STATEMENT FOR THE RECORD OF

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SUBCOMMITTEE ON SURFACE TRANSPORTATION, FREIGHT, PIPELINES AND SAFETY

HEARING ON:

THE NEED FOR SPEED: HOW TECHNOLOGICAL ADVANCES ARE DRIVING TRANSPORTATION INNOVATION

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On behalf of the members of the Association of American Railroads (AAR), thank you for the opportunity to testify before the Committee. AAR freight railroad members account for the vast majority of railroad mileage, employees, and freight traffic in Canada, Mexico, and the United States. In addition, AAR maintains two wholly-owned subsidiaries on the cutting edge of rail technology. MxV Rail in Pueblo, Colorado, is the industry's research, testing, and training epicenter, developing science-based solutions to make North America's rail network safer, more efficient, and more reliable. Railinc in Cary, North Carolina, is the industry's digital backbone, providing essential data, tracking, maintenance, and messaging services to power safe and efficient rail service around the country.

Safety is at the forefront of everything the railroads do, and I am proud to report that 2025 was the safest year on record for railroads. The industry set *four all-time records:* the lowest derailment rate, equipment-caused accident rate, track-caused accident rate, and employee injury rate. That record-breaking year was made possible thanks to billions of dollars in reinvestment by the railroads into cutting-edge technology that has transformed the systems that support, operate, and optimize freight railroads. As a result, railroads are safer, more reliable, and more cost-effective than ever before, and the industry is continuing to develop and deploy new technology to maintain that trajectory. Railroads have identified a path to take us into the future that combines the power of innovative technology with the grit and expertise of our workers. That path will only come to fruition in a regulatory environment that supports innovation.

Technological Innovation is Changing the Game for Railroads

When many Americans think of railroads, they might not think of cutting-edge technologies, but the Class I railroads are working to change that image. Each of the railroads is

at the forefront of researching, developing, and deploying game-changing technology to bring inspections, track health, and employee safety into the future.

CPKC: Broken Rail Detector

CPKC identified a problem with detecting broken rails in non-signaled, or dark, territories where a broken rail could go unnoticed and cause accidents. To address this concern, the railroad developed the Broken Rail Detector (BRD), an in-house proprietary technology to identify broken rails and halt train movements on a compromised section of track. These solar-powered detectors create an electrical circuit all along the rails on a certain section of track. When all the rails are functioning properly, the circuit will be continuous. If a rail breaks, that circuit will be broken and all traffic will stop. The BRD sends an alert to CPKC, and a team is dispatched to inspect and fix the broken rail right away. The BRD provides a constant stream of information, with new data coming in every 10 minutes ensuring that rails are continuously monitored rather than waiting between visual inspections to identify problems. These near continuous updates also allow CPKC to update its algorithms, identify out of service detectors quickly, and create work orders for CPKC track inspection teams. Combined with machine learning models and intensive data analysis, the company is working to continuously improve the health of its tracks, prevent accidents, and keep its track work teams focused on repairs around the network.

BNSF: Track Safety Technology Systems

BNSF's track safety work has focused on an array of different tools that allow for more frequent, technology-enabled inspections and identify problems sooner than traditional periodic manual inspections. BNSF is now inspecting track weekly or more frequently, at track speed in revenue service, safely integrating improved inspections without operational interruptions. BNSF

uses two in-house designed and built systems to improve inspections. First, the Onboard Defect Identification and Notification (ODIN) is a locomotive-mounted track geometry system that measures track conditions as the locomotive is pulling freight. Every foot, ODIN uses lasers to measure the gauge, cross-level, alignment, and track surface. That information is transmitted to BNSF and analyzed in real-time so any defect can be addressed as quickly as possible. By the end of 2026, the entire BNSF network will be inspected by ODIN systems. Second, the Track Health Optical Recognition (THOR) system compliments ODIN's track geometry measurements with a machine learning optical inspection system that finds safety defects such as broken rails or bars in real time. THOR's high-speed optical cameras capture thousands of detailed images of rails at various angles while mounted on BNSF's track geometry cars. These images are analyzed on board using AI and reports are sent to BNSF within minutes, allowing maintenance personnel to be dispatched and fix defects early. In 2025 THOR found 1900 defects on 160,000 miles of inspected track, most long-before they would have been found by a manual inspection. Finally, BNSF is using rail neutral temperature measurement projects across the network to measure actual neutral temperature and identify and mitigate buckle risk before buckles occur, building our understanding of heat-related risks to the entire network. Collectively, these efforts reflect continued progress toward a data-informed, risk-focused approach to track safety.

Norfolk Southern: Train Inspection Portals

Working with the Georgia Tech Research Institute, NS sought to harness the power of AI and optical cameras to take train inspections beyond what a manual inspection can see with the naked eye. To that end, Georgia Tech developed and NS deployed cutting-edge train inspection portals equipped with state-of-the-art, ultra high-resolution cameras and stadium lighting to capture nearly 1,000 high-resolution, 360-degree images of each rail car as it passes through the

portal at track speed. These images are analyzed using AI algorithms developed by NS to identify defects that would be otherwise invisible to the naked eye during a stationary, manual inspection. NS's 24-hour Network Operations Center receives near-real-time alerts for these defects, where experts review and flag the defects to be addressed as quickly as possible. NS now deploys 11 of these portals around their network, and combined with its other wayside detection systems, NS estimates that technology now finds 75 percent of the mechanical defects on the railroads.

Union Pacific: Machine Vision

Union Pacific (UP) is also improving its inspections and operations across the network, combining AI with innovative new technology to expand the reach of inspections and speed up the supply chain. UP's Machine Vision technology mounts high-resolution cameras, lasers, and other sensors on hi-rail trucks to quickly scan track infrastructure. Using Machine Vision, UP inspected 644,000 miles of track in 2025, or the equivalent of inspecting the entire network 20 times, and generated more than 100 billion measurements of real-world track conditions. That data is then analyzed by AI software to detect subtle patterns where conditions are changing or defects may occur, allowing the railroad to predict where maintenance may be necessary before a defect or an incident happens. Track inspectors can then prioritize repairs using precise GPS coordinates to identify problem areas and monitor trends in track performance over time. This technology allows UP to predict months in advance when specific sections of track may require maintenance or additional attention, ensuring UP can better plan its work and improve safety outcomes.

CSX: Mobile Collision Safety System

CSX noticed an uptick in machine-to-machine collisions and recognized the inherent risks for rail employees in the work environment. To address these concerns, CSX developed new technology that takes inspiration from advanced automotive safety systems to keep workers safer around heavy machinery. The Mobile Collision Safety System combines GPS, cameras, radar, and lidar to monitor the areas around the equipment, where employees are at the most risk of getting injured and machine-to-machine collisions are most likely to happen. The system monitors this so-called "red-zone" around the equipment and, if an object, person, or other collision risk is detected, stops the equipment and prevents an accident. While workers are already trained to anticipate and prevent collisions, this new technology adds an extra layer of protection to prevent accidents. The Mobile Collision Safety System is just one of the many innovative ideas developed in-house by CSX's InnovationX program, which encourages employees to submit ideas for new technology, processes, and other innovations to make the railroad safer and more efficient.

Canadian National: Critical Risk Management System

Railroads work every day to ensure employees follow the highest safety standards and return home safely. To support this commitment, Canadian National (CN) has developed a new mobile safety observation app focused on Life Critical Rules—the essential safety practices that prevent serious injury or death. Leveraging AI and machine learning, the app will identify the work that should be observed, which rule to focus on, and when and where the observation should take place to maximize impact. These insights are driven by trends in historical data, including injuries, accidents, prior observations, weather conditions, and other key metrics. By integrating these factors, employees can be confident they are conducting the most meaningful

observations to reduce risk and strengthen workplace safety. When combined with CN's Enablon app—which enables real-time reporting and tracking of near misses and hazards —employees are empowered with the tools and data needed to proactively improve safety across the railroad.

Regulatory Environments Can Foster Innovation and Improve Safety

The billions of dollars in technology investment described above are already having an impact on safety and efficiency across the network. To take the next great leap forward in safety, regulators and policymakers must move beyond the prescriptive regulatory framework that stifles innovation and gets sidetracked by political issues. Railroads seek a regulatory framework that supports the effective systems in place today and embraces investments for the future.

Performance-Based Regulations

Rather than setting rigid, outdated mandates, a modern regulatory framework that emphasizes performance-based, data-driven results will help freight railroads improve safety and meet the growing demand for freight service while maintaining sufficient government oversight. Regulators should set strong safety and operational standards for railroads and give railroads the ability to identify the best processes, operating systems, and technologies to meet those goals.

To move into the future and develop a modern, effective regulatory framework, policymakers should focus on implementing performance-based regulations that allow the industry to invest in cost-effective, innovative solutions to enhance safety and efficiency. These regulations should be based on verifiable data, sound science, and demonstrated need and should encourage innovation without locking in existing technologies and processes. Regulators should also strive to improve transparency throughout the regulatory process, including meaningful discussions with all stakeholders, robust benefit cost analysis that considers the cumulative burden of regulations, and guidance documents that clarify ambiguous regulations rather than

creating new obligations or coercing compliance. Finally, these regulatory updates must be implemented in an equitable manner across all modes of transportation. Currently, other modes of surface transportation have embraced performance-based regulations, but railroad regulations continue to be bogged down in the status quo of the 1980s and 1990s. This divergence in how the different modes are regulated only exacerbates underlying modal inequities, putting railroads at a distinct competitive disadvantage. Finally, regulators should ensure that any federal money invested in developing and expanding new technology, like telematics, creates incentives for information sharing between all stakeholders, including the railroads themselves.

FRA Waiver Reform

Policymakers should consider long-overdue reforms to the Federal Railroad Administration (FRA) waiver process, which is intended to give railroads the opportunity to utilize new technology to improve safety outcomes when compared with current regulatory requirements. FRA is supposed to use the waiver process to encourage railroads to develop new technology that improves safety outcomes. However, in recent years, this process has turned into a bottleneck; prior administrations have sidetracked technological innovation by focusing on achieving unrelated political goals instead of improving rail safety. Refocusing that process on safety, rather than satisfying the demands of one stakeholder group over another, is one way to build a more technology-focused regulatory environment. Specifically, FRA should act on waivers in a timely manner consistent with statute; make decisions only based on transparent criteria and clear science-based data demonstrating improved safety outcomes; consistently renew or expand waivers as additional data becomes available; and create clear expectations and pathways for adoption of new technology and processes by the broader industry when the safety record is established. In addition, when a waiver is eventually successful, FRA should update the

prescriptive regulation to a modern, performance-based regulation that follows the data, embraces technology, and allows for future development and deployment. Finally, lawmakers should not adopt new legislation that effectively eliminates or undercuts the waiver process. Bills that bar any regulatory waivers or modernizations will actually make the railroads less safe by limiting the use of safety technology in the future.

Conclusion

By investing billions in infrastructure and innovation, railroads are constantly modernizing operations to improve safety while meeting rigorous global supply chain demands. Railroads look forward to working with members of this Committee and other policymakers to create a regulatory framework that supports innovation, harnesses the expertise and ingenuity of the industry, and keeps our workers, customers, and communities safe while serving as the engine of America's economy.