Prepared Statement of Grady C. Cothen, Jr.

Before the Subcommittee on Railroads, Pipelines, and Hazardous Materials

Committee on Transportation and Infrastructure

United States House of Representatives

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Chairman Payne, Ranking Member Crawford, Chairman DeFazio, Ranking Member Graves, and members of the Subcommittee, thank you for the opportunity to appear before you to discuss an important safety issue: management of in-train forces. I am here as an individual, not in a representative capacity. I have maintained a strong interest in transportation safety after a career of 36 years at the Federal Railroad Administration and additional work, following retirement from Federal service, for a passenger railroad and a major transit authority. Since 2016, I have been fully retired, although I remain a member of the District of Columbia Bar and several professional associations.

When we speak of managing in-train forces, we mean at least two things. The first is proper control of the train as a whole, ensuring that it will not exceed the permitted speed, that it can stop when and where it needs to stop, and that it will not roll away uncontrolled. The second is control of tensile (draft) and compressive (buff) forces within the train as it gains momentum, is slowed by braking effort, and gathers up or distributes "slack" among the locomotives and cars. If draft and buff forces are not properly controlled, excessive lateral over vertical forces can be translated to the wheel/rail interface, resulting in wheel lift or rail rollover. Significant damage can also be done to car components, often resulting in a train separation and an emergency brake application leading to a derailment.

The challenge of managing in-train forces has been with us throughout the history of railroads. From the advent of "automatic" train air brakes in the 1870's, to joint government and industry research on track/train dynamics in the 1970's, to the adoption of mandatory two-way end-of-train telemetry as a replacement for the caboose in the 1990s, and to the more widespread use of distributed power locomotives, this is a field that has benefitted from enhanced knowledge and improved technology.

Still, when FRA reported to this Committee in 2005[1], railroads continued to report train accidents related to train make-up and train handling. That pattern continues to the present date. There is good reason why the pattern should be disrupted. FRA research has developed and

[1] Safe Placement of Train Cars: Report to the Senate Committee on Commerce, Science and Transportation and the House Committee on Transportation and Infrastructure (FRA June 2005).

validated a computer model ("TEDS"[2]) which, like its industry counterpart ("TOES"[3]) is capable of evaluating management of in-train forces for purposes of accident investigation and accident prevention. Thus, it would seem to be time for FRA to take a more active role in overseeing this area of railroad safety, quite apart from the other developments.

What are the other developments? Driven by investor demands, major railroads have plunged head-long into one or more versions of so-called "Precision Scheduled Railroading" or PSR. This is an operating philosophy that has produced neither precision nor scheduled operations. It *has* succeeded handsomely in driving cash to the bottom line, facilitating massive distributions through stock buy-backs and dividends.

We all want our freight railroads to be profitable—none more than my generation of FRA personnel. As colleagues under successive Administrations, we helped the industry through the Northeast rail reorganizations, the bankruptcy of Midwest carriers, economic deregulation through the Staggers Rail Act, and the return of Conrail to the private sector, among many misalignments in the track structure along the way.

Profitability is a critical element of success, particularly for an industry that is both capital and labor intensive and needs to generate its capital from operations. But corporate responsibility requires consideration of employees, customers, and affected communities, as well as investors.

The first obligation of the railroad is to operate safely, and as a former safety enforcement attorney and regulator I'm delighted that we have seen immense progress over the last several decades. However, this testimony addresses an area in which major railroads have regressed and need to do a better job.

What is the problem? Perhaps, the simplest way of explaining this is first to call out the types of accidents under discussion. In broad summary, they are events involving one or more of the following:

- Trains that are poorly marshalled because of the improper placement of blocks of loaded cars, empty cars, long and short cars, or cars presenting special problems (mostly cars with end of train cushioning devices).

- Trains that lack adequate means of control because of the locomotives assigned and their placement in the train.

- Trains for which the train air brake line is too long (between assigned locomotives) to function as intended.

- Trains marshalled with the expectation that locomotives distributed within the train will remain in communication with the controlling locomotive in the front but without sufficient means of relaying electronic commands. (This can happen because

[2] Train Energy and Dynamics Simulator
[3] Train Operations and Energy Simulator

communications are blocked by terrain and other local conditions or simply because the train is too long.)

- Trains required by management to be controlled by energy saving on-board systems, when the systems are not adequate to the job given train make-up or route conditions.

These types of problems arise much more frequently under PSR operations because this type of operating plan calls for—

- Power assigned to each train to be minimally adequate
- Pre-blocking to destination of rail cars regardless of the impact on train make-up of large blocks picked up along the route of travel
- Aggregation of car types that formerly would be in trains of uniform profile (intermodal trains, unit trains) into very long and heavy manifest trains, and
- Minimum staffing in yards and terminals, and reduced numbers of crews handling local switching. This results in the requirement for road crews to handle over-the-road challenges and also perform local switching involving drafts of cars much longer and heavier than previously would have been the case.

So, how are they doing with this traditional mix of potential problems and brand-new problematic practices? The cleanest way to look at this is to examine Class 1 railroad train accident performance. Since the late 1970s, Class 1 railroads have gotten better and better, decade after decade, until the current period. For now, however, they have hit a plateau:

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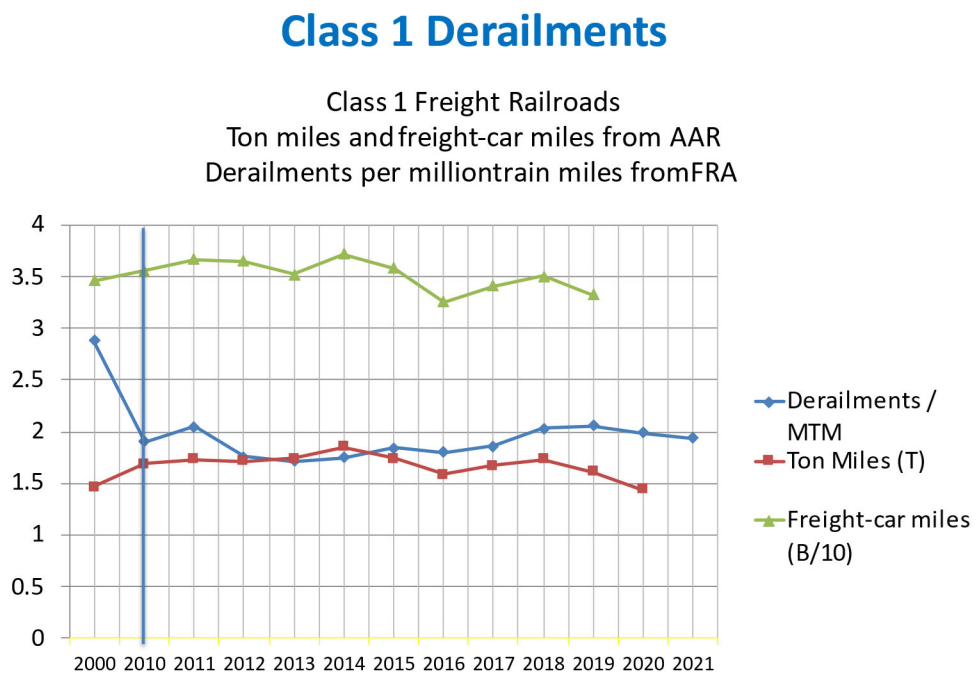

Figure 1—Class 1 railroads, rate for all derailments (yard, siding, main line, etc.)

Figure 1 focuses on derailments, for all causes and on all types of tracks. There is a point of potential contention here because we use the rate "per million train miles." This rate has traditionally been used as the appropriate measure of safety by the industry and FRA. It is fair to say that with fewer trains the *rate* might rise. But it is not as easy to say what another normalizing statistic should be. As the graph shows, Class 1 railroads are hardly knocking it out of the park when it comes to freight car miles or ton-miles of transportation service. The markets railroads serve are growing much faster than railroad car loadings or intermodal units transported (but that is for another testimony). To be fair, the decline of coal as a fuel has also cut drastically into ton miles.

If we stick with Class 1 railroads and consider only the raw counts, and only for *main line* derailments, Figure 2 shows what the picture looks like:

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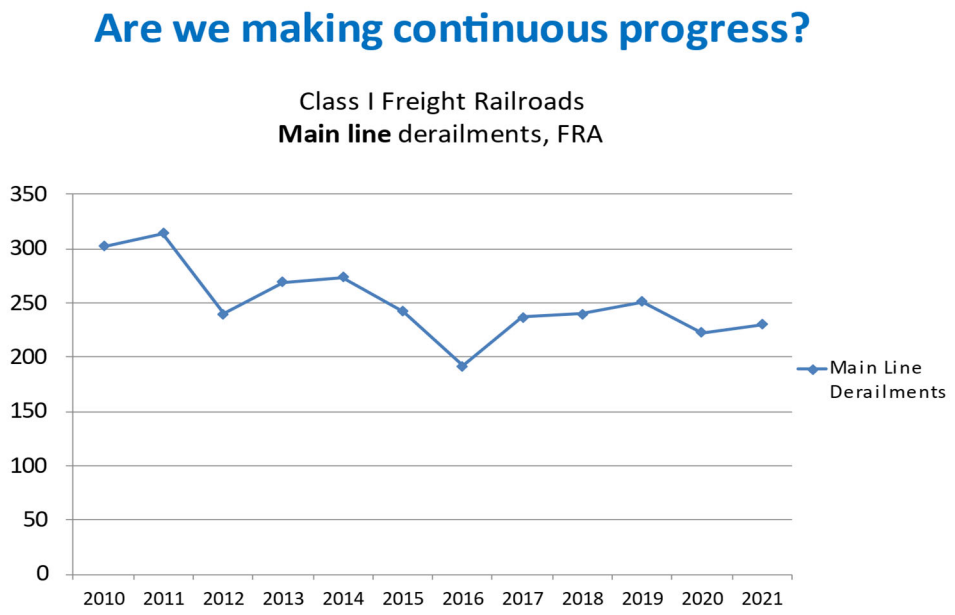

Figure 2—Derailments, main line only (Class 1)

Figure 2 illustrates the lack of progress in derailment prevention during the PSR era, which began among the major railroads in the United States in mid-decade. But how can this be? Aren't we making big progress in automated track inspections, more frequent internal rail flaw testing, better wayside detectors and much improved use of the data from these systems? In general, we would say "yes." Figure 3 provides some insight:

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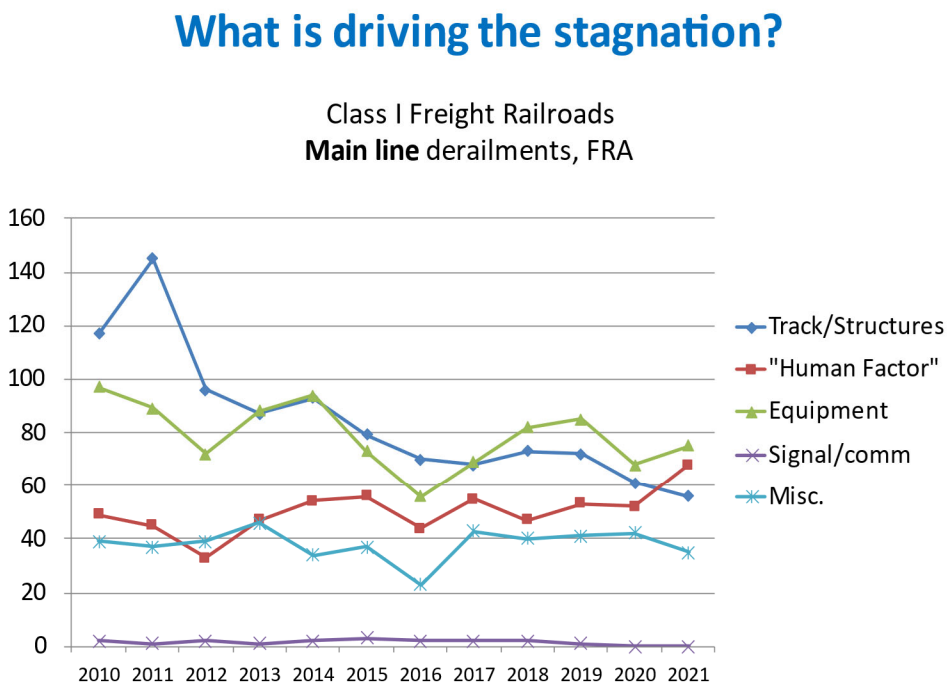

Figure 3—Derailments by cause (Class 1 main line)

FRA accident reporting breaks up the various "cause codes" into "buckets," and historically track/structure causes were most numerous. Note the steady decline in derailments related to track and structures. However, these declines have been offset by a steady rise in so-called "human factor" accidents and the persistence of equipment-caused accidents. The latter is surprising, given the widespread deployment of wheel temperature and bearing detectors, flat wheel detectors, and other technology (and the advent of "big data" used to trend individual cars in service to permit early intervention).

How, then, does this relate to management of in-train forces? Based on Federal accident investigations and my own review of the data, derailments caused by poor management of in-train forces are being reported primarily under "human factor" codes. This categorization fits the reporting system, which was established with heavy industry input and is managed by FRA.

However, it is important to know the "human factors" include organizational failures (e.g., train make-up, pushing technology farther than it is ready to go) as well as individual mistakes. Further, even events reported as individual mistakes may grow out of organizational failures (e.g., dispatching a train that has little chance of making it safely over the railroad). My own assessment, after review of multiple years of raw train accident records, is that organizational factors (management decisions related to PSR) are behind this lackluster performance.

From the review, it is also evident that mechanical (equipment) codes get applied to derailments caused by improper management of in-train forces, sometimes questionably (e.g., when a coupler fails without prior crack) and sometimes because the equipment code is the only one available (e.g., when communication fails among locomotives in the very long train).

Miscellaneous codes appear in the relevant data, as well, including my personal favorite, "M599—Other miscellaneous causes." That code was applied to a derailment that was determined both by FRA and by the railroad's own modeling to have been caused by train make-up. But the cause code was never updated. (This is only one of many errors evident in the filed accident reports.)

What can we do about it right now? Preventing each and every accident involving management of in-train forces is not a goal within our grasp given present technology and knowledge. However, the industry can do much better today from the point of view of safety, and provide much better service to its customers by using common sense. The industry should—

- Utilize the knowledge and experience that has been reduced to train make-up rules on every railroad. Follow your own rules, and update them promptly.

- Don't rely on technology that is not ready (e.g., using automated operations in territory where expertise and air brakes are required) or that is not properly deployed (e.g., without supplementary communications to close gaps).

- Don't ask employees to do the impossible. If you have to put multiple locomotives both in the middle of the train and in the rear, and the train has to traverse undulating terrain with air brakes used to avoid run-in or arrest movement down a grade, think twice. Would you want to try to manage that train?

Very clearly, major railroads are not prepared to do this on their own, so the Congress and FRA need to impose some discipline through an appropriately flexible regulatory structure.

How can we mold a better future? For the longer term, railroads express ambitions to automate their operations more fully. They are not even close to being able to do that. However, with or without automation, they would be much better positioned for the future with electronically controlled pneumatic brakes (ECP brakes).

The industry declares its love for technology, but two-way end-of-train devices took Congressional action. Positive Train Control came to fruition 35 years after its conception only because of a statutory mandate. Both technologies were implemented under rules I helped to write.

Our usual attitude as believers in market forces is that management will do what makes sense, and it doesn't need government to tell them. Very often, happily, that is the case. However, when it comes to major transitions that will cost a good amount of capital up front but will not fully pay off during the tenure of the senior management then in charge, the matter will

often be deferred. If the investment itself is not the major issue, often the fear of failure in implementation is.

ECP brakes has now been deferred since the 1990's, despite FRA's efforts to support and incentivize implementation. The result has been that run-away accidents have not ended and management of in-train forces has been made increasingly difficult. It's time for ECP brakes.

Why should we care? The price for not moving forward on management of in-train forces will be more derailments, more releases of hazardous materials, more communities impacted, more disruptions to shippers' supply chains, and more employees confronted with dangerous working conditions on trains, on the ground, and during wreck clearance. Very fortunately, most derailments are not catastrophic events; but the more we treat them casually the more likely it is that we will have a catastrophe. And the failure to treat railroad braking systems as safety-critical will lead to further run-away accidents that will claim lives as well as property.

Mr. Chairman, one of the reasons little has been done about management of in-train forces, apart from the traditional focus on power brake safety, is that the subject is dense and complicated. The problem is one of interfacing systems, rapid technological change, the variety of operating environments and operating plans, and the need for human-centered engineering. The whole field is further complicated by the realities of railroad interline service and joint operations, meaning no single railroad can address it all alone.

I have provided the Committee with my *White Paper* on Management of In-Train Forces (v3.0, June 2022), which explores the related issues and attempts to frame appropriate questions and proposals, in some depth. It even discusses the potential of ECP brakes to prevent or mitigate some highway-rail grade crossing accidents and similar obstruction events. I would appreciate its being made a part of the record.

My hope is that Congress will charge FRA with developing flexible regulations governing the management of in-train forces and direct FRA to proceed with regulatory action requiring the phased implementation of ECP brakes. If I can be helpful to members or staff going forward, I would be happy to do so *pro bono publico*.

Thank you for the opportunity to address this important issue. I would welcome the opportunity to respond to any questions.

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