air brake performance and reduce braking response time, as previously discussed. In addition, according to stakeholders, use of properly positioned DP locomotives can improve radio communication between the lead locomotive and rear DP locomotives on longer trains.[30] Union representatives added that in their view, the safest train-braking operations are when DP locomotives are used in conjunction with electronically controlled pneumatic brakes. According to representatives from AAR and Class I railroads, however, freight railroads have faced challenges with these braking systems, including reliability issues, as we have noted in a previous report.[31]

While there are no comprehensive federal regulations that govern train makeup, including use of DP locomotives, representatives of Class I railroads told us they consider a variety of factors when determining train makeup to ensure safe operation of all of their trains, including tonnage, train-length, and terrain.[32] According to one railroad, using software to determine train makeup and predict train handling needs is an industry standard and critical best practice. Another railroad told us they use computer simulations to develop rules for train makeup in order to operate longer and heavier trains. Some railroads told us they impose

[30]Union officials said that these communications can fail when longer trains travel around curves, over the tops of mountains, or through terrain with dense vegetation. Representatives from Class I railroads mentioned use of communication transmitters or repeaters to increase signal strength and improve the radio communication between the head and end of a train. A radio repeater is a combination of a radio receiver and a radio transmitter that receives a weak or low-level signal and retransmits it at a higher level or higher power, so that the signal can cover longer distances without degradation. As previously mentioned, pursuant to 49 C.F.R. § 232.407(g), if an end-of-train device loses its radio communication signal with the front of the train for more than 16 minutes and 30 seconds and, as a result, is unable to initiate an emergency brake application, the engineer is notified, and the train's speed is limited to 30 miles per hour.

[31]GAO-17-122.

[32]According to FRA, while there are no comprehensive requirements that govern train makeup, FRA enforces regulations set forth by the Pipeline and Hazardous Materials Safety Administration that govern the placement of placarded hazardous material cars in a train. 49 C.F.R. § 174.85.

length and weight restrictions on specific routes to ensure safe train operation and manage corridor capacity. Union representatives and rail experts we spoke with told us that in their view, railroads do not always properly assemble their longer trains, for example placing heavy railcars behind lighter railcars, a practice that can increase the likelihood of derailment. These stakeholders also said that railroads do not always use DP with longer trains, which experts attributed to the extra cost of deploying additional locomotives. We did not independently verify how the railroads we spoke with assemble or operate longer trains.

Training Crews to Operate Longer Trains

Stakeholders we interviewed said that it is essential that crews are properly trained to operate longer freight trains. FRA regulations require railroads to train and certify their train crews.[33] More specifically, FRA requires qualified locomotive engineers to demonstrate proficiency in operating trains in the most demanding type of service they may be permitted to perform, which includes operating longer trains.[34] Railroads are required to conduct annual performance evaluations of engineers to ensure that they can safely operate trains according to federal railroad safety requirements.[35] Representatives of Class I railroads told us they train their crews on trains and simulators with various routes, scenarios, and train lengths. However, union representatives said that some railroads do not provide sufficient training for crews to operate longer trains, and that some locomotive engineers and conductors lack the necessary training and experience to handle longer trains, a situation that can be challenging even for properly trained crew. As discussed later, FRA is planning to review this issue when it performs planned audits of Class I railroads' training programs.

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[33] 49 C.F.R. Parts 240, 242, and 243.

[34] 49 C.F.R. § 240.213. FRA regulations require that each railroad shall determine that the person has the knowledge and skills to safely operate a locomotive or train in the most demanding class or type of service that the person will be permitted to perform. Specific topics for training programs include personal safety, railroad operating rules, handling trains over the railroad's territory, federal regulations, and operating the different train types normally used by the railroad.

[35] 49 C.F.R. § 240.129. In addition, FRA regulations require that FRA review new and materially modified railroad-crew-training programs and also meet with railroads to discuss strategies to reduce instances of poor safety conduct by train crews. See 49 C.F.R. § 240.103 and 49 C.F.R. § 240.309, respectively. According to FRA, the agency may audit training programs and require railroads to update deficient training programs to comply with regulations.

Stakeholders we interviewed identified additional challenges for crews when operating longer freight trains related to crew members' fatigue. For example, according to FRA, union representatives, and other stakeholders, a longer train may require crew members to walk a long distance if the train stops unexpectedly. For example, when there is a mechanical or other problem that causes a train to stop, the conductor may have to walk from the lead locomotive to the problem area and back again. This could mean walking 4 miles to the end and back on a 2-mile-long train. Also, according to FRA officials, as with any train that is left unattended, the crew must apply a sufficient number of handbrakes to prevent unintended movement. With longer and heavier trains, railroads may require additional handbrakes to be applied. According to union representatives, such physically demanding tasks can increase crew fatigue.

Longer Trains May Impact Grade Crossings in Communities

Stakeholders we interviewed expressed divergent views about whether longer trains may increase or decrease blockages at grade crossings. Our prior work has noted a connection between the volume of freight rail traffic and the potential for grade-crossing blockages to increase.[36] In 2014, we found that trends in freight flows, if they continue as expected, may exacerbate congestion issues in communities, particularly along certain corridors.[37] FRA officials told us that complaints about blocked highway-rail grade crossings have increased in recent years. They noted that blocked crossings are a local concern and it is not clear the extent to which longer freight trains are contributing to increases in reporting about such blockages. According to FRA, trains sometimes block crossings for a limited time or for hours if an accident or mechanical problem occurs. They noted that such blockages can be created by trains of any length

[36]As we previously reported, the amount of time that highway-rail grade crossings are blocked depends on a number of factors and is typically a function of the number, speed, and length of trains. See GAO-16-274.

[37]We found a key impact of increasing freight flows is congestion at highway-rail grade crossings, where road traffic must wait to cross the tracks when trains are passing. We recommended that DOT clarify the federal role for mitigating local freight-related congestion in the National Freight Strategic Plan, including a strategy for improving needed data. According to DOT officials, they are continuing work on the National Freight Strategic Plan and believe it will be released in 2019. See GAO, *Freight Transportation: Developing National Strategy Would Benefit from Added Focus on Community Congestion Impacts,* GAO-14-740 (Washington, D.C.: Sept. 19, 2014).

and that in their experience, railroads prioritize movement of longer trains, making it less likely that such trains would be responsible for prolonged blockages of crossings. Furthermore, officials from FRA and Class I railroads and others we spoke with pointed out that longer trains may decrease the frequency of blocked crossings, as railroads may run fewer trains.

In contrast, officials from the National League of Cities, as well as state and local officials we spoke with, expressed concerns over increased frequency of longer trains and their impact on grade crossing safety.[38] Although they also acknowledged that trains of any length can block grade crossings, they raised concerns that longer trains prolong the duration of a blockage and can block more crossings concurrently, making it harder for vehicles to find an alternate route around the train. Consequently, these stakeholders are concerned that longer trains create increased delays for emergency responders and increase the likelihood of unsafe behavior among motorists and pedestrians, as outlined below.

- *Delayed emergency response*. According to national, state, and local officials we interviewed, longer trains pose concerns about the potential for emergency response delays if responders encounter a train blocking one or more crossings and cannot quickly find an alternate route around it. (See fig. 3.) For example, officials in Mount Victory, Ohio, reported that 22 freight trains travel through their town daily, including a 16,000-feet train, which is nearly 3 miles long. This train blocks 4-to-5 grade crossings concurrently, which increases the time to access parts of the town, according to local officials. Our prior work has found that blocked highway-railroad grade crossings can have significant impacts on emergency response time and outcomes.[39] For example, we reported an instance of a fire that destroyed a house while train traffic blocked the only two crossings in the town and prevented fire crews from responding in time. In another example, a local official in Texas said that one Class I railroad assembles trains and conducts brake checks on the main line tracks

[38]The National League of Cities is a membership organization that represents the interests of 19,000 cities, towns, and villages across the United States, as well as professionals working in local government.

[39]In our report, we recommended that DOT clarify the federal role for mitigating local freight-related congestion in the National Freight Strategic Plan, including a strategy for improving needed data. DOT has not yet implemented this recommendation. See GAO-14-740.

because the trains are too long to fit into sidings and railyards. Executing such procedures on mainline track has blocked grade crossings for up to several hours and poses safety challenges for surrounding communities, according to this local official. As a result of situations like these, communities are looking for ways to mitigate delays in emergency services when emergency vehicles must find ways around blocked grade crossings. For instance, some local officials in Washington and Ohio said they have revised their emergency response plans to avoid grade crossings that are likely to be blocked.

Figure 3: Emergency Vehicle Blocked by Freight Train

Source: National Industrial Transportation League – Photo by Bruce Ridley. | GAO-19-443

- *Motorist and pedestrian behavior*. Stakeholders we spoke with expressed concerns that longer trains may increase the likelihood of unsafe behavior among motorists and pedestrians. For example, fatalities can occur when motorists or pedestrians engage in risky behavior such as trying to make it across the tracks before an approaching train reaches the crossing. Moreover, pedestrians have been known to crawl over, through, or under stopped trains (see fig. 4). For example, local officials in Ohio and Texas told us that they have witnessed children crawling through stopped trains to get to school. Research sponsored by FRA has identified driver behavior as the main cause of highway-rail grade crossing collisions, but other factors such as train and traffic volume can contribute to the risk of a crash occurring.[40]

Figure 4: Individuals Climbing through Stopped Train

Source: Federal Railroad Administration. | GAO-19-443

Although there are no current federal regulations that directly address blocked crossings or limit the amount of time trains can block grade crossings, some states and localities have attempted to address this issue.[41] For example, some states and localities have passed laws limiting the duration of blocked crossings and proposed fines for

[40]In our 2018 report on grade crossings, state officials we spoke with explained that drivers may become impatient waiting at a grade crossing and decide to go around the gates, an action that may increase the likelihood of collisions. Crashes at highway-rail grade crossings are one of the leading causes of railroad-related deaths. According to FRA data, in 2017 there were more than 2,100 crashes resulting in 273 fatalities. Over 70 percent of fatal railroad crashes in 2017 took place at grade crossings with gates. See GAO, *Grade Crossing Safety: DOT Should Evaluate Whether Program Provides States Flexibility to Address Ongoing Challenges.* GAO-19-80 (Washington, D.C.: Nov. 8, 2018).

[41]While there are no current federal regulations that directly address blocked crossings, FRA stated that 49 C.F.R. § 234.209 prohibits standing trains, locomotives, and other railroad equipment from unnecessarily activating grade crossing warning devices. According to FRA, this is not limited to standing trains, locomotives, and other railroad equipment that block vehicular access to the crossing.

railroads,[42] but state and local officials and other stakeholders we spoke with said that federal law preempts such efforts.[43] Other states and local communities have attempted to address blocked crossings through studies and communication with federal agencies and railroads, with mixed success. For example, the Texas Department of Transportation has undertaken mobility studies for the towns of El Paso and Laredo to identify options to address blocked crossings, such as constructing bridges or underpasses. According to officials with the Texas Department of Transportation, these studies identified alternatives that may help alleviate some of the vehicular/rail conflicts if they were implemented; however, the implementation of alternatives for any potential projects are constrained by the availability of funds.[44] In other examples, local officials from Ohio and Illinois told us they have contacted Class I railroads and FRA to find solutions when idle trains lead to blocked crossings, especially when emergency access is a concern but continue to face challenges. Class I railroads and FRA officials said they work with local communities to find solutions to these issues.

Additionally, state and local officials noted that they do not have access to information on the length of trains that travel through their communities.[45]

[42]State laws on blocked grade crossings vary. According to FRA, 35 states and Washington, D.C. have laws addressing blocked crossings by on-track railroad equipment. More specifically, 7 states have no time limit; 14 states and Washington, D.C. allow no longer than 5 minutes; 10 states allow no more than 10 minutes; 3 states allow no more than 15 minutes; and 1 state allows for no more than 20 minutes for a train to block a crossing.

[43]In some specific cases, courts have found state and local legal actions are preempted under the Interstate Commerce Commission Termination Act and federal railroad safety statutes. For example, in 2008, the Illinois State Supreme Court struck down a state law regulating the amount of time trains can block highway-rail grade crossings finding that the state law was preempted by federal law. *Eagle Marine Industries, Inc. v. Union Pacific R. Co. 882 N.E.2d 522 (Ill. 2008)*. In 2001, a federal appeals court also ruled that a state law on blocked crossings could not be enforced because it was preempted by federal law. *Friberg v. Kansas City S. Ry. Co.*, 267 F.3d 439, 443 (5th Cir. 2001).

[44]We previously reported that DOT grants to states can be used to improve safety at grade crossings but eliminating crossings completely–for example by constructing a bridge or underpass—is uncommon compared to other grade-crossing safety projects. See GAO-19-80.

[45]In 2016, we reviewed blockage of highway-rail grade crossings in border communities. We found that DOT's data improvement efforts could better equip state and local governments to define the extent of blocked highway-rail grade crossings in communities nationwide, including at rail border communities. See GAO, *U.S. Border Communities: Ongoing DOT Efforts Could Help Address Impacts of International Freight Rail,* GAO-16-274 (Washington, D.C.: Jan. 28, 2016).

Some added that freight railroads are not required to provide such data and that local efforts to gather this information, such as through videotaping train movements and analyzing data, are costly. This circumstance makes it challenging for state and local officials to assess the extent to which longer trains may or may not be contributing to blocked crossings.

FRA Is Studying Operational Risks of Longer Trains but Lacks a Strategy for Sharing Research Results and Is Not Fully Assessing Community Risks

FRA Is Studying Operational Risks of Longer Freight Trains

In the fall of 2017, FRA began a study to understand operational risks of long freight trains.[46] The study is examining issues related to train makeup and handling, including the use of DP locomotives, crew training and fatigue, and braking performance for longer trains. The study intends to identify strategies to reduce any risks identified. According to FRA, as the railroad industry has increased the length of freight trains, past accepted practices for train makeup and handling may not be appropriate for longer trains. For example, according to FRA, the current performance standard for air brakes was last updated in 1947 and based on tests for trains with up to 150 cars. FRA officials stated the study will conduct air brake tests to evaluate brake performance for trains with 150-to-250 railcars and use this data to conduct computer simulations of trains in a variety of configurations—for example, with and without DP and with DP locomotives at different locations throughout a train—to evaluate in-train forces. According to FRA officials, this information will help FRA determine whether rail safety issues exist for trains with over 150 railcars and if regulatory actions are necessary.

[46]Although FRA regulations do not define a long train, for the purposes of the study, FRA defines a "very long train" as a freight train greater than 150 railcars. According to FRA, this definition was chosen because current performance standards for air brakes are based upon a 150-railcar train. See 49 C.F.R. § 232.103 (l) and AAR Standard S-469, "Performance Specification for Freight Brakes," which is incorporated by reference in the regulation.

The study employs a two-phase approach that includes data analysis, literature review, computer simulations, and brake testing. FRA officials said the agency plans to complete the first phase of its study and issue a report by the end of 2020 and issue a report on the second phase by the end of 2021. Table 1, below, outlines specific tasks of the study by phase.

Table 1: Selected Tasks in the Federal Railroad Administration's (FRA) Study on Longer Freight Trains

Phase	Tasks
Phase I (2020 expected completion)	• Identify routes, frequency, operating practices, and potential risk factors for operating longer trains. • Review crew fatigue studies and analyze FRA accident data to understand causes of accidents, injuries, and fatalities (including human factors) for trains of more than 150 cars.[a] • Conduct a literature review on operations, experiences, and challenges of operating long trains in the United States and other countries, including providing information on new training programs to operate longer trains. • Conduct simulations with a variety of train lengths, track scenarios, train makeups (e.g., trains with and without distributed power), handling options, and other factors to understand how to minimize in-train forces.
Phase II (2021 expected completion)	• Test air brake performance for trains of 150–250 cars using air-brake test racks and field tests.

Source: GAO analysis of Federal Railroad Administration documents. | GAO-19-443

[a]For the purposes of FRA's study, a "very long train" is defined as a freight train greater than 150 cars. Neither industry standards nor federal rail safety regulations define a long train nor limit train length, according to FRA.

As we previously mentioned, FRA provides oversight of railroad safety through a variety of activities to ensure compliance with regulations, such as conducting inspections of railroad operations and reviewing and approving new and materially modified railroad crew training programs. According to FRA officials, these activities address safety for all freight trains, including longer trains. In addition to these activities, FRA plans to begin new, more in-depth audits of Class I railroads' training programs on a systematic basis in 2019 to determine whether engineers are being adequately trained to operate longer trains and perform other types of demanding service. According to FRA, these audits will determine whether locomotive engineer certification programs are in compliance with federal rail safety regulations. For example, federal regulations require that railroads provide training to their engineers—through classroom lessons and in trains or simulators—on the most demanding type of service they may be called upon to perform.[47] According to FRA officials, this would include operation of longer freight trains in challenging terrain. FRA plans to audit the training programs of three Class I railroads by the end of 2019, selected based upon safety risk factors, with additional audits of other railroads planned for the following year. Once the audits are complete, FRA plans to discuss its findings with each audited railroad and make recommendations for improvements, as needed.

FRA Lacks a Strategy for Sharing the Results of Its Study on Longer Trains

While FRA's study to assess operational safety risks of longer trains is under way, the agency lacks a current, documented strategy for how it will use and share the results of its research with relevant stakeholders. According to FRA officials, after internal review and approval, the agency routinely shares its research results at conferences and on its website.[48] However, FRA's strategic plan for research and development, which outlined how the agency shares research results and engages with internal and external stakeholders in support of FRA's rail safety mission, expired in 2017.[49] More specifically, this plan outlined key internal and external stakeholders and their roles—including labor and industry partners—and specific outreach strategies, such as holding periodic, public events to present FRA's research and development. This plan also stated that FRA's research provides the scientific and technological basis for its rulemaking and regulation enforcement and that effectively sharing the results of its studies increases the likelihood that its research will have "real world" impacts. According to FRA officials, the agency is currently updating its strategic plan for research and development, which will outline FRA's goals and objectives for its research, and expects to finalize the plan by the summer of 2019. FRA does not have any other documented policies in place for how it will use or disseminate the results of its study.

[47] 49 C.F.R. § 240.127(b).

[48] For example, between January 1, 2018, and April 15, 2019, FRA posted on its website 80 technical reports and research results, according to FRA.

[49] FRA, *Research and Development Strategic Plan, FY2013-FY2017* (Washington, D.C.: May 2013).

Federal internal control standards call for management to communicate quality information—using appropriate methods—both internally and externally in order to achieve an entity's objectives and respond to risks.[50] Further, our work on best practices for strategic planning has found that formulating specific strategies and linking them with goals and objectives is critical for agencies to achieve these goals and objectives.[51] In addition, we previously identified generally accepted research standards for sound studies, standards that include presentation of results.[52] These standards call for relevant stakeholders to be informed of research results and any recommendations upon completion of a study.

The Transportation Research Board—a part of the National Academies of Sciences, Engineering, and Medicine which provides research-based solutions to improve transportation, among other things—has found that organizations that develop processes and a systematic approach to implementing research are more effective and efficient at applying research results.[53] FRA's study is a first step for determining how, if at all, makeup and handling for longer trains as well as their crews' needs may differ from shorter trains. If study results are effectively shared with relevant stakeholders, then those best situated to act on the results may be more likely to do so. For example, FRA officials—who have rulemaking and enforcement authority—could identify and implement changes needed to improve the safety of longer train operations, such as by issuing relevant guidance, rulemaking, or other actions. Similarly, external stakeholders, such as Class I railroads and workers, would have the opportunity to use study results to inform their practices and policies, such as making changes to internal train-makeup rules or operators' training programs for longer trains. As FRA updates its strategic plan for research and development, formulating specific strategies for how it will share its research results with internal and external stakeholders would help to ensure FRA is in the best position to achieve its research goals and objectives in support of the agency's mission of enabling the safe, efficient, and reliable transportation of people and goods.

[50]GAO-14-704G.

[51]GAO/GGD-97-180.

[52]GAO-06-938.

[53]Transportation Research Board, *National Cooperative Highway Research Program Synthesis 461: Accelerating Implementation of Transportation Research Results* (Washington, D.C.: 2014).

FRA Is Not Fully Assessing Community Impacts Related to Longer Trains

While FRA is taking steps to assess operational safety risks of longer trains through its study and other efforts, it is not assessing whether longer freight trains impact communities by blocking more grade crossings. Safety at grade crossings has been a longstanding issue in the United States, and according to stakeholders we spoke with, some of these issues may be exacerbated by longer trains. In 2006, as part of its report on the impacts of blocked grade crossings on emergency response services, FRA stated that future growth in rail and highway traffic will likely increase blocked crossings, and more recently FRA officials stated that this is still the case.[54] In addition, while collisions at grade crossings have declined over time, FRA also expects the risk of grade-crossing incidents to grow as both rail and highway traffic increase during the next decade. However, FRA officials also stated that there is no evidence that more blocked crossings results in more grade-crossing incidents. Further, according to FRA, the agency is not in a position to address community-specific public safety issues. We have previously reported that the amount of time that grade crossings are blocked depends on a number of factors and is typically a function of the number, speed, and length of trains.[55]

Although there are no federal regulations directly addressing blocked grade crossings, to gauge the extent of reported instances of blocked crossings, in early 2018, FRA began to track data on the location of blocked-crossing complaints from state rail-safety managers in nine states.[56] FRA officials stated they intend to use this data to identify communities where frequently blocked grade crossings are reported and work with the railroads and communities for resolution. However, FRA officials said they do not plan to explore any potential impacts of longer trains on grade crossings in communities, as FRA officials have stated they do not believe that longer trains are having an impact on blocked crossings. For example, FRA does not plan to use any of the information

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[54]FRA, *Impact of Blocked Highway/Rail Grade Crossings on Emergency Response Services* (August 2006).

[55]GAO-16-274.

[56]FRA is tracking this data to learn more about the locations of blocked crossings in each of the nine states. Specifically, it is placing a mark on a computerized map at the location of each blocked crossing complaint.

gathered in its longer train study—which will include a sampling of the routes longer trains travel—to inform the agency's work on blocked crossings because FRA officials stated that they do not expect the study will yield relevant information. State and local officials we spoke with, as previously mentioned, expressed concerns about the potential for longer trains to increase the number of blocked grade crossings, causing delays for emergency responders and affecting the behavior of motorists and pedestrians.

Federal internal control standards state that effective use of information and communication are vital for an entity to achieve its objectives. These standards call for management to use quality information—relevant, reliable information that is current, complete, accurate, accessible, and timely—to achieve an agency's objectives and respond to risks. Further, we previously identified essential practices for agencies to help manage risks and identify opportunities that could impact the achievement of agencies' goals. These risk-management practices call on agencies to systematically identify risks and use the best information available to assess them.[57]

Community officials acknowledged that while they believe longer trains are making blocked crossings worse, they do not have access to information needed to confirm this observation. As previously discussed, some local communities continue to face challenges after reaching out to FRA and Class I railroads to find solutions to issues related to grade crossings. As these issues continue to evolve and FRA works to identify locations where blocked crossings are reported, working with railroads and local communities to identify any potential impacts of longer trains on grade crossings would help FRA to determine whether and how longer trains are affecting these communities and what could be done to address those impacts. In addition, it would allow FRA to determine whether it should take additional action to ensure that longer trains are operating safely and to work with railroads to minimize their impact to the communities through which they travel.

[57]GAO, *Enterprise Risk Management: Selected Agencies' Experiences Illustrate Good Practices in Managing Risk*, GAO-17-63 (Washington, D.C.: Dec. 1, 2016).

Conclusions

FRA faces a challenging task in assessing the safety impacts of longer trains and has taken some important steps to collect needed information through its study of longer trains' operations. However, without documented strategies for how it plans to communicate the results of its research, FRA may lose an opportunity to effectively work with internal and external stakeholders—such as railroads, railroad workers, and local communities—to address any risks of operating longer trains in support of the agency's mission of enabling the safe, efficient, and reliable transportation of people and goods. In addition, local community officials we spoke with raised concerns that longer trains are creating safety risks by causing emergency response delays and exacerbating dangerous motorist and pedestrian behavior, but acknowledged that they lack access to information on longer trains. FRA, however, is uniquely positioned to assess whether these concerns have merit. As FRA has stated, it expects that future growth in rail and highway traffic will increase incidences of blocked crossings and the risk of grade-crossing incidents. As traffic continues to grow—including railroads' potential increased use of longer trains—having better information could be useful to FRA and other stakeholders. Without examining the potential impacts of longer trains on local communities, including on blocked grade crossings, FRA may lose an opportunity to identify what, if any, additional actions should be taken to ensure the safety of longer trains and the communities through which they travel.

Recommendations

We are making the following two recommendations to FRA:

- The Administrator of FRA should develop a strategy for sharing FRA's research results with internal and external stakeholders and implement that strategy for its research on the safety impacts of very long trains. (Recommendation 1)
- The Administrator of FRA should work with railroads to engage state and local governments to (a) identify community-specific impacts of train operations, including longer trains, where streets and highways cross railroad rights-of-way and (b) develop potential solutions to reduce those impacts. (Recommendation 2)

Agency Comments

We provided a draft of this report to DOT, NTSB, and STB for their review and comment. In its comments, reproduced in appendix I, DOT concurred with the recommendations. DOT and STB also provided technical comments, which we incorporated as appropriate. NTSB had no comments.

As agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to the appropriate congressional committees, the Secretary of Transportation, the Chairman of NTSB, the Chairman of STB, and other interested parties. In addition, the report will be available at no charge on the GAO website at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-2834 or FlemingS@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix II.

Susan A. Fleming
Director, Physical Infrastructure Issues

Appendix I: Comments from the U.S. Department of Transportation

U.S. Department of Transportation

Office of the Secretary of Transportation

1200 New Jersey Avenue, SE
Washington, DC 20590

MAY 13 2019

Susan A. Fleming
Director, Physical Infrastructure Issues
U.S. Government Accountability Office (GAO)
441 G Street NW
Washington, DC 20548

Dear Ms. Fleming:

The Federal Railroad Administration (FRA) works to promote safety in every area of railroad operations and to reduce the occurrence of railroad-related accidents and incidents. As GAO noted in its draft report, FRA is studying rail centric operational risks associated with freight trains of over 150 cars long. Thus, FRA's study is focused on evaluating the train dynamics of operating longer trains to include, for example, train makeup, handling, and braking performance, and associated risk of derailment. Reorienting the study to assess the impact of longer freight trains on local communities would too greatly depart from the study's present objectives and contract.

FRA is also concerned about safety at grade crossings. FRA is already working with railroads and local and state governments to address blocked crossings and other community-specific impacts of train operations. For example, to address the root causes of grade crossing collisions and trespassing incidents, FRA conducts a comprehensive grade crossing safety and trespasser prevention program. Major components of the program include:

- Researching ways to improve crossing safety technology, such as in-vehicle communications and advanced crossing gate systems.
- Researching driver and pedestrian behavior at grade crossings.
- Establishing FRA grade crossing safety inspector positions to enforce Federal requirements.
- Providing grants to organizations that help motorists learn how to be safe at grade crossings.
- With the National Highway Traffic Safety Administration, implementing the public safety awareness campaign – *Stop. Trains Can't.*
- Alerting railroads to the number of blocked crossing reports FRA receives, the intensity of community concerns, best practices to reduce community-specific impacts of train operations, and the benefits of working proactively with State and local governments along the railroads' rights-of-way.

While FRA is concerned about blocked crossings as well as every rail-related accident and incident, a Federal one-size-fits-all approach is not the best way to respond to every issue. Specifically, for blocked crossings, State and local governments are better positioned to address each community's unique road network and emergency service characteristics and needs, in consultation with the railroads. FRA, however, will continue to work with State and local governments, and the railroad industry, to develop potential solutions to reduce community-specific impacts of trains operations.

Upon review of GAO's draft report, we concur with both recommendations to FRA. We will provide a detailed response to each recommendation within 180-days of the final report's issuance.

We appreciate the opportunity to respond to the draft report. Please contact Madeline M. Chulumovich, Director, Audit Relations and Program Improvement, at (202) 366-6512, with any questions or if you would like to obtain additional details.

Sincerely,

Keith Washington
Deputy Assistant Secretary for Administration

Text of Appendix I: Comments from the U.S. Department of Transportation

Page 1

Susan A. Fleming

Director, Physical Infrastructure Issues

U.S. Government Accountability Office (GAO) 441 G Street NW

Washington, DC 20548

Dear Ms. Fleming:

The Federal Railroad Administration (FRA) works to promote safety in every area of railroad operations and to reduce the occurrence of railroad-related accidents and incidents. As GAO noted in its draft report, FRA is studying rail centric operational risks associated with freight trains of over 150 cars long. Thus, FRA' s study is focused on evaluating the train dynamics of operating longer trains to include, for example , train makeup, handling, and braking performance, and associated risk of derailment. Reorienting the study to assess the impact of longer freight trains on local communities would too greatly depart from the study' s present objectives and contract.

FRA is also concerned about safety at grade crossings. FRA is already working with railroads and local and state governments to address blocked crossings and other community-specific impacts of train operations. For example, to address the root causes of grade crossing collisions and trespassing incidents , FRA conducts a comprehensive grade crossing safety and trespasser prevention program. Major components of the program include:

- Researching ways to improve crossing safety technology, such as in-vehicle communications and advanced crossing gate systems.
- Researching driver and pedestrian behavior at grade crossings.
- Establishing FRA grade crossing safety inspector positions to enforce Federal requirements.
- Providing grants to organizations that help motorists learn how to be safe at grade crossings.

- With the National Highway Traffic Safety Administration, implementing the public safety awareness campaign - Stop. Trains Can 't.

Alerting railroads to the number of blocked crossing reports FRA receives , the intensity of community concerns, best practices to reduce community-specific impacts of train operation , and the benefits of working proactively with State and local governments along the railroads' rights-of-way.

Page 2

While FRA is concerned about blocked crossings as well as every rail-related accident and incident , a Federal one-size-fits-all approach is not the best way to respond to every issue. Specifically, for blocked crossings, State and local governments are better positioned to address each community ' s unique road network and emergency service characteristics and needs, in consultation with the railroads. FRA, however, will continue to work with State and local governments, and the railroad industry, to develop potential solutions to reduce community- specific impacts of trains operations.

Upon review of GAO' s draft report, we concur with both recommendations to FRA. We will provide a detailed response to each recommendation within 180-days of the final report' s issuance.

We appreciate the opportunity to respond to the draft report. Please contact Madeline M. Chulumovich, Director, Audit Relations and Program Improvement , at (202) 366-6512, with any questions or if you would like to obtain additional details.

Sincerely,

Keith Washington

Deputy Assistant Secretary for Administration

Appendix II: GAO Contact and Staff Acknowledgments

GAO Contact

Susan A. Fleming, (202) 512-2834 or FlemingS@gao.gov

Staff Acknowledgments

In addition to the contact named above, Andrew Huddleston (Assistant Director); Jean Cook (Analyst in Charge); Jason Coates; Philip Farah; David Hooper; Rosa Leung; Gail Marnik; John Mingus; Madhav Panwar; Malika Rice; Kelly Rubin; and Michelle Weathers made key contributions to this report.

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