

# BROTHERHOOD OF LOCOMOTIVE ENGINEERS AND TRAINMEN

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## VIA ELECTRONIC MAIL

March 17, 2025

Mr. John Karl Alexy  
Associate Administrator for Railroad Safety  
Federal Railroad Administration  
1200 New Jersey Avenue, SE  
Washington, DC 20590

Re: CSX Transportation, Inc. Petition for Approval of Product Safety Plan  
Docket No. FRA-2024-0126

Dear Mr. Alexy:

These comments are submitted by the Brotherhood of Locomotive Engineers and Trainmen, a Division of the Rail Conference of the International Brotherhood of Teamsters (“BLET”), which is the duly designated and recognized collective bargaining representative for over 31,000 active locomotive engineers and trainmen. As such, we have a vested interest in ensuring the safety of not only the locomotive engineers who operate trains, but also the safety of the nation’s entire rail network on which our members operate.

On November 11, 2024, CSX Transportation, Inc. (“CSX”) submitted a petition to the Federal Railroad Administration (“FRA”) seeking approval for its Product Safety Plan (“PSP”) for the Trip Optimizer Air Brake Control (“TO/ABC”) system, commonly referred to as “Zero to Zero.” This technology would allow the Zero-to-Zero software to have complete control of a train’s air, independent, and dynamic brake systems. If approved, Zero-to-Zero would nearly fully automate the movement of trains from a complete stop to moving at full speed and adjusting speed throughout the trip, and bring the train to a complete stop. In its submission, CSX identifies that one goal of Zero to Zero is to increase “overall automatic state utilization...” and reduce the time a human is manually operating the train.

The BLET strongly urges the FRA to reject the proposed PSP. This technology is unsafe. BLET urges FRA to consider the amount of regulatory oversight needed to address safety concerns. In these comments, we will elaborate on the technical issues we have with the Zero-to-Zero program as well as the policy implications of reducing human operation of trains, including the deskilling of locomotive engineers, increased fatigue factors, and the fact that CSX has not adequately proven that the technology can respond to a variety of environmental and operational conditions.

The BLET requests that the FRA hold a public hearing regarding this docket to accept testimony from all stakeholders and the public regarding the safety of Zero to Zero. The rail workers and communities directly affected by this technology have invaluable perspectives to offer as the FRA considers this PSP. Zero to Zero represents a significant shift in the industry that must be carefully considered. The FRA is required to accept meaningful comments on administrative actions, such as Product Safety Plans. For many local community residents, navigating the Federal Register and regulatory dockets is complicated, cumbersome, and does not provide enough awareness. A well-publicized hearing would offer a venue for the public to provide comments. Additionally, many additional documents and reference materials have not been made public as part of this filing, and a hearing would allow the public to ask questions regarding subjects that have not been fully discussed in the PSP itself.

Zero to Zero is an “extension” of an existing energy management system called Trip Optimizer (“TO”), which currently automates the use of the throttle and dynamic brakes. The BLET has been on record opposing its use for several reasons. In a 2016 letter to FRA, the BLET stated, “The technology was originally conceived to assist engineers in obtaining greater fuel efficiency when operating locomotives. However, some carriers have mandated that this one-time guidance tool should supersede the skill-based judgment of locomotive engineers, forcing engineers to rely upon the technology as the primary method of train operation.”<sup>1</sup>

The implementation and use of existing TO technology have not been uniform and have brought new types of risk to capture fuel savings. The use of the technology has created dangerous situations where crew members have been thrown out of their seats because of severe slack action. Introducing the additional capabilities of air brakes, the primary method used to stop trains, and independent brakes adds incredible risk to train operations. A single failure, whether a technological failure caused by an inadvertent coding error or a security failure caused by a malicious hacking attack, could lead to a catastrophic derailment, collision, release of hazardous materials, or loss of life.

The public should be aware that Zero to Zero is a software program that does not include any additional safety equipment or sensors. Zero-to-Zero relies upon existing motive equipment and back-office servers with no remote human input to control the train. All the monitoring and moment-to-moment safety management of the train is done by a locomotive engineer and conductor in the cab of the locomotive. This software adds another train system for the locomotive engineer to monitor along with the existing train systems.

CSX indicates that it intends to use Zero to Zero technology in both Positive Train Control (“PTC”) territory, territory without PTC protection, and dark territory. As background, PTC is a safety-critical but imperfect system designed to prevent trains from going past red signals, control speed, and prevent incursions into work zones and collisions. “Dark territory” refers to tracks that are

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<sup>1</sup> <https://ble-t.org/news/blet-petitions-fra-for-immediate-halt-to-leader-trip-optimizer-technology/>

non-signaled and instead require the locomotive engineer to get verbal authority from the dispatcher to occupy the main track.

Using Zero to Zero, particularly without PTC, where protection from derailment and collision is entirely reliant upon the vigilance of the locomotive engineer and conductor, introduces a distraction and potential for fixing the attention of the train crew on monitors giving “prompts” and other directions in real-time. If the locomotive engineer, conductor, or dispatcher realizes a mistake was made in giving or receiving authority to move in dark territory, it is imperative that the train be able to stop as quickly as possible in a safe and controlled manner. With the addition of Zero to Zero, the locomotive engineer may be delayed in stopping the train due to the need to transition from automatic to manual mode. The locomotive engineer retains the option to apply an emergency application of the brakes, but immediately forcing an emergency is not always the best or safest course of action. In this situation, all available brakes apply immediately, leading to excessive in-train forces (buff and/or draft) that could cause a derailment.

### **Policy and Operational Concerns and Deskilling of Locomotive Engineers**

One of the primary implications of deploying Zero to Zero software is that locomotive engineers will spend fewer hours manually controlling their trains. Currently, locomotive engineers operating on CSX are expected and largely required to utilize the existing TO system 95% or more of the time, under threat of discipline. The existing policy is already unsafe and reduces the agency of the operator – who is responsible for the safe operation of the train. We understand the term “agency” to refer to “the agency of an actor, whether human or machine, as the capacity to perform activities in a particular environment in line with a set of goals/objectives that influence and shape the extent and nature of their participation. The environment in this context is bound by human machine networks.<sup>2</sup>

In this filing, CSX has made no indication of whether it intends to apply similar requirements for minimum usage to Zero to Zero. However, CSX has stated that it intends to utilize Zero to Zero for as many trip miles as possible. This raises concerns of degrading the overall skills of the locomotive engineer as well as limiting exposure to the unique eccentricities of particular routes. Railroad terrain varies dramatically across the system, creating distinct operational challenges that require specialized knowledge and experience to navigate safely. For instance, safely operating a train on a downhill curve with a complex consist of both empty and loaded cars—while preparing to stop at a signal that may be obscured until reaching the curve—demands skills that can only be maintained through regular practice and direct experience.

The BLET believes that the best way to maintain the skills of locomotive engineers – which are already actively being eroded by using existing TO software – is to require a certain percentage of trips to be operated entirely manually. This would ensure that locomotive engineers remain

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<sup>2</sup> [https://link.springer.com/chapter/10.1007/978-3-319-39513-5\\_9#Sec5](https://link.springer.com/chapter/10.1007/978-3-319-39513-5_9#Sec5)

familiar with the operation and behavior of rail equipment and the unique complexities of specific routes and terrain. It is one thing to know how to stop a train manually on a straight and flat track. It is another thing to know how to safely control trains with various car types, weights, and lengths on difficult terrain.

### **Training**

In its filing, CSX failed to provide the exact training materials that it intends to provide to train crews regarding the operation of Zero to Zero. CSX states that it intends to utilize online training to meet its responsibility to fully train locomotive engineers on the safe operation of the Zero-to-Zero software. This raises several concerns. Zero to Zero is a highly complex software program that interfaces with other existing train systems, such as PTC, and relies on the independent function of other train systems, such as end-of-train brake pressure monitoring systems (“EOT”). Locomotive engineers need to be familiar with both the expected behavior and interaction with all these systems and the unexpected and unacceptable behavior of the Zero to Zero. CSX holds that the locomotive engineer is ultimately responsible for the safe operation of the train. To be capably accountable for such a complex system, locomotive engineers need comprehensive and hands-on training, particularly in learning to identify, mitigate, and report a failure of the software.

### **Fatigue Concerns when Passively Monitoring**

While notably, few studies have been completed regarding the safety of increasing automation and safety in the rail industry, many such studies have been completed in the motor vehicle sector. Studies of automated driver assistance systems, which range from basic functions such as cruise control to fully autonomous driving, conclude that higher levels of automated operation lead to higher levels of operator disengagement, which increases the rate of fatigue on operators.<sup>3</sup>

The active operation of the locomotive keeps the engineer engaged and focused on the tasks at hand. They will be quick to respond to concerns as they are meaningfully participating in the control of the train. Passive participation is exhausting – monitoring as many as four separate screens to ensure the various systems are operating the train properly could lead to task complacency and distract the locomotive engineer from the tracks and terrain ahead. This is highly concerning given that fatigue is already a pervasive risk in rail operations. Fatigue is so dangerous that Congress mandated that FRA require railroads to implement Fatigue Risk Management Plans.

Some of the risk of fatigue comes from the unique nature of work on the railroad. Much of the public is unaware of the erratic schedules of train crews. While the FRA mandates minimum rest periods for operating crews, those crews never know when they will be called into work after their rest period has elapsed. Crews may be called in immediately following their rest, or they may be called in days later. For crews waiting to be called for multiple days, it is all too common to be

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<sup>3</sup> <https://www.mdpi.com/2313-576X/8/2/30>  
<https://www.sciencedirect.com/science/article/pii/S000145752300115X>

prepared to sleep after being awake all day and then get called to work for up to 12 hours. This is the current norm. There are already significant risks of fatigue with the current norms. Adding a passive system and monitoring mode vs. actively controlling the locomotive, Zero to Zero, will increase the likelihood of fatigue from increased levels of monitor vigilance.

### **Discipline**

Locomotive engineers should not be penalized, punished, or experience any adverse employment outcomes due to their professional judgment to take manual control of the train away from Zero to Zero. Nor should they be decertified for events brought about because of a fuel savings software that operates the train. Operating rules requirements, such as a minimum requirement for using Zero to Zero, should be considered as part of the overall safety analysis of this proposed program because such a requirement could directly contribute to a locomotive engineer being hesitant or unwilling to assume manual control of the train for fear of losing their job.

Two arbitration awards issued on March 15, 2016 by Public Law Board (“PLB”) No. 7384 — Award Nos. 56 and 59 (“PLB 7384-59”) — are relevant to our prior communications with FRA and these comments. These incidents occurred on the CSX Railroad. The Awards are included as Attachments “B” and “C.” Fortunately, these incidents did not produce fatal accidents; otherwise, we may never know what caused the excessive speed of the trains.

These incidents also are relevant to Part 236 Appendix E’s requirement stating:

(3) *End user limited ability to process information.* HMI design must therefore minimize an operator’s information processing load. To minimize information processing load, the designer must:

- (i) Present integrated information that directly supports the variety and types of decisions that an operator makes;
- (ii) Provide information in a format or representation that minimizes the time required to understand and act; and
- (iii) Conduct utility tests of decision aids to establish clear benefits such as processing time saved or improved quality of decisions.

Many of TO's problems are laid bare in these Awards. Problems such as lack of predictability in the system, workarounds, and software glitches (corrected on “newer versions”) all beg the question about extant older versions still being used on the railroad. The Awards also note from a carrier Road Forman of Engines (“RFE”) that software problems are not isolated incidents and have been reported by other employees. These system failures were of a frequency that the same RFE instructed engineers that they would not be “held accountable for speeding” if they were using Trip Optimizer. *See* Award No. 56 at pg. 5.

However, the engineer was held accountable for speeding by the Carrier and his FRA certification was revoked. CSX delegated its responsibility to have a product that functioned as marketed, designed, and manufactured and placed that responsibility on the locomotive engineer. Our members cannot have a vendor's product liability thrust upon them by the rail carriers. To do so injects third party manufacturers into the employment arbitration process, because carriers urge that the manufacturer be permitted to be the arbiter of fact regarding the veracity of claims regarding the product's performance. A manufacturer will act in its own economic self-interest and contend that its product performs as intended. This also has become a problem for FRA in Parts 240 and 242 revocation matters.

The "good" news for our members in these PLB cases is that they only suffered a temporary loss of employment; they did not lose their lives due to these chronic and recurring software problems. FRA simply must act before someone loses his or her life.

Also evident is that TO use takes the user "out of the loop," Which is contrary to the following requirement of Appendix E of Part 236:

(c) Human factors issues the designers must consider regarding the general function of a system include:

(1) *Reduced situational awareness and over-reliance.* HMI design must give an operator active functions to perform, feedback on the results of the operator's actions, and information on the automatic functions of the system as well as its performance. The operator must be "in-the-loop." Designers must consider at a minimum the following methods of maintaining an active role for human operators:

(i) The system must require an operator to initiate action to operate the train and require an operator to remain "in-the-loop" for at least 30 minutes at a time;

(ii) The system must provide timely feedback to an operator regarding the system's automated actions, the reasons for such actions, and the effects of the operator's manual actions on the system;

(iii) The system must warn operators in advance when it requires an operator to take action;

(iv) HMI design must equalize an operator's workload; and

(v) HMI design must not distract from the operator's safety related duties.

BLET urges you to carefully review the attached PLB Awards and discern all the potential adverse consequences from the current way these technologies are forced upon locomotive engineers, whether those consequences are intended or not.

On the certification topic, at a minimum, FRA needs to review how these systems take control away from the engineer when considering adverse certification actions taken by railroads. When the system is in control, FRA should reverse any revocation or denial of certification/re-certification that faults the engineer. Automated systems, such as TO, in use during a revocable event — whether covered under Section 240.117(e) – criteria for consideration of operating rules compliance data, or Section 240.305 – Prohibited Conduct, to name just two — that place responsibility on a locomotive engineer, should now place that responsibility on the carrier for requiring the engineer to rely upon faulty software. The train crew retains the ultimate responsibility for the train. Still, there is no way they can guarantee that software and automation systems are performing to a third party’s ambiguous design criteria.

### **Safety During System-Wide and Multi-System Failures**

The BLET remains alarmed that CSX has not sufficiently demonstrated that Zero to Zero will not degrade safety, particularly given that Zero to Zero is a technology designed to interface and work in tandem with many other railroad systems. Specifically, this filing does not describe specific procedures for Zero-to-Zero operations when other railroad systems have failed. CSX notes that Zero to Zero is capable of operating without the protection of PTC. However, CSX has not discussed procedures for operating TO/Zero to Zero during unexpected or major PTC outages. We are left to infer that CSX plans to run Zero to Zero even when there is a catastrophic outage of PTC or other critical safety systems such as signals and radios.

Allowing such operations would be a grave mistake. The current state of railroad safety relies on many systems working simultaneously. Most rail safety systems have historically been desired to be “fail safe.” When one or multiple of these systems are unavailable, the safety is significantly degraded. As an example, when a train’s PTC system experiences an en route failure, 49 CFR 236.1029 requires a reduction in speed to accommodate the lack of PTC protection. Under the same regulation, trains are not allowed to leave the initial terminal if the PTC system fails to initialize; however, railroads have received FRA waivers in the past that allow these movements. In the situation of a PTC failure, whether en route or at the initial terminal, adding another technological system on top of the existing overlapping systems introduces additional risk and complexity to the operating environment. This risk, particularly given that there is inadequate risk management to address network-wide or multi-system failures, is unacceptable.

### **Public Expectations of Manual Human Operation in an Emergency**

The public expects a human operator in the cab of a locomotive to be completely in control of the train. In a variety of emergency situations, the public expects that locomotive engineers will be able to visualize the situation and react accordingly. With Zero to Zero, this reaction would be significantly impaired, if not impossible. The public, despite many public safety campaigns to the contrary, routinely behaves unsafely around trains. By removing the control and judgment of locomotive engineers of the train, these unsafe behaviors from members of the public could lead to even more accidents.

### **Atmospheric Conditions**

Adverse weather conditions can create many unsafe conditions on the railroad. To name a few, wet leaves on the track can create “wheel slip” that prevents a train from being able to get traction and can frequently lead to a train sliding on the rails. Wet or snowy conditions can also reduce friction and traction on the rail. Locomotives are equipped with “sanders” that spread sand to increase friction on the rails. In cold temperatures, it takes longer for air brake pressure to recharge after the brakes are applied. High winds frequently limit the safe speeds at which trains can operate. Excessive heat can cause rails to crack and become impassible. Floods can wash out entire stretches of track.

These are just some examples of atmospheric conditions that may impact train movements. Locomotive engineers are fully trained and equipped to recognize the conditions and make handling adjustments to accommodate them. Additionally, train crews constantly visually look for degraded tracks that would be unsafe. However, Zero to Zero does not have the sensors—even a basic thermometer—to make these kinds of adjustments.

### **Distributed Power Communication**

In its filing, CSX states that Zero to Zero would operate Distributed Power (“DP”) locomotives using existing DP technology. As background, DP locomotives are placed in the middle or end of the train and can pull or push as needed. For example, on flat terrain, the DP locomotives will pull the same way that the head end locomotives do. If the train is cresting a hill and the front half of the train is going downhill and the back half is still going uphill, DP locomotives placed on the end of the train or in-train may exert different force (in “fence-up” mode) to ensure the train does not get pulled in two. CSX’s filing has not elaborated on how Zero to Zero would calculate the management of buff and draft forces while in asynchronous modes of operation.

Additionally, there are existing concerns regarding DP technology. Due to the increasing length of trains and certain atmospheric or terrain features, it is not uncommon to lose radio communication and control with the DP locomotives. It is unclear how Zero to Zero will compensate or if it will be aware when DP communication loss occurs.

### **Communication with Wayside Detectors**

Railroads use a wide variety of wayside detectors to identify potential safety hazards in moving trains. The importance of wayside detectors entered the public awareness after the tragic derailment in East Palestine, Ohio, where wayside detectors identified a hot bearing that ultimately failed. Although not regulated by FRA, these detectors can provide important safety information to train crews. When a wayside detector alerts a problem, the locomotive engineer is required to take appropriate actions to slow or stop the train.

### **Violation of Existing Operating Rules**

As background, each railroad maintains specific operating rules that govern what is allowable and safe in general and in particular situations. These operating rules sometimes mirror regulatory requirements and sometimes address grey areas that may not be regulated by the FRA but do impact safety. A simple example of an operating rule would be rules governing dismounting moving equipment. While dismounting moving equipment is not explicitly regulated, getting off equipment while moving at a high rate of speed presents a clear danger, so each railroad has operating rules governing what is and is not acceptable. These operating rules are there for a reason, and it would be unsafe to allow Zero to Zero to violate operating rules that train crews are expected to follow.

That said, CSX's current rules on Air Brake and Train Handling (referenced in the PSP as document A23) state in rule 5402.6 that "While in Auto mode, the Locomotive Operator must resume manual control of the train when... Operating on signals that require the train to approach the next signal prepared to stop." This rule ensures that trains do not exceed their signal authority.

Additionally, it appears that Zero to Zero would also violate CSX's current Air Brake and Train Handling rule 5553.4, which requires a minimum of 10 PSI of air to be applied and released before continuing when using the air brakes. This is done to ensure that the brake shoes fully release and do not "stick" to the wheels. If the brakes do not fully release, this can create extreme amounts of heat from friction. This can lead to brake shoes burning off and not functioning.

### **Availability of Data and Documentation**

While we understand that large documents, such as PSPs, rely on additional materials such as federal regulations and industry standards, the public filing should provide sufficient evidence and justification to attest that the product is safe to deploy and will not degrade railroad safety. The filing that CSX has submitted in this docket relies extensively on many reference documents that are not publicly available in the docket. These documents include safety testing data, testing procedures, training documents, safety analyses, and human factors analyses. These documents are critical to understanding the full scope of the operation and function of the Zero-to-Zero system, and a transparent public review process cannot be completed without these documents being available to the public.

### **Product Safety Plan**

While many of the concepts raised in the Product Safety Plan ("PSP") PSP have already been discussed in general terms in these comments, for ease of the FRA's technical review team, we will now discuss our concerns in each section of the PSP. Our intention is for this section to make it easier to reference specific safety concerns with each part of the PSP.

### Purpose (Section 1)

In Section 1 of the PSP, CSX states, “Trip Optimizer (TO) is an Energy Management System installed on locomotives that is used by the train’s operator to improve the energy efficiency of train operation.” This language lacks specificity. The existing TO is under the control of the locomotive engineer, specifically a human operator certified under 49 CFR Part 240 operating or in an immediate position to operate the manual controls of the locomotive. While we do not endorse the approval of TO/ABC due to the many safety concerns raised throughout this document, **the BLET asks that this language (a human operator certified under 49 CFR Part 240 operating or in an immediate position to operate the manual controls of the locomotive) be used in place of “train’s operator” because only a certified locomotive engineer is authorized by regulation to be at the controls of a locomotive.**

Further, in Section 1, CSX states, “TO/ABC is an expansion of TO that adds the function of air brake control to the TO product for the purpose of improving overall efficiency.” However, CSX’s operating rules have stated that air brakes are not an energy efficient means of controlling a train’s speed and should be used primarily for stopping to conserve fuel. The use of air brakes by TO/ABC does not appear to be, according to CSX’s prior statements on efficient train handling, designed to make trains more energy efficient. Instead, it seems that TO/ABC is intended solely to automate the train’s movements.

Section 1 also states, “TO/ABC is not designed to perform any safety functions but is safety critical because a failure of TO/ABC could create an unsafe condition.” This statement contradicts itself. The controlled movement, speed and stopping of a train are safety functions that TO/ABC would perform after being activated. BLET agrees that a failure of TO/ABC could create multiple unsafe conditions.

CSX further states, “TO/ABC does not commingle with any locomotive or train safety system.” We will discuss this issue further in these comments when we discuss PSP Section 5 regarding the Product Description, but we will note here that we disagree with this statement. In PTC interface mode, TO/ABC gathers data from the PTC system “to build and update the desired energy efficient speed profile for the planned route.” This reliance constitutes commingling such that if the PTC was utilizing incorrect data or the data were transmitted incorrectly, the TO/ABC would also be utilizing invalid data.

These misstatements and lack of specificity warrant revision before the FRA considers approving the use of TO/ABC.

### Applicable Documents (Section 3.2)

The PSP relies upon at least 26 external documents, as named in section 3.2. However, these documents were not included in the publicly available docket. For the public to have adequate

opportunity to review the full safety implications of the TO/ABC program, these documents need to be readily available.

### **Product Description (Section 5)**

In Section 5, CSX states, “TO/ABC is installed on a locomotive and receives data from external interfaces that connect it to data provided by on and off locomotive systems. ... This data is provided either by TO Offboard, the Wabtec back-office server, or from the onboard PTC application.” As discussed above, this constitutes commingling of the TO/ABC and the PTC system’s data.

CSX also states, “TO/ABC will also control remote locomotives using the Distributed Power equipment when in a train with distributed locomotives.” This is concerning due to existing and ongoing communications failures when utilizing DP technology. The current regulations allow the DP to be without communication for 16.5 minutes before the locomotive engineer gets an alert about the communication loss. This already can create unsafe conditions when the DP cannot be utilized for optimal train handling. This unsafe condition would only be exacerbated and compounded by using TO/ABC. It further reduces the agency that the locomotive engineer would have to identify dangerous situations and act quickly to correct them.

Beyond this, CSX fails to specify how or if TO/ABC can control DP in asynchronous mode or how fencing will work with the TO/ABC technology. Utilizing DP asynchronously can be very helpful in managing in-train forces, but it requires skill and attention to do so safely and should not be used in all situations. We request clarification on this topic.

Regarding the Human Machine Interface (HMI), CSX states, “The standard locomotive screens are the human machine interface (HMI) for both the locomotive and TO/ABC.” While we will discuss issues regarding HMI in more detail further in these comments, we do wish to note here that utilizing the existing HMI to control TO/ABC will necessitate modifications to ensure that it is immediately clear to the locomotive engineer that the train is operating with TO/ABC activated. Further, the locomotive engineer will need to be able to rapidly visualize the active throttle and air brake settings to be prepared to resume manual controls at a moment’s notice. If this information is not immediately accessible when the need arises to transition from automatic to manual operations, there is a chance that the locomotive engineer may be delayed in resuming manual controls or may apply more air than is necessary – possibly leading to an abrupt stop.

In describing the functions of TO/ABC’s manual (traditional operation) mode and automatic state, CSX states, “Automatic state occurs when TO/ABC is available, the operator has chosen to engage the system by selecting the soft key on the HMI and matches the throttle and air brake handles per the prompt commands on the HMI screen.”

Once again, we feel compelled to remind the FRA that under existing TO operations, the operator—the locomotive engineer—is not free to choose when to engage the automatic state due

to operating rules that threaten locomotive engineers with discipline for not utilizing the automatic state for upwards of 95% of the trip. When locomotive engineers cease operating for over 95% of the time, as is currently the case with the existing TO program, their muscle memory and skills degrade.

CSX states, “Enabling automatic state allows the operator to focus on the safe operation of the train.” We fundamentally disagree with this statement and the assumptions it relies upon. Numerous studies have found that reducing manual operation and the intervention necessary to operate a vehicle increases rates of fatigue.<sup>4</sup> This also turns a locomotive engineer’s task from actively manipulating the controls of a locomotive to passively monitoring a screen.

Monitoring a screen for indications of a failure is a fundamentally different task than maintaining full situational awareness and manual operation. Constantly monitoring a screen can capture attention in such a way that it promotes task overload. We have already witnessed the dangers of this transition with the introduction of the existing TO system – which is one of the reasons we opposed the introduction of TO in the first place.<sup>5</sup>

In Section 5, CSX states, “If TO/ABC encounters invalid conditions during automatic state such as loss of communication, erroneous data, parameters exceeding design limits, or it determines that the plan exceeds the train handling parameters, TO/ABC will initiate the exit of automatic state and prompt **the crew** to return to manual state. When exiting automatic state, the operator is notified of the state transition by an audible alarm and display on the HMI.” (Emphasis added)

We wish to clarify that, at present, only the locomotive engineer has a TO display. The PSP has not discussed adding a TO/ABC display for the conductor. This is a critical distinction because if the locomotive engineer is the only one receiving the prompt, the locomotive engineer is the sole safeguard. It is inaccurate and misleading to say “the crew” is prompted when only one member of the crew is being prompted. For this to be accurate would require the installation of another screen on the side of the cab occupied by the certified conductor. Further, locomotive engineers have complained about the human machine interface issue of getting the operations of the train “dumped in their lap,” when the system relinquishes control of the locomotive to the locomotive engineer with little notice. This places a locomotive engineer into an operating scenario that is not of his own making.

This process of transition between automatic and manual states (when the transition is not initiated by the locomotive engineer), sets up a risky situation. The PSP has not established the timeframe given to the locomotive engineer to take manual control. The software can force people into managing the interface (How do I get to that page? How do we get it into this mode?) instead of

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<sup>4</sup> <https://www.mdpi.com/2313-576X/8/2/30>

<https://www.sciencedirect.com/science/article/pii/S000145752300115X>

<sup>5</sup> <https://ble-t.org/news/blet-petitions-fra-for-immediate-halt-to-leader-trip-optimizer-technology/>

managing the safety-critical process (something the computer was promised to help them do). These extra interface management burdens often occur during periods of high workload.<sup>6</sup>

This time window is critical for the locomotive engineer to know with certainty because many tasks will need to occur in quick succession, such as the throttle position and the current air brake application. In addition, routine situational awareness would include track speed limits, upcoming signals, upcoming terrain, the state of slack within the train, and weather conditions that would limit braking and stopping capacity.

CSX states, “No locomotive safety system depends on TO/ABC functionality, and TO/ABC does not interfere with the behavior of the locomotive’s existing safety equipment.” However, we wish to point out that the core functionality of TO/ABC requires that the physical position of the throttle and air brake handle be disconnected from the enacted function of the train. While we understand that the design of TO/ABC is that any physical movement of the physical handles will initiate the transition from automatic to manual state, we are deeply concerned about the potential for technological failure, either due to hacking of the software or simple malfunction, that the software would continue to disconnect the physical state of the throttle and air brake from the enacted function. If this failure were to occur, there would be limited ways to stop the train in a controlled manner. To address this, CSX states, “The primary safeguard for ensuring safe train operation is that the emergency braking capability is external to TO/ABC and can be invoked by the train’s operator at any time.” While valid as a last resort, this solution would not always affect a controlled stop. Such a sudden stop may cause excessive in-train forces that could lead to derailments.

In Section 5, CSX describes the differences between Stand-Alone and PTC-Interface modes and that in Stand-Alone mode, TO/ABC can operate in non-PTC territory. In Stand-Alone, TO/ABC gets speed restrictions, train makeup, and track data from the TO Offboard, which is maintained by Wabtec. In PTC-Interface mode, TO/ABC gets such data directly from the PTC. CSX states, “This is done to increase available automatic state miles by generating a speed profile that matches the track and wayside conditions.”

This raises concerns about the accuracy and reliability of the data maintained in the TO Offboard. CSX seems to be implying that the operation of TO/ABC is more reliable with the addition of the PTC data regarding track and wayside conditions. BLET believes it is in the public’s interest to know and understand just how much more unreliable CSX considers Stand-Alone mode and why—as opposed to PTC-Interface Mode. The distinctions need to be explicitly stated in the PSP.

CSX further states, “The onboard PTC application will monitor the conditions and activities on the train and protects the route from train-to-train collisions, overspeed derailments, work zone incursions, and movement through misaligned switches by enforcing the train to a stop when required.” While we strongly support the protection of PTC as a safety-critical system, we know

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<sup>6</sup> Dekker, Sidney, “The Field Guide to Understanding ‘Human Error’, Third Edition, CRC Press, 2014, pg.101.

that PTC is not perfect. There are still many locations where PTC is not fully mapped. We also note that PTC experiences frequent and sometimes unexpected failures. This is worth noting because CSX is relying on PTC as a failsafe to protect from risks introduced by TO/ABC. Again, we agree that PTC is a failsafe, but not a perfect one, which needs to be considered in the safety and risk assessments for TO/ABC.

At a minimum, it would not be safe to operate TO/ABC if PTC failed to initialize or experienced an enroute failure. In either of these cases, the existing regulation, 49 CFR 236.1029, regarding failure of PTC should apply.

### **Product Implementation (Section 6)**

In the overview of Section 6, CSX states, “TO/ABC is intended to operate as an extension of TO from the lead controlling locomotive to increase overall automatic state utilization and provide equivalent and improved train handling. TO is currently deployed across nearly all CSXT dispatcher-controlled tracks and is used on all types of trains. CSXT expects TO/ABC to be available on all dispatcher-controlled tracks when operating conditions permit. In 2023, CSXT operated nearly 30 million train miles with trains operating in TO automatic state.”

As these statements directly convey that CSX plans to automate as much train operation as possible, we must interject that – even if TO/ABC is fully implemented – the role of a locomotive engineer (a human operator certified under 49 CFR Part 240 operating or in an immediate position to operate the manual controls of the locomotive) and a conductor (a human operator certified under 49 CFR 242) will still be mandatory and critical to safe operations. Trains are dangerous equipment that can cause significant injury and damage if not operated safely and capably. Trains often haul highly volatile hazardous materials that risk harming entire communities if derailments and hazmat spills occur. With such potentially catastrophic outcomes possible if things go wrong, having fully trained crews is vital.

Additionally, a minimum of two-person crews are necessary to maintain safe operations in the case of an emergency. If a derailment occurs, the conductor can get out of the locomotive and separate the train while the locomotive engineer secures the locomotive and communicates with the dispatcher and relevant first responders. Just as it would be inconceivable to board a commercial flight with only one pilot, it is unreasonable to utilize fewer than two crew members, a certified locomotive engineer and certified conductor, to operate a train. The critical safety concerns in both aviation and rail disasters are that they are not limited to the plane or train itself but frequently involve the public on the ground and areas surrounding railroad tracks.

Further, we strongly disagree that TO/ABC would improve train handling. Some of the train handling we have seen with existing TO includes the TO not anticipating upcoming speed restrictions at the timing of a human. To be safe, TO and TO/ABC need to indicate that they would slow or stop the train with enough time for the locomotive engineer to intervene if it appears that the TO or TO/ABC would not safely operate the train. Thus, there is no safe improvement that can

be made to existing human reaction times. If anything, TO/ABC operations would need to be slower than human operations to allow for the time to transition from automatic to manual states should human intervention be necessary.

Reports from our members in the field include countless incidents of existing TO operating at full track speed, or even slightly over the allowable speed, and then slowing or stopping right at the moment of necessity. This kind of train handling is unsafe. We would be especially concerned if TO/ABC mimicked this behavior of existing TO. The addition of air brake control means that sudden and abrupt stops or reductions in speed could significantly affect in-train forces and the slack of the train. Other examples of TO/ABC violating train handling rules at CSX, invite the question of how that would be better train handling e.g. releasing the train brakes following only a minimum set.

Regarding CSX's statement that "TO is currently deployed across nearly all CSXT dispatcher-controlled tracks and is used on all types of trains," we raise a couple of concerns. CSX is stating that TO is not currently deployed across all dispatcher-controlled tracks. It would not be safe for the FRA to allow the deployment of TO/ABC across CSX's entire network, given that some locations have not been tested with existing TO. If the FRA were to grant CSX this authority, it could give CSX the ability to "leapfrog" directly to TO/ABC in specific locations. This would be extremely unsafe by rapidly introducing new hazards instead of utilizing a phased approach. **While we do not recommend that the FRA approve this PSP, we would like the FRA to consider appropriate approval for those locations where the use of TO/ABC has a history of safe TO operation.**

Secondly, regarding CSX's statement that TO is currently used on all types of trains, we wish to advise that certain types of trains and services are not suitable for TO or TO/ABC. When discussing TO/ABC configuration, CSX specifies that TO/ABC will be available on all road locomotives. We request that CSX clarify precisely which locomotives it considers "road locomotives." In other portions of this PSP, CSX has offered some limitations for locomotives that would be suitable for TO/ABC.

In the PSP, CSX states that it intends to operate TO/ABC on tracks controlled by yard limits. We question the rationale for operating TO/ABC on such territory due to the need to stop within half the range of vision much of the time. This is otherwise known as restricted speed. This type of operation requires the most vigilance of any operating condition. Train crews operating at restricted speed must operate looking out for a train, engine, railroad car, men or equipment fouling the track and broken rail, typically not to exceed 20 mph. Operating with TO/ABC in yard limits would seem overly cumbersome due to frequently needing to transition from automatic to manual states, which could delay stopping time. Any delay in stopping time could obviously prove highly dangerous, particularly within yards where personnel are used to current operations.

When discussing the configuration of the TO/ABC system, CSX states, "The TO database contains attributes that identify whether TO/ABC may be used on a particular segment of track." However,

CSX does not provide any further details on the accuracy or review process of this database. They do not list the criteria used for identifying the segment of track. The PSP does not even specify precisely which TO database is being discussed. If the TO Offboard, maintained by Wabtec, is the database in question, we must reiterate our concerns addressed in Section 5. CSX has stated that the PTC database is more reliable than the TO Offboard, so we are concerned that the TO Offboard may be unreliable in identifying segments of track that may be safely traversed with TO/ABC.

Lastly, CSX specifies in Section 6 that “TO/ABC will only be used by operators that have been fully trained on the use of this system.” The training plan and associated documents have not been provided as part of this PSP. This hinders the ability of the public to make meaningful comments, as required by 49 CFR 211.3 that allow for informed administrative action.

### **Operational Concepts (Section 7)**

When discussing the operations of TO/ABC, CSX elaborates that “The operator can return TO/ABC to the manual state by either pressing a button on the HMI, or by moving the locomotive’s control handles to match the current commanded throttle and brake state of the locomotive. Manual state may be selected by the operator at any time.”

As we will discuss in further detail in this section, we have several concerns about the process of transitioning between automatic and manual states, and CSX has failed to provide sufficient detail in this PSP to adequately establish that such transitions will be safe enough to engender trust in the system from the locomotive engineer. To begin with, CSX has not discussed the amount of time that TO/ABC takes to transition states. Further, the above quote indicates that the transition to manual may be made by simply pressing a soft key on the HMI. At night, the cab of a locomotive can be in a dark environment, and pressing an unintended button is not difficult. This could prove disastrous if the throttle and air brake were not appropriately positioned and the transition wasn’t immediate. If the physical position of the air brake handle had no air applied, and the automatic state had any amount of air applied, the rapid transition to manual state could affect a significant increase in speed.

Also, matching the position of the throttle and air brake may prove exceedingly difficult, particularly in an unexpected situation. Existing TO technology allows for more “positions” of the throttle than the physical throttle that is available to the locomotive engineer. To transition to a manual state, the TO/ABC would need to accommodate this and modify the throttle application to a notch that is physically available. However, making this change while transitioning from automatic to manual would force the locomotive engineer to chase a moving target as far as the position of the throttle, forcing the engineer to second guess the running rationale of a software program. This could delay the effectuation of the transition to manual operations, losing critical time in responding to whatever unexpected circumstances led to the transition being initiated.

Similarly, this same concept would apply to the position of the air brake handles. As CSX has indicated, if inevitable failures occur, TO/ABC and other existing train systems will apply all

available brakes – and actively increase that brake application – during the transition from automatic to manual states. This is likely to lead to locomotive engineers trying to keep up with the rapidly changing state of the train and possibly applying too much air and stopping too suddenly. Sudden, uncontrolled stops can create excessive in-train forces and lead to derailments.

Further, if an emergency were to occur that initiated the transition from automatic to manual states, and the TO/ABC was actively applying independent and dynamic brakes in addition to air brakes during the transition, excessive in-train forces – run-ins – could occur that might be avoided if a locomotive engineer were in complete control. Locomotive engineers in full control of the locomotive have many tools to quickly, safely, and effectively stop a train. This would include monitoring the amount of slack in the train – whether the train is stretched or bunched – and using the independent and dynamic brakes during an emergency or suppression application to actuate the train and prevent excessive and unsafe in-train forces. When lead locomotive power is available, but a stop is needed, the locomotive engineer may also apply the throttle to prevent run-ins.

Locomotive engineers use all these train handling maneuvers to maintain the safest operation of the train possible, drawing upon years of training and experience. The use of TO/ABC, which could delay or prevent the locomotive engineer from using such necessary handling techniques, would degrade the existing safety of train operations.

CSX states, “When TO/ABC identifies a situation in which automatic state is prohibited, or not desirable TO/ABC will prompt the operator to transition from automatic state to manual state.” Again, we request clarification of the exact procedures that transitions will utilize. This statement implies that, at least under some conditions, the operator needs to accept or acknowledge the transition.

The answers to these questions are particularly critical given CSX’s statement, “The transition to manual state is the same in all situations, including transitions to manual state triggered by degraded conditions.” From reading this statement, we assume that the timeframe, countdown, or other procedure will be consistent across all types of failures, including those initiated by the PTC, brake pipe, or other system.

During transitions from automatic to manual states, CSX clarifies, “During the transition process TO/ABC will increase dynamic braking and air braking as needed to prevent overspeed.” Trying to match a prior application of the brakes with little or no notice can lead to applying too much air and inadvertently stopping the train when a stop is not desired. This is not just human error; it is setting up a scenario where human error will happen because the system sets up the scenario.

Depending on the terrain – for instance, if such an undesired stop occurred on a steep grade – this could create a very unsafe condition depending upon how much air pressure was remaining. Further, cold weather conditions could significantly lengthen the time it takes to rebuild air

pressure. Multiple considerations that could contribute to a catastrophic failure need to be addressed.

The PSP states, “The TO/ABC HMI provides the operator with the information required to maintain situational awareness about the slack state of the train.” However, we disagree with this assertion. Many factors affect the state of slack in the train at any moment. Grade, curves, differences in unique end of car cushioning devices, and DP placement are just a few examples of these factors. Experienced locomotive engineers are familiar with these variables and constantly note unexpected slack behavior and modify train handling to ensure the train is moving safely. The HMI will never be able to provide equivalent information about the train’s slack compared with the experience of a certified locomotive engineer.

CSX continues, “These algorithms combine train handling and energy optimization rules to operate the train in a manner compliant with CSXT train handling rules.” However, this is demonstrably untrue. While we have no doubt that CSX will soon change the operating rules to accommodate the limitations of TO/ABC, CSX’s current rules on Air Brake and Train Handling (referenced in the PSP as document A23) state in rule 5402.6 that “While in Auto mode, the Locomotive Operator must resume manual control of the train when... Operating on signals that require the train to approach the next signal prepared to stop.” This rule ensures that trains do not exceed their signal authority.

Additionally, it appears that TO/ABC operations would violate CSX’s current Air Brake and Train Handling rule 5553.4, which requires a minimum of 10 PSI of air to be applied and released before continuing when using the air brakes to make a running release. This is done to ensure that the brake shoes are cleanly released. If TO/ABC applies a first service brake application of 6-8 PSI and does not further set to 10 PSI, the brakes may not fully release.

CSX states, “The use of automatic state operation increases overall efficiency of the train’s operation.” We disagree with this statement. While TO and TO/ABC may be more fuel efficient, these programs do not promote operational or service efficiency. Many trains operating with existing TO average speeds 30 mph or more below track speed. These slow speeds can contribute to the time trains block highway grade crossings. This is not efficient for customers, the public, or the operating crews. Further, CSX has not provided proof that TO and TO/ABC are more fuel efficient. The TO and TO/ABC software allows for more throttle settings than are available to the human locomotive engineer. Still, if these additional throttle positions contributed significantly to fuel efficiency or another type of efficiency, mechanisms could almost certainly be created and implemented to offer locomotive engineers additional control of the throttle.

CSX may also refer to efficiencies created in timing trains so that trains do not spend time idling in sidings or waiting for availability in yards or other destinations. If two trains are planned to meet, and the faster train is artificially slowed to prevent time idling, that may save fuel. However, that operational adjustment would not create any other type of efficiency and could contribute to additional time blocking crossings, etc.

When discussing TO/ABC's Concept of Operations, CSX states, "Any braking request will always result in the air brakes being applied." BLET is asking FRA to clarify this statement. If TO/ABC needs to reduce speed but not stop due to any number of routine reasons such as grades, lower track speeds around curves or undulating territory, etc., will the TO/ABC always apply air brakes? Engineers are encouraged to try to control the speed of their trains using mostly dynamic brakes. Does this mean CSX would instead use Zero to Zero run in a less efficient manner than required of their locomotive engineers?

BLET finds the wisdom of this type of train handling suspect. We are concerned that over utilizing the air brakes will result in extended time needed to allow air brakes to recharge or routinely having less-than-ideal brake pressure available when needing to make a brake application. We would also point out that overuse of air brakes is usually not efficient train handling because of wear on brake shoes and other mechanisms that would need to be inspected and replaced more frequently if CSX is truly planning to utilize the air brakes every time a train wishes to reduce speed.

Next, CSX states "When the locomotive operator engages automatic state while stopped, the train-starting algorithms will begin applying tractive effort or dynamic braking effort and will release the automatic and independent air brakes as conditions require." Because CSX mentions the need for dynamic braking effort upon startup of TO/ABC, we would like to request clarification about any parameters regarding allowable conditions for initiating TO/ABC. Is CSX planning to allow TO/ABC to initiate train movement on steep grades? Mountain grades? Is there an upper limit? Applying dynamic brake from stop would presume a start from a downward grade.

We have many concerns about allowing TO/ABC to initiate movement on a grade. If a train intends to initiate movement uphill but does not exert sufficient tractive effort, the train could slide backward. Wet leaves or adverse weather conditions could make the wheel slip or backward movement more likely. This backward movement could push the end of the train past a switch that exceeds the train's authority and cause a derailment or collision. If a train is intending to initiate movement downhill, but does not exert enough dynamic braking, the train could exceed allowable speed, particularly if the train is stopped ahead of a switch. Going through a switch too quickly could also lead to a derailment or collision.

Again, we urge the FRA to reject this PSP due to the numerous safety concerns that have been left unanswered. However, if the FRA chooses to approve this PSP, **we ask that there be conditions placed upon the allowable grade a train can be on when initiating TO/ABC. It is our position that TO/ABC should not be able to initiate movement on a grade where independent brakes by themselves cannot prevent undesired movement of the train.** This is a common-sense safety condition to ensure that a train cannot roll down a hill out of control.

In describing how TO/ABC initiates movement, CSX states, "The train-starting algorithms will factor the slack state of the train, the grade under and ahead of the train, the position of Distributed Power locomotives, and general operating rules to start the train and accelerate up to the efficient

operating speed.” The PSP has not sufficiently described any mechanism that would provide a full understanding of the slack state of the train. The TO/ABC would have access to consist data, track data, and GPS data; however, this information would not fully provide the state of the train’s slack.

Further, for the train-starting algorithm to know the grade under and ahead of the train, that assumes TO/ABC is fully and correctly mapped for the specific location. We know from our members in the field that many locations still are not mapped for TO use. With existing TO technology, this is not as critical of a safety concern because if TO behaves improperly, it may go slower than necessary or over the allowable speed, necessitating the locomotive engineer to assume manual control. However, with TO/ABC, any inaccuracies in mapping would be more critical and apparent because miscalculations while initiating train movement could lead to the same runaway train scenarios we just described.

When CSX’s PSP states that the train-starting algorithm will accelerate the train up to “efficient operating speed,” we wish to note that the safe operating speed may be lower than the speed an algorithm calculates will save the most fuel. Any number of conditions, such as track speed restrictions or adverse weather conditions, could necessitate a lower speed than the algorithm’s “efficient operating speed.” Further, in the same paragraph quoted above, CSX states, “Once the train has started, TO/ABC will accelerate to the planned speed based on the train location and train makeup.” While this statement is less concerning than stating that the TO/ABC will operate the train at the “efficient operating speed,” this statement still does not articulate that speeds may need to be lowered at any time to accommodate temporary conditions. Planned speed, efficient speed track speed, speed restricted cars and track restrictions are all different speeds, with the slowest speed governing the movement.

CSX has indicated that TO/ABC will use the same algorithm as Air Advise to operate the air brakes. This is concerning. Our members in the field report many issues with the existing Air Advise function. Many report that it advises setting air too late to affect a controlled stop without causing excessive in-train forces and, in some cases, breaking knuckles and separating or derailling the train.

CSX states, “TO/ABC will not command a reduction greater than 15 PSI while controlling train speed.” While this is good information to know that the system is designed to ensure enough air will always be available to command a full-service brake pipe reduction, we would like more clarification regarding how the TO/ABC will monitor the air pressure available. CSX also states, “TO/ABC stopping algorithms consider the state of the train, which includes but is not limited to speed, slack state, air brake charge state, and the grade under and ahead of the train.”

It is unclear where the air brake charge state data will come from, and we would like clarification. Will different data be derived from the locomotive event recorder? Locomotives must remain Section 229.135-compliant, irrespective of the presence of TO/ABC equipment on board. We are concerned that the locomotive engineer and/or other crewmembers may have access to and, perhaps, rely upon data containing anomalies that do not reflect true operating conditions.

Appropriate training and warnings should be provided to prevent a crew from acting on inaccurate information concerning operating conditions.

We want additional clarification on data inputs for the TO/ABC software. Will the TO/ABC have visibility to EOT data? This functionality has not been described in the PSP. Are there other data points the TO/ABC will utilize to monitor and maintain awareness of brake pipe pressure? A safeguard must ensure that TO/ABC cannot erroneously make another service after making a 15 PSI reduction. If the TO/ABC does not adequately have data on air pressure as it releases and recharges, very dangerous situations could be created. For instance, if the weather is particularly cold and the air is slow to recharge, but the TO/ABC is relying on a standard algorithm for the time to recharge air, it could make a brake reduction to an unsafe level, not realizing that the air had not recharged. This type of failure could lead to any number of catastrophic situations.

The PSP states, "TO/ABC will utilize control of the throttle, dynamic brakes, automatic brakes, and independent brakes to bring the train to a stop at a railroad-configured distance from the zero-speed target using appropriate train handling methods." We are concerned that the railroad-configured distance from the zero-speed target is not sufficiently described here. As we discussed earlier, for human locomotive engineers to maintain ultimate responsibility for the operation and control of the train, TO/ABC will need to behave in such a way that a human can recognize a malfunction or error and have time to correct it. Further, there should be consistency regarding the stopping distance to prevent train crews from making preventable mistakes due to arbitrarily different operating procedures. Secondly, we find this wording to be unacceptably vague regarding CSX's statement that TO/ABC will bring the train to a stop using appropriate train handling methods. Currently, CSX frequently modifies operating rules for train handling. **If these frequent modifications are going to be applied to TO/ABC, we believe that such changes would necessitate an amendment to the TO/ABC PSP, be submitted for public comment, and be approved by the FRA prior to being deployed.**

CSX states, "When the train is stopped TO/ABC will prompt the operator to transition to manual state. The train will only resume movement when directed to do so by the operator." This is a critical safeguard. Under no circumstances should TO/ABC be left operational on a stopped train. It would serve no benefit and only introduce unacceptable risks that the TO/ABC could initiate an undesired movement if a technological or security failure were to occur. FRA should be particularly aware of this risk.

If TO/ABC did not always return to manual control following a stop, we would have additional concerns about the availability of air brake pressure. In the case of a train that stopped at a red signal following a full-service brake application but was quickly given authority to proceed, the locomotive engineer would know the need to wait until the air had sufficiently recharged, but the TO/ABC might not. For this and the reasons already stated, manual control must be returned to the locomotive engineer any time the train stops.

CSX continues, “The operator can engage automatic state for an automatic start or execute a manual start.” Locomotive engineers are experts in their craft and should not be punished or penalized for using their independent judgment to start and operate the train manually when they determine it is necessary or preferable.

We will discuss the HMI in more depth in other sections. Still, we wish to discuss the following statement CSX offers: “In Stand-alone mode TO/ABC does not support automatic stopping because zero-speed targets are only generated in PTC Interface mode.” There must be a conspicuous indicator on the HMI to indicate whether TO/ABC is in stand-alone or PTC-interface modes to safeguard against preventable accidents rising from the locomotive engineer being confused about the operating mode.

Some locomotive engineers may work a main line job one day utilizing PTC and a local job without PTC the next. Locomotive engineers need certainty regarding the locomotive capabilities for slowing and stopping in any and all modes.

We understand that when operating in PTC-interface mode and PTC is unavailable, the locomotive engineer will be required to transition to a manual state. This raises several questions. Presumably, CSX will expect the locomotive engineer to re-engage TO/ABC when PTC is again available. However, if PTC is spotty, which we have heard can occur during adverse weather, transitioning back and forth from manual to automatic states could be distracting.

CSX states, “While operating in the automatic state in PTC Interface mode, TO/ABC expects a broadcast of route information and speed targets upon change of the target list or at a predetermined, short interval.” We request clarification on precisely what that “short interval” is. There are clear safety issues if that interval is too long, so we would like to know precisely what the interval is and how CSX has determined that that interval is safe.

Finally, we have mentioned concerns regarding transitioning between automatic and manual states several times already, and CSX addresses this issue again, saying, “If the operator fails or is unable to perform required actions to transition from automatic to manual state, TO/ABC will idle the locomotive consist or hold the dynamic brakes and air brakes in the current position if the consist is currently braking.” Yet again, CSX has not provided us with the specific timeline for the locomotive engineer to perform the required actions to transition from automatic to manual states. While idling the locomotive or maintaining the current braking is likely the safest action for TO/ABC to take if the engineer fails to act, idling the locomotive suddenly could still cause unsafe conditions in certain circumstances. Given this, it is imperative for the locomotive engineer to have a full understanding of the timeline to execute all required actions.

### **Safety Requirements (Section 8)**

Throughout these comments, we have stated multiple times that TO/ABC does not increase safety and, in fact, introduces new risks to rail operations. CSX admits as much in saying, “The design

of the TO/ABC product is not intended to provide vital functionality and does not provide functions to enhance safety. TO/ABC is safety critical because a TO/ABC failure could create an unsafe condition.” We remind the FRA of this because, for this PSP to be approved, the FRA needs to determine that CSX has proven that TO/ABC will provide an equal or higher level of railroad safety as required by 49 CFR 236.909 and 49 CFR 236.913. CSX acknowledges this, stating, “The product is intended to provide efficient energy management through automatic planning and control of the speed profile of the train while not introducing unacceptable hazards in its operation.” However, the BLET does not consider any of the hazards introduced by TO/ABC acceptable because there is insufficient demonstrated benefit to justify these hazards. Automatic planning is not inherently desirable and may introduce problems when operating conditions are not routine and when unplanned events take place. Most trains experience unplanned events of some kind during their operation.

CSX continues, “Responsibility for safe train operation remains with the operator and their adherence to railroad operating rules and procedures. In preserving safety, the design of TO/ABC does not undermine or interfere with the locomotive operator’s ability to manage braking functions.” Again, we must disagree with this assertion. With existing TO functions, engaging brakes to slow the train at the last moment before a speed reduction is necessary does not allow sufficient time for the locomotive engineer to intervene if the system malfunctions. Additionally, our experience with the existing Air Advise system is that it frequently recommends setting air too late. If the TO/ABC uses the same algorithm as Air Advise, as indicated in Section 8 of the PSP, this late application of air brakes would also require the locomotive engineer to intervene.

CSX states, “The ultimate mitigation to any hazardous conditions created by incorrect TO/ABC performance that could contribute to a hazardous condition is the manual engagement of the locomotive’s emergency brake system.” BLET is compelled to point out to the FRA that relying upon emergency brake applications introduces additional risks of uncontrolled stops and excessive in-train forces beyond the current state of rail operations.

BLET has repeatedly raised the concern in these comments that the train crew may attempt to initiate an emergency brake application, and the TO/ABC prevents this. To address this concern, CSX states the following:

To preclude the possibility that a train operator is prohibited from manually instituting necessary brake activations using the brake handle, design requirements were derived as the result of failure analyses of TO/ABC and its associated components:

- Design Failure Modes and Effect Analysis (DFMEA) - External Facing - Interfaces for EM Control of Air Brakes [A5]
- DFMEA of Trip Optimizer Control of Air Brake [A7] for design
- Safety Failure Modes and Effect Analysis (SFMEA) - External Facing - Interfaces for EM Control of Air Brakes [A6]
- SFMEA of Trip Optimizer Control of Air Brake [A8] for safety

As CSX has not provided any of these documents publicly as part of this PSP, BLET and the public are unable to evaluate and confirm that CSX is correct that under no circumstances would the train crew be prevented from initiating an emergency brake application. Without conclusive and publicly available evidence to support CSX's assertion, it would be inappropriate for the FRA to approve this PSP.

CSX's statements regarding the analysis in these non-public documents do not give us much additional confidence. CSX states, "These methods of analysis provide evidence demonstrating the reduction in the likelihood that single points of failure can prevent the operator from initiating manual control of the braking system."

The BLET is unwilling to accept the "reduction in likelihood" that the locomotive engineer may be prevented from initiating manual control of the braking system. Any risk that the locomotive engineer would be prevented from braking would be a significant and unacceptable deterioration of railroad safety from current operations. This alone should disqualify this PSP from being approved.

### **Product Architecture (Section 9)**

Section 9 of the PSP addresses 49 CFR 236.907(a)(5), which requires the PSP to contain a document describing how product architecture satisfies the safety requirements. CSX has set forth only two safety requirements for TO/ABC in this PSP:

[Req #1] – An electronic air brake that is designed to remove tractive effort upon application of the emergency brakes shall be used in Trip Optimizer Air Brake Control configurations.

[Req #2] The Trip Optimizer Air Brake Control function, during normal operation, and in the presence of any and all errors or failures of the functionality, shall not inhibit a train operator from engaging the train's braking system (i.e., via the brake handle) to assure safety of a train movement.

CSX states, "Evidence that Req #1 is satisfied rests with the confirmation that emergency brake control is in place and can be separately invoked, independent of TO/ABC." Will this be a manual check performed every trip? Does CSX consider a single "confirmation" of this functionality during already-conducted field tests sufficient? The BLET does not consider field tests alone to be sufficient confirmation of such a safety-critical function.

Regarding the only other safety requirement for TO/ABC that CSX has proposed, CSX states, "Req #2 is satisfied through verification and validation activities which include testing of TO/ABC functional and product design requirements." Again, we would like clarification on whether this verification and validation will be required to occur on an ongoing basis. Even if CSX currently

“intends” to perform verification and validation activities on a schedule, these activities must be required by the FRA.

### **Hazard Log (Section 10)**

The hazard log does not comply with 49 CFR 236 Appendix B(b), which requires, “The risk assessment of each safety-critical system (product) must account not only for the risks associated with each subsystem or component, but also for the risks associated with interactions (interfaces) between such subsystems.” The hazard log does not discuss failures of other systems, such as PTC, other onboard equipment, or any back-office business systems. While we understand that these systems have been deemed safe to use individually, this PSP has not discussed the risks associated with interactions between these systems.

Additionally, the hazard log does not comply with 49 CFR 236 Appendix D(e), which requires third party assessment of the hazard log. CSX has not indicated that any third party has verified this hazard log.

All the hazards identified in the hazard table are indicated to be a 1A hazard on their own. When every hazard that can be imagined for a given situation would be both frequent and catastrophic, resulting in a possible derailment or collision in every case, we strongly question the wisdom of deploying TO/ABC. With “mitigation,” every single hazard is then downgraded to 1D or below, meaning that the hazard would still be just as catastrophic, but is assessed to likely occur less frequently. Yet again, we feel compelled to point out to the FRA that even the additional risk of infrequent catastrophe is still an additional risk introduced to rail operations and thus should not be approved under the standards 49 CFR 236.909 and 49 CFR 236.913.

The methodology that CSX has adopted for addressing only “residual” risk, meaning risk after including mitigations, is unusual. Applying mitigations works 100% of the time in theory, but in the real world, mitigations are never applied perfectly and universally, particularly when those mitigations rely upon external facts. Nearly all the “mitigations” involve external safety programs, many of which depend upon human intervention. This violates the first principle listed in the risk assessment appendix for 49 CFR 236: “The risk metric for the proposed product must describe with a high degree of confidence the accumulated risk of a train control system that operates over the designated life cycle of the product.”

Utilizing mitigations that rely on other safety systems, including the training and expertise of locomotive engineers, carries additional risks when training is lacking. For instance, the quality and frequency of the training must be sufficient to meet the needs of the task. Locomotive engineers must be able to utilize these skills at a moment’s notice, which requires them to have performed the skills recently so that they have not degraded from lack of use. They must also not fear utilizing their expertise with the threat of discipline for not utilizing the automatic state a certain percentage of the time. Currently, CSX requires most locomotive engineers to operate TO 95% of the time, with punishment given if they fail to meet this percentage. However, “failing” to

meet this percentage directly contributes to both maintaining good train handling skills and exercising judgment about the safety of train operations, which CSX is stating here will mitigate the catastrophic risks introduced by TO/ABC.

CSX states that “The HL [Hazard Log] tables are updated as necessary throughout the life of the product.” We want to clarify if the updated tables will be available to the public. Further, CSX states, “Hazards are tracked, and hazard entries are closed once mitigations have been confirmed to be successfully implemented with supporting evidence provided to justify the position.” Once again, we must point out that this is an unusual method of hazard mitigation. The hazard still exists, even if the hazard is mitigated. That mitigation is still critical and must be monitored on an ongoing basis to ensure that the mitigation remains as effective at reducing the frequency and/or severity of the hazard – and, therefore, the overall risk.

### **Risk Assessment (Section 11)**

When discussing the required risk assessment performed, CSX states, “No adjustment of the previous condition as described in §236.909(e)(3) is required because no changes to the physical or operating conditions of the railroad are required for the introduction of the product.” We disagree with this statement. The Rail Safety Improvement Act of 2008 requires railroads to have within their risk analysis a technology implementation plan including a technological analysis with the introduction of “novel technologies.” Introducing TO/ABC will require modifying at least two operating rules. The use of TO/ABC will fundamentally change the operating conditions of the railroad by changing what systems have access to control the air brakes. The use of TO/ABC would also expand the role of the locomotive engineer to require much more passive monitoring and alertness to the behavior of the TO/ABC program.

Further, we have concerns that the scope CSX used when conducting its risk analysis is unusual. CSX states, “The RA [Risk Analysis] was defined as the process of determining, both quantitatively and qualitatively, the measure of risk associated with use of the product under its intended operating conditions.” At its most basic, a risk analysis is designed to analyze the risk posed by the subject. That includes all the risks – not just the risks posed by the subject when everything is working perfectly. To conduct a comprehensive risk analysis, CSX must consist of an analysis of unintended but reasonably expected operating conditions. An analysis metric that must be included in the overall risk would examine the risk *when the product fails in all the ways it can*.

CSX states that it has complied with 49 CFR 236 Appendix B(a) by saying, “The risk metrics presented for train operation with the product are expressed as an upper bound, as extremely conservative estimates, justified through field experience, product reliability verification and validation, and expert knowledge of the operating environment.” However, CSX has not publicized any of the mentioned field data or other product studies. Without the public availability of this data, it is impossible to verify if CSX’s assumptions are reasonable. This lack of data

inhibits the public's ability to offer meaningful comments as required by the Administrative Procedures Act, 49 CFR 211, and 49 CFR 236.913.

CSX's statement concerning 49 CFR 236 Appendix B(b) is as follows:

The TO/ABC product does not depend on interfaces with other connected systems in Stand-alone mode. In PTC Interface mode, the product does depend on the provision of track data, consist data, and zero speed target data from PTC to accomplish its function. The Fault Tree Analysis in the Risk Assessment accounts for the failure modes associated with these interfaces, in the context of the primary safety mitigations (train operator supervision and PTC ACTIVE state protection).

We do not believe that the fault tree CSX has included in this PSP for stand-alone mode is sufficient because it only addresses TO/ABC, causing an overspeed event. Other potential malfunctions that could impact railroad safety include TO/ABC not exerting sufficient tractive effort on a grade, leading to the train moving backwards in an uncontrolled fashion.

Further, neither fault tree contains any consideration of the critical functionality of the EOT. Presumably, even if TO/ABC failed in such a way that the air brake handle was not available to initiate an emergency, the locomotive engineer could initiate an emergency from the rear of the train via the EOT. Of course, this would be a highly undesirable option due to the in-train forces and the high likelihood of a train separation or derailment. The EOT is still a safety-critical system that should be considered in the fault tree and overall risk analyses. This is particularly important because EOTs can also fail on their own. It is not unusual to experience a loss of communications with the EOT, similar to the loss of communications with DPUs. We will also note that not all trains use a traditional EOT, as described in 49 CFR 232 Subpart E. Depending upon the train makeup, a DPU may be used instead of an EOT device. Using a DPU in the place of an EOT introduces a few operational differences. Both of these – using an EOT or a DPU in place of an EOT – must be considered in the fault trees and overall risk analyses.

CSX states the following concerning the applicability of 49 CFR 236 Appendix B(c):

As stated previously, the previous condition model is not fully applicable since the previous condition is also present when TO/ABC is not in automatic state. The "base condition" is defined as a train operating with TO/ABC installed but in manual state whether TO/ABC is powered up or not (i.e., TO/ABC not influencing train operation in any way), whether or not PTC is present or operating. The modifications to the TO software and interfaces to add the capability of ABC are analyzed and validated to ensure that in cut-out manual state, there is no functional difference from the previous condition (TO without ABC) in that TO/ABC cannot fail in such a way as to impede operator control of the train.

We disagree with CSX's assertion that a previous condition model is not entirely applicable. We understand that TO/ABC may not always be active or in a mode intended to control air brakes.

However, simply stating that when TO/ABC is not active, it is not functionally different from operating without a train without TO/ABC does not change that when TO/ABC is engaged, it introduces new hazards that should be compared against the hazards present in existing railroad operations to determine if the introduction of TO/ABC poses a higher risk.

CSX further states:

The Fault Tree Analysis in the Risk Assessment accounts for the aspects of the base condition that are affected by installation of the product, which are train speed control (all modes) and stopping functionality (in PTC Interface mode only). No societal cost is assessed for TO/ABC as the risks contributed by the product are shown to be assessed to an acceptable level, and failure of the product alone cannot lead to an accident (no single point failures present).

49 CFR 236 Appendix B(c) states, in part:

A full risk assessment must consider the entire railroad environment where the product is being applied and show all aspects of the previous condition that are affected by the installation of the product, considering all faults, operating errors, exposure scenarios, and consequences that are related as described in this part.

CSX claims exemption from the full risk assessment simply because it claims that TO/ABC cannot fail due to a single point failure. The regulation does not provide such an exemption or exception. We find no reason for CSX to omit the full risk assessment and previous condition model for comparison and analysis. BLET has held the human factor accepted position that the introduction of technology can solve certain problems while simultaneously introducing new problems.

Throughout Section 11, CSX refers heavily to non-public documents that claim to provide a fully compliant risk assessment. However, without public access to these documents, we are unable to verify that the risk assessment meets the regulatory requirements or that it establishes a sufficient level of safety to allow for the implementation of TO/ABC. The public must be able to review the full risk assessment to provide informed comments.

As noted in the PSP, 49 CFR 236 Appendix B(h)(2) requires CSX to document assumptions regarding human performance in its risk analysis. To address this, CSX states, “CSXT maintains a robust monitoring process to capture all instances of operator noncompliance that results in a safety incident, in addition to regular performance monitoring and testing of operators to validate skills and rules compliance.” We find this response lacks any seriousness regarding human factors in train operations. Instead of examining potential risk factors that could lead to performance errors or identifying strategies to support locomotive engineers in safely executing their duties, CSX merely states that it maintains a robust program to capture “operator noncompliance.”

This approach does not address or acknowledge underlying risks or recognize the train crews operate within a complex system that affects human performance. It only identifies errors in human performance while doing nothing to correct them. While CSX does mention that locomotive engineers will be skills-tested regularly, there is no mention of regular training or support to develop and maintain the skills and knowledge needed to pass such tests. This is not a plan to address and mitigate risks posed by human performance. This is a reactionary and punitive plan only.

Regarding CSX's Mean-Time-To-Hazardous-Event (MTTHE) calculation for stand-alone mode, we again note that CSX has failed to address the potential for TO/ABC to malfunction by not exerting enough tractive effort to move the train or hold it in place. This malfunction has also not been included in the PTC-interface mode's fault tree analysis or MTTHE calculation.

We disagree with CSX's assertion that the risk assessment and TO/ABC meet the standard of 49 CFR 236.909(a), which requires:

The safety analysis included in the railroad's PSP must establish with a high degree of confidence that introduction of the product will not result in risk that exceeds the previous condition. The railroad shall determine, prior to filing its petition for approval or informational filing, that this standard has been met and shall make available the necessary analyses and documentation as provided in this subpart.

CSX has not established that the risk introduced by TO/ABC will not exceed that of the previous condition. In fact, CSX has stated multiple times in the PSP that TO/ABC introduces hazards but does not provide any safety benefit. In this section, CSX states, "As previously described, there are no hazards associated with the base condition that are no longer present in the enhanced condition, because the base condition is still present and unchanged when TO/ABC is not in the automatic state." While CSX offers a MTTHE calculation, it notably does not compare this calculation with the MTTHE for the previous state, or existing operations.

For these reasons, and reasons discussed above, we disagree with CSX's statement that "Hazards that may be impacted by the use of TO/ABC are mitigated to an acceptable level as shown in Section 10."

### **Hazard Mitigation Analysis (Section 12)**

As required in 49 CFR 236.907(a)(8), CSX includes a discussion of hazard mitigation. CSX states, "Each hazard entry is assessed for the ability of its mitigation to reduce the level of safety risk to a level commensurate with the requirements of the application. ... With TO/ABC functionality developed as a non-vital product, it is anticipated that residual risks for hazards in the Acceptable with Review or Undesirable AREMA risk categories are acceptable for its use." The BLET disagrees with this assessment. Any decrease in overall rail safety is unacceptable. Additionally, risks deemed "undesirable" in the AREMA risk categories include events that are considered to

have a “critical” consequence and occur “occasionally.” This is still too frequent when the lives and safety of crews and communities are at stake. BLET agrees in a certain sense that the TO/ABC is not a vital product because fuel savings, and train handling can be performed just fine without TO/ABC by the locomotive engineer. This does not change the fact that if a consequence is critical, it should be allowed to happen occasionally. FRA should not accept occasional problems from a software product introduced into the locomotive in a PSP.

CSX further states that mitigation primarily consists of relying on the locomotive engineer to intervene in the case of an emergency or anomaly. CSX also specifies that certain design features of the TO/ABC are established in such a way as to mitigate failures. One such design feature mentioned is, “TO/ABC shall notify the crew with audible alarms and visual prompts through the HMI when automatic state is prohibited.” As a practical note, previously, only one member of the crew, the locomotive engineer, would be notified through the HMI as conductors do not currently have a TO screen. CSX cannot give certified conductors visual prompts without the hardware installation of a monitor positioned in front of their normally seated position.

Another design feature that CSX mentions is that “TO/ABC shall only operate when internal communication is established.” BLET asks if this internal communication extends to DP. If so, will TO/ABC immediately transition to manual state upon losing communication with any DP? In certain territories, this could be highly distracting as DP loss of communication happens on a regular basis. If loss of communication with the DP initiates TO/ABC to relinquish control of the lead locomotive back to the locomotive engineer, FRA needs to know if the transition time to manual state and warning of the impending modal change is sufficient in a way that adheres to human factors engineering and design principles regarding human machine interface.

CSX discusses training as a safety mitigation by stating, “Training – training on the application and corrective actions necessary to address system anomalies is provided. Training for all locomotive operators will be provided electronically and recorded in CSXT’s Learning Management System prior to the deployment of TO/ABC.” We do not believe online training alone to be comprehensive enough to sufficiently train locomotive engineers to safely utilize TO/ABC. Hands-on training at the controls of the locomotive and simulator training is a more proven and time-tested training strategy in the rail industry. Mouse clicks alone will not do the job of training.

Finally, as a hazard mitigation, CSX states the following, “Rules and procedures – Locomotive Operators must comply with CSXT Air Brake and Train Handling [A23] and CSXT Operating Rules [A25] before and after the addition of the new TO/ABC functionality. The CSXT Employee Operating Manual contains all applicable rule books and is updated monthly by system bulletin.” However, as we have pointed out, we have already identified at least two Air Brake and Train Handling rules that TO/ABC operations would violate. Specifically, 5402.6 and 5553.4, prohibiting use of automatic state following approach signals and requiring a minimum 10 PSI brake pipe reduction before proceeding, respectively. This raises an important problem that was stated earlier regarding how CSX will handle situations where the TO/ABC violates the operating rules, but the locomotive engineer did not. BLET believes any sanctions for operating rules

violations allowed by the TO/ABC software should go directly to the rail carrier for introducing the product into the locomotive operating environment—not the locomotive engineer.

### **Safety Assessment and Verification and Validation Processes (Section 13)**

CSX claims that “TO is a product with a proven history of reliable and safe operation in railroad application on CSXT property.” However, we have numerous incidents of TO malfunctioning in unsafe ways reported from our members in the field. For examples, please see the included Appendix B.

In discussing TO/ABC’s exposure to current operating conditions, CSX states:

The addition of TO/ABC software does not increase exposure to normal operating or external events because the characteristics of the underlying train operations (number of train moves, speeds, number of meets, number of work zones and other bulletin conditions, etc.) that constitute the exposure to mishaps is not changed by whether the TO/ABC functionality is deployed.

We somewhat disagree with this characterization, and it ignores a more significant potential problem. Simply stating that underlying train operations remain the same because they are not changed does not address the influence of introducing software that operates the train. The necessary actions to respond to unexpected modal changes involving air brakes is a newly introduced problem. To successfully and safely navigate existing conditions in rail operations, the locomotive engineer would need to now ensure the TO/ABC is operating safely or assume manual control, which could increase response times, constituting an additional risk.

CSX adds that “The operator continues to manage safe train operations under the applicable CSXT Air Brake and Train Handling Rules [A23] and CSXT Operating Rules [A25] regardless of the operating state of TO or the TO/ABC function.” And once again, we must point out that this is incorrect as the TO/ABC function would violate existing train handling rules.

In this section, CSX states that TO/ABC is not designed to be a closed-loop system, saying, “TO operates on the premise that the train operator is responsible for the safe movement of a train. TO/ABC is not designed to fully satisfy the requirements of the closed loop principle as it is not intended to be an Appendix C compliant product, but closed loop operation is achieved when used as part of the system with the operator.” It is worth reiterating this point. The TO/ABC functionality cannot replace the human operator certified under 49 CFR Part 240 operating or in an immediate position to operate the manual controls of the locomotive. It is also a contradictory principle to state the system is not designed to be a closed-loop system, but it “achieves” closed-loop operation. BLET takes issue with a product being designed to do one thing but performing a different way cannot be classified as an “achievement.” At least not a positive one. A locomotive, including its hardware and software, should function as intended, in this case, as designed.

CSX claims to have considered human factors in the engineering of the TO/ABC technology, stating:

A Human Factors Analysis (HFA) CSX Trip Optimizer with Air Brake Control - Human Factors Evaluation Report [A14] was performed to assess operator interactions with TO and the potential impacts due to the addition of TO/ABC. The human factors analysis addressed topics of cognitive workload, acceptability of information displayed to the locomotive operator and elements of detrimental reliance. Results presented in this report [A14] indicate there are no impacts on the safe operation of the train.

The Human Factors Evaluation Report has not been made publicly available as part of this docket. Therefore, we cannot evaluate if the study covers the topics that CSX claims it does. This is concerning. As discussed in the next section, addressing human factors concerns such as cognitive load and effective displays of critical operations data while a train is in use, only becomes more critical as additional requirements and systems are added for the locomotive engineer to manage. As it is, we do not know how the study was conducted, if it was conducted on real-world operations or on a simulator, if the study covered complex terrain, or if the study included adverse environmental conditions. Many factors can contribute to human factors errors, and we want to ensure that CSX studied the full complexity of train operations rather than testing only on a straight, flat test track with a unit train full of evenly distributed sand cars.

Regarding safety from external influences, CSX states:

As part of Wabtec design, analysis and verification activities, faults related to environmental occurrences, malicious attacks, implementation within different locomotive configurations and types, and the effects of providing the TO/ABC with incorrect data sets, have been considered with mitigations built into the design. The primary mitigation for any of these rests with the actions of the train operator and their adherence to training received, applicable processes and procedures and operating rules.

To begin with, CSX is again relying on the training and skill of the locomotive engineer to mitigate risks associated with external influences, yet CSX claims that online-only training is sufficient to meet these needs. As skilled as BLET locomotive engineers are, they cannot prevent software hacking or cyber-attacks. Weather events like rain, wet leaves, or cold temperatures that can affect operations can somewhat affect how an engineer handles a train, but not TO/ABC. The ability of the locomotive engineer to mitigate these events is simply to respond to the event as safely as possible, which requires sufficient training and hands-on experience to recognize the event and take appropriate action.

Lastly, CSX discusses the process for making revisions and updates to the TO/ABC software, saying, "CSXT and Wabtec follow a rigorous process for version and revision control and ensuring that the proper version and revision of TO are properly configured on each locomotive. This is managed by following the processes defined within the CSXT's Railroad Safety Program Plan

[A15] in close coordination with Wabtec.” A railroad’s safety program plan is a risk reduction plan by another name. As part of a risk reduction plan a risk assessment is required to be performed. Any risk assessment should calculate what risks are added by a system that can have “critical” “undesired” events that happen “occasionally.” Additionally, CSX has not explained a process for notifying locomotive engineers of revisions of the software prior to being implemented.

#### **Human Factors Analysis (Section 14)**

49 CFR 236 Appendix E(d) requires railroads to “Design systems that anticipate possible user errors and include capabilities to catch errors before they propagate through the system...” We do not believe CSX’s Heuristic Evaluation and Cognitive Walkthrough meet this standard. CSX states that the Cognitive Walkthrough conducted evaluated the following:

- Will the user know what course of action is needed to achieve the desired result?
- Will the user see that the correct action or option is available?
- Will the user be able to associate the correct course of action with the desired result?
- Will the user understand whether a correct or incorrect course of action has been taken?

These criteria do not include evaluating reaction times and the “capabilities to catch errors before they propagate through the system,” as required by the regulation.

Similarly, in CSX’s Cognitive Workload Assessment, it evaluated the following:

- the number of tasks that must be performed,
- whether any simultaneous tasks must be performed,
- the accuracy required by the task, and
- whether there are any time-constraints on the completion of the task, as each affects cognitive workload.

BLET notes again that this assessment did not examine real-world reaction times to ensure that the time-constraints placed upon the locomotive engineer by the tasks were reasonable and safe.

CSX concludes, “The results of the HFA [A14] concluded that there are no primary human factors concerns associated with the TO/ABC features. The HFA [A14] includes several human factors recommendations that CSXT will review to determine their viability for incorporation into the TO/ABC product.” Without the Human Factors Analysis (HFA) being publicly available, we are unable to agree that there are no primary human factors concerns associated with TO/ABC.

Additionally, CSX has not disclosed in the PSP the human factors recommendations provided by the third-party. CSX has not committed to incorporating these recommendations and are concerned that some of these recommendations may be necessary to improve the safety of TO/ABC. Without the benefit of the additional documents, we cannot be sure that CSX has fulfilled its obligations to arrive at the conclusion that TO/ABC presents no human factors risks.

In this section, CSX describes the feedback sought from locomotive engineers: “During the Engineering and Field Tests, Wabtec solicited feedback from CSXT operators to improve operator messages and usability.” We are disappointed that CSX and Wabtec chose not to work collaboratively with BLET throughout the process to solicit feedback. While individual locomotive engineers can offer valuable insight, the BLET can offer a much more comprehensive evaluation that draws upon collectively hundreds of years of experience. Additionally, the BLET has an agreement with CSX to participate in the Cab Committee to discuss matters that affect the operation of locomotives, and CSX has not sought feedback from the Cab Committee.

CSX offers select examples of changes that were made due to feedback from locomotive engineers:

1. Changes were made to the TO/ABC rolling map display to provide operators with a better indication of pending air brake applications and releases.
2. To initiate the auto-start sequence, TO/ABC initially required that the automatic brake handle be in a service zone (applied). Operators pointed out that this was counterproductive if the train was stopped with the automatic brakes released. Operators may now initiate the auto start sequence with the automatic brake handle in release.
3. A new message is being introduced to remind the operator to confirm all consist locomotives are running prior to initiating the auto start sequence.

These changes represent safety-sensitive operational considerations. This raises our concerns that the recommendations made in CSX’s HFA may also contain improvements that could be made to the safety of TO/ABC operations. For instance, in the first piece of feedback CSX received from locomotive engineers improves indications of pending air brake applications and releases. This is critical to the locomotive engineer’s ability to ensure that the TO/ABC is functioning properly and abiding by train handling and operating rules.

The second example identifies a potentially catastrophic design. If the TO/ABC malfunctioned and the air brake handle was already in an applied position, this would limit the options available to the locomotive engineer when they need to retake manual control. This could result in excessive in-train forces and a derailment, and BLET believes that CSX and Wabtec failed to recognize it as a problem until a locomotive engineer pointed it out. This is an obvious safety issue that must be addressed at the beginning of the conception and design process.

There are many accepted design standards that have come about in the field of human factors and human machine interface (“HMI”) issues with the integration of computers and software with locomotives. Consulting human factors experts is a good way to know how to confront emerging technologies and how their integration into the cab of the locomotive is received. While BLET members are not human factors experts per se, our members are professional and know how to operate trains in any situation. Sidney Dekker is a giant in safety research, authoring several valuable contributions to transportation safety, including “The Field Guide to Understanding “Human Error.”

Regarding the introduction of new technologies and typical errors, Dekker writes, “If people were interacting with computers in the events that led up to the mishap, look for the possibility of the following “errors”:

- Mode error. The user thought the computer was in one mode, and did the right thing had it been in that mode, yet the computer was actually in another mode.
- Getting lost in display architectures. Computers often have only one or a few displays, but a potentially unlimited number of things you can see on them. Thus, it may be difficult to find the right page or data set.
- Not coordinating computer entries. When people work together on one (automated) process, they have to invest in common ground by telling one another what they tell the computer, double-checking each other's work. Under the pressure of circumstances or constant meaningless repetition, such coordination may not happen consistently.
- Overload. Computers are supposed to off-load people in their work. But often the demand to interact with computers concentrates itself on exactly those times when there is already a lot to do, when other tasks or people are also competing for the operator's attention. You may find that people were very busy programming computers when other things were equally deserving of their attention.
- Data overload. People were forced to sort through a large amount of data produced by their computers and were unable to locate the pieces that would have revealed the true nature of their situation. Computers may also spawn all manner of automated (visual and auditory) warnings which clutter a workspace and proliferate distractions.
- Not noticing changes. Despite the enormous visualization opportunities the computer offers, many displays still rely on raw digital values (for showing rates, quantities, modes, ratios, ranges and so forth). It is very difficult to observe changes, trends, events or activities in the underlying process through one digital value clicking up or down. You have to look at it often or continuously and interpolate and infer what is going on.
- Automation surprises are often the end-result: the system did something that the user had not expected. Especially in high tempo, high workload scenarios, where modes change without direct user commands and computer activities are hard to observe, people may be surprised by what the automation did or did not do.”<sup>7</sup>

### **Training Requirements (Section 15)**

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<sup>7</sup> Dekker, Sidney, “The Field Guide to Understanding ‘Human Error’, Third Edition, CRC Press, 2014, pg.104.

CSX has not provided the training manual that will be used to train locomotive engineers on the use of TO/ABC publicly in this filing. We are not able to fully evaluate it for this reason. However, as we have stated multiple times, online-only training is insufficient for a system as complicated and safety-sensitive as TO/ABC. To safely identify and respond to malfunctions, locomotive engineers need to have hands-on experience with TO/ABC in a variety of real-world scenarios.

In this section, CSX makes a statement regarding software updates that we would like some clarification on. CSX states, "TO/ABC receives software updates over the air and the locomotive installs the updates when it detects that it is in a safe state. There is no training required for this process to occur." We would like to know exactly what TO/ABC considers a "safe state" in which to perform an update. Further, if TO/ABC incorrectly identifies a "safe state," the locomotive engineer will need training in how to respond to prevent unsafe conditions.

CSX further explains software updates:

CSXT Maintainers that have received on the job training to install air brake software will follow the procedure found in system maintenance instructions [A17] published by CSXT and the manufacturer of the air brake system. Following air brake software installation, the air brake system performs a self-test, and the installer performs a standard locomotive air brake test.

Which craft or class of rail employees will be considered "Maintainers?" If they can install TO/ABC software *and* perform locomotive air brake tests, it is critical that these "maintainers" be fully qualified to perform such duties. Locomotive air-brake tests are required by carrier rule and federal regulation and are typically done by the class or craft of locomotive engineer.

Additionally, we are disappointed that CSX has not included any details on training for dispatchers, mechanical employees, or supervisors in this PSP, as required by 49 CFR 236.907(a)(12). While dispatchers, mechanical employees, and supervisors will not be immediately responsible for managing TO/ABC, they will need to be familiar with its behaviors and failure states to advise train crews on appropriate courses of action.

### **Installation and Operational Procedures (Section 16)**

In describing the installation process proposed for TO/ABC, CSX states, "All software releases are targeted at specific locomotive models and fleets, and a specific review and approval is provided at each step prior to proceeding to subsequent steps." However, many of the steps listed in this process are indicated to be optional "...if a risk review of the proposed software change determines the steps are not required":

1. Selection of software features for deployment as an incremental change to CSXT
2. Wabtec lab validation of software features
3. CSXT and Wabtec joint supervised evaluation testing (engineering runs) (Optional)
4. CSXT and Wabtec small quantity field testing (field testing) (Optional)

#### 5. CSXT release for deployment.

We would like clarification regarding what the risk review will consist of to determine that testing is not necessary for software updates. We do not want our members used as guinea pigs to test out software updates that have not been rigorously reviewed, tested, and determined safe to operate.

CSX states, "Once all Wabtec approvers have signed off on the release, the release notes are submitted to CSXT for approval by CSXT's Change Control Board (CCB)." The BLET would like to note that CSX has not allowed us to participate in the CCB, which could allow for oversights such as those already discovered and discussed earlier in these comments in Section 14 regarding human factors where a locomotive engineer pointed out that it would be unsafe for the air brake handle to already be in a service position should the TO/ABC malfunction. Clearly software engineers are needed in every stage of the product's deployment. BLET believes locomotive engineers should also be part of the process to provide their professional perspective about the safe operation of locomotives.

To install the software, CSX states, "The eServices Software Release Tool provides the CSXT locomotive maintainer with the desired software release for each locomotive by road number and the means to access the software files needed to update the locomotive." The term "locomotive maintainers" is not a traditionally defined craft and needs clarification as to what craft or class of employee a "locomotive maintainer" is intended to describe?

#### **Security (Section 18)**

In discussing the cybersecurity protections for the TO/ABC system, CSX states, "Additional security auditing and/or penetration testing, including that performed by Wabtec Operational Technology Security teams, may be conducted based on risk profile of product." We would like additional information regarding how the risk profile will be created. Given that a failure of the TO/ABC can lead to catastrophic incidents, the FRA should require CSX to adhere to a minimum schedule of cybersecurity testing.

CSX states:

The communications from CSXT locomotives to offboard systems utilize the Interoperable Train Control Messaging (ITCM) network designed for CSXT's PTC implementation. The security design of the ITCM network is built in accordance with the requirements of 236.1033. The items listed below provide details of the security approach and techniques used in the ITCM system to ensure that CSXT and/or its contractors comply with 236.1033.

Given that the communications for TO/ABC and PTC utilize the same network, the FRA should consider prohibiting TO/ABC operations whenever the PTC system fails. It would not be practically safe to operate TO/ABC when the additional risk of a system-wide PTC has occurred. It would also be incredibly unsafe from a cybersecurity perspective and put the integrity of the TO/ABC software at risk to use a communication network that may be compromised. In fact, the

judgment of the locomotive engineer to run the train manually should not be second guessed when the engineer decides manually operating the locomotive is a matter of taking the safest course.

### **Warnings and Warning Labels (Section 19)**

The meaning of Section 19 is ambiguous. We have reviewed Appendix A of this PSP. If CSX is indicating that the warning and caution alerts found in Appendix A are messages that locomotive engineers would be expected to review while operating a moving train, we have extreme concerns. The warnings provided in Appendix A are excessively wordy and vague to be used as alerts enroute while controlling train movement. Clarification on the specific process (who, what, where, when, why, and how) that will be used for warnings and caution alerts that may cause distraction, capture attention, or require quick modal changes from automatic to manual modes of operation.

### **Initial Implementation Testing Procedures (Section 20)**

In describing testing and implementation for TO/ABC, CSX states, "It [Section 20] also sites modifications made to TO/ABC and operator training based on feedback from the testing." However, Section 20 does not mention specific modifications made to locomotive engineer training or any specific feedback from testing regarding training or the role of a "human in the loop."

CSX describes tests done at the Transportation Technology Center in Pueblo, Colorado. CSX states:

The testing involved general system operation, air brake control, automatic train starting, automatic train stopping, and failure mode test cases. Over multiple days of testing, the Wabtec and CSXT team executed an extensive test plan.

The test plan included:

Testing for failure conditions involved induced communications interruptions, deliberate use of incorrect data, and injection of locomotive faults.

Specific tests designed to demonstrate that TO/ABC did not impact PTC penalty, the air brake handles, or brake pipe emergency.

Repeated operation of the train start, train stop and air brake control functions to exercise the system in automatic state with TO/ABC actively controlling the train.

We are concerned that these tests did not include any human factors issues or weather and environmental conditions – though we understand there are limitations to the weather conditions that can be reasonably simulated.

CSX continues to describe engineering phase by saying:

During the Engineering Test phase, CSXT and Wabtec tested all three software elements using two locomotives on a single subdivision (CSXT Wilmington Subdivision between Hamlet NC and Wilmington NC). CSXT and Wabtec engineering teams, along with FRA and labor representatives, rode trains with the TO/ABC function active and executed specific test cases to observe the performance of the system and its interaction with other systems.

The territory between Hamlet and Wilmington is relatively flat terrain with minimal curves. While this makes the territory a reasonable initial testing venue, it certainly is not indicative of all of CSX's network. CSX indicates that "labor representatives" were present for these tests. However, the BLET is not aware of any attempted contacts to our labor representatives. We believe it is disingenuous to say that CSX has included labor representatives when the union representing the craft who operate TO/ABC – certified locomotive engineers – was not consulted.

CSX describes its field-testing phase by stating:

During the Field Test phase, the TO/ABC functions were tested on multiple trains operating on defined sections of CSXT's network. The field-testing program includes four primary goals:

1. Evaluation of preliminary safety analysis hazards and mitigations.
2. Evaluate TO/ABC and PTC Interface behavior, specifically assess interactions between TO/ABC and PTC to confirm that such interactions do not introduce previously unknown hazards to the PTC system.
3. Monitoring and metrics:
  - a. Collect performance data including changes in automatic state performance.
  - b. Collect feedback from locomotive operators and railroad management.
  - c. Investigate reports of abnormal performance.
4. Evaluation and refinement of operator training.

Again, we are concerned and disappointed that CSX did not include an evaluation of human factors concerns or atmospheric and environmental hazards. In complete field testing, these factors should be much easier to test than at the TTC test track, and evaluation of the full operating environment is critical to fully understanding how TO/ABC will behave in adverse conditions.

CSX states, "CSXT completed five Field Test cycles with no new findings related to TO/ABC control." We find this statement a little difficult to believe, particularly given that no evidence to support this claim is publicly available and that CSX has stated it made modifications to the locomotive engineer training module due to findings in the field tests.

### **Post Implementation Testing Procedures (Section 21)**

Section 21 responds to requirements in 49 CFR 236.907(a)(18)(i), which requires a complete description of all post-implementation testing (validation) and monitoring procedures, including the intervals necessary to establish that safety-functional requirements, safety-critical hazard mitigation processes, and safety-critical tolerances are not compromised over time, through use, or after maintenance (repair, replacement, adjustment) is performed.

However, in this section, CSX appears to only address the process for software updates and does not include post-implementation monitoring and testing at specified intervals, as the regulation requires.

CSX states, “This section describes the process followed for all locomotive control system and TO/ABC software updates. Any future incremental releases of TO/ABC or software modified by other OEMs will also follow this process.”

When describing field testing procedures that would apply to software updates, CSX states, “Feedback from CSXT operators running the new software is collected, evaluated, and assessed.” The BLET would like more information regarding how this feedback is collected from locomotive engineers. BLET would appreciate a formal way to participate in this process to lend the full expertise of our organization.

### **Implementation Test Records (Section 22)**

CSX states that “TO/ABC does not have any periodic inspections beyond those covered by the required FRA mandated locomotive inspection schedule.” While this may be reasonable, the inclusion of inspecting and testing the TO/ABC – if this PSP is approved – should be included in the locomotive’s inspection schedule. For example, the locomotive daily inspection could be expanded to require the locomotive engineer to turn on TO/ABC, initiate automatic mode, and then apply the air brakes to ensure that the TO/ABC successfully transitions to manual state. Locomotive engineers and train crews should be notified of any software changes or updates that may affect the operation of the locomotive in any way.

Regarding recordkeeping, CSX states, “CSXT will maintain a record of component failures resulting in safety-relevant hazards using a form similar to the existing 49 CFR § 236.1023, Errors and Malfunctions Notification Form. The form has been modified to refer to TO/ABC specifically.”

In addition to providing a form for recording PTC failures, 49 CFR 236.1023 also provides requirements for the railroads or vendors to notify the FRA of certain failures and ensure that records are available to the FRA upon request.

Further, 49 CFR 236.1023(g) requires:

Whenever any investigation of an accident or service difficulty report shows that a PTC system or product is unsafe because of a manufacturing or design defect, the railroad and its vendor or supplier shall, upon request of the Associate Administrator, report to the Associate Administrator the results of its investigation and any action taken or proposed to correct that defect.

We would like to see equivalent requirements placed upon the use of TO/ABC as in 49 CFR 1023, including notifying the FRA of failures, updating the FRA of any investigations and corrective actions, and ensuring that records are available to the FRA.

### **Safety Critical Assumptions (Section 23)**

49 CFR 236.907(a)/19) requires a complete description of any safety-critical assumptions regarding the availability of the product and a complete description of all backup methods of operation.

In response, CSX states, “This product does not in itself provide any safety-critical functionality to mitigate hazards. Therefore, the availability of the product does not impact train operations from a safety perspective. Backup methods of operation are not relevant, as train operations remain the same whether or not TO/ABC is operational.”

The safety of the train’s operations are not negatively affected if TO/ABC is not available as trains can simply operate conventionally, however this fact underscores the need to have locomotive engineers who are well trained and have kept their skills current because of frequent and required time operating the controls of the locomotive in manual operation. As the BLET has argued, and as CSX has stated numerous times throughout the PSP, the availability and use of TO/ABC introduces additional hazards and risks to rail operations. We would argue that the availability of the product **can** impact rail safety negatively.

As CSX states, “Backup methods of operation are not relevant as train operations remain the same whether or not TO/ABC is operational.” BLET offers a caution to this idea. Train operations are materially not the same as TO/ABC in an automatic state because a human locomotive engineer is not manually controlling the locomotive braking functions in the same way as conventional operations. Backup methods of operation – e.g., functions to return control of air brakes to the locomotive engineer – are very much relevant, as evidenced by the need for extended discussion in this PSP. Unexpected or surprise modal changes from automatic to manual when backing up, could lead to in-train forces that could cause undesired slack action and put crew members riding the rear of the train during a back-up move in jeopardy.

**Safety Critical Upgrades (Section 25)**

Regarding the deployment of safety critical upgrades, CSX states:

CSXT and Wabtec review any reports of erroneous TO/ABC behavior when they are reported. Wabtec maintains an archive of these reports as part of its quality control system for product design. The quality control system includes the process to report any safety relevant failure and previously unidentified hazards promptly and thoroughly to CSXT and other railroads using the product.

While this system and review process may be effective internally between Wabtec and CSX, or other railroads as relevant, as mentioned in our discussion of Section 23, **we ask the FRA to require additional reporting of errors and failures to ensure that the FRA has visibility of these issues. The provisions of 49 CFR 236.1023 should apply to the TO/ABC system in addition to the PTC system.**

**Railroad Procedures for Action (Section 26)**

As noted in the PSP, 49 CFR 236.907(d)(2) requires PSPs to specify the railroad's procedures for action upon notification of a safety-critical upgrade, patch, or revision for this processor-based system, sub-system, or component, and until the upgrade, patch, or revision has been installed; and such action shall be consistent with the criterion set forth in 49 CFR 236.915(d) as if the failure had occurred on that railroad. The requirements of 49 CFR 236.915(d) are: When any safety-critical product component fails to perform its intended function, the cause must be determined and the faulty component adjusted, repaired, or replaced without undue delay. Until such essential components are repaired, a railroad shall take appropriate action as specified in the PSP.

CSX has already stated in Section 1 that "TO/ABC is not designed to perform any safety functions, but is safety critical because a failure of TO/ABC could create an unsafe condition." CSX acknowledges that TO/ABC is "safety critical." Yet, CSX states in Section 26 that "TO/ABC does not provide any safety critical functionality and will not require safety critical upgrades." We are struggling to see why CSX sometimes considers TO/ABC safety critical and other times does not. We agree that TO/ABC is a safety critical system due to the potential for the creation of unsafe conditions, as CSX has stated. As such, 49 CFR 907(d)(2) and 49 CFR 236.915(d) are fully applicable. The FRA has a responsibility to ensure that these regulations are followed and that repairs are made as quickly as possible to protect train crews, rail workers, and communities.

**Change Control Process (Section 27)**

As required by 49 CFR 236.907(d)(3), the PSP must identify configuration/revision control measures designed to ensure that safety-functional requirements and safety-critical hazard mitigation processes are not compromised due to any such change.

CSX's PSP states, "Change control for any safety-critical upgrade, patch, revision, replacement, or modification to TO/ABC is controlled through the CSXT CCB." This statement seems contradictory to the statement that CSX makes in Section 26 that "TO/ABC does not provide any safety critical functionality and will not require safety critical upgrades."

By assigning the CCB to be responsible for controlling safety critical upgrades to TO/ABC, CSX is acknowledging that TO/ABC very well may require safety critical upgrades.

CSX describes the CCB process by saying, "The CSXT CCB review and approval checkpoints are designed to assure that CSXT does not adversely affect the onboard system's ability to satisfy safety functional requirements or that revision changes do not compromise any safety-critical hazard mitigation processes in the implemented system."

Given that TO/ABC operations include, as CSX here acknowledges, safety critical hazard mitigation processes, we believe that the FRA needs to apply rigorous oversight to any such changes to the TO/ABC software, similar to the oversight that the FRA applies to PTC updates.

### **Conclusion (Section 29)**

In its conclusion, CSX states:

This PSP presents the context of application, the nature of the TO/ABC functionality as it relates to its potential effect on safe train operation in both Stand-alone and PTC Interface modes and supporting documentation to demonstrate the TO/ABC system is acceptably safe for use by CSXT as an energy management system. This document, in accordance with 49 CFR 236 Subpart H [A1], demonstrates with a high degree of confidence that Wabtec's TO/ABC product, as designed, is safe for use and the use of TO/ABC does not increase safety risk over the previous condition.

The BLET intends our public comments to demonstrate our belief that TO/ABC is not "acceptably safe." The safety risks that are increased have been discussed over the previous (current) conditions and more needs to be done to share information about other functions missing from the docket. The fact that CSX has not studied the safety risks of the previous condition for comparison is extremely telling that CSX is aware, as it has stated, that TO/ABC does not and is not designed to improve safety in any way. It has been plainly stated that TO/ABC is an "energy management system." This is the only different nomenclature for fuel savings software that operates the locomotive. The problem with the attempt to save fuel via this software is that CSX has also provided extensive examples of the hazards and risks that TO/ABC poses to rail operations.

This does not demonstrate that TO/ABC is "acceptably safe." The only safety standards that the BLET can accept are those standards that **improve** safety – not degrade it.

## Conclusion

Throughout these comments, we have made it clear that it is our position that TO/ABC is unsafe and should not be approved for deployment. BLET understands the FRA may be inclined to take a permissive regulatory posture in accepting the PSP for reasons of “innovation” or to be forward thinking with technology. The FRA may allow the deployment of TO/ABC despite the concerns of those most familiar with the safe operation of trains – locomotive engineers. Because of this, the BLET has raised several issues our organization finds would increase the risk to our members and to the public.

The BLET exists to protect and preserve the safety of our members. The TO/ABC – Zero to Zero – software as it is currently being included with the PSP will not improve safety. The implementation of fuel savings programs introduces numerous hazards to the rail environment that did not exist prior to their implementation. This is a degradation of safety. BLET cannot support a PSP that could put our members in scenarios where they are forced to assume the risk of an automated fuel saving system.

Additionally, we have pointed out numerous areas where there appear to be errors, inaccuracies, and failures to meet regulatory requirements throughout CSX’s proposed product safety plan. The extent of these shortcomings is such that we believe the FRA should reject this PSP submission.

Some of the examples of these issues are:

1. CSX has not adequately described how TO/ABC will operate DPUs and if asynchronous DPU functionality will be available;
2. CSX’s primary mitigation for risks introduced by TO/ABC is the locomotive engineer’s ability to put the train into emergency, which could produce excessive in-train forces;
3. CSX has failed to show that TO/ABC would not increase response times when the locomotive engineer encounters unsafe conditions;
4. CSX has failed to demonstrate that TO/ABC software can recognize and adapt to environmental factors such as weather or wet leaves on tracks;
5. CSX states that TO/ABC will follow all operating and train handling rules, but we have identified multiple rules that would be violated during TO/ABC operations;
6. CSX has failed to show that TO/ABC could safely navigate automatic starts on a grade;
7. In its filing, CSX has made contradictory statements regarding the speed at which TO/ABC will be able to operate;

8. The filing has not established how TO/ABC will accurately gauge the air brake pipe pressure throughout the train;
9. CSX has failed to provide an explanation of how long TO/ABC would be able to continue operating if PTC failed or were unavailable;
10. CSX asserts that responsibility for safe operation of the train remains with the locomotive engineer, yet does not include hands-on training on TO/ABC technology in the proposed implementation plan;
11. CSX has failed to provide public documentation that demonstrates sufficient failsafes to ensure that the TO/ABC software will not interfere with the locomotive engineer retaking manual controls when necessary.
12. The hazard log included in this proposal does not include hazards caused by multi-system or multi-factor failures and appears to violate regulatory requirements by not being verified by a third-party;
13. CSX has not provided a sufficient mitigation plan to address locomotive engineers' degradation of skills due to the significant reduction in manual operation of the train;
14. The risk analysis that CSX performed only analyzed risks associated with intended operations, not with potential and predictable failures;
15. The fault analyses that CSX performed did not include the potential failure that TO/ABC could fail to exert enough tractive effort, thereby letting the train slide backwards;
16. The fault analyses performed did not include considerations regarding the potential failure or unavailability of the EOT;
17. CSX did not perform a risk calculation of current railroad operations to compare to the risk calculation for TO/ABC operations, which would almost certainly show that TO/ABC operations are riskier than the current condition;
18. CSX failed to perform a full, regulation-required, risk assessment because it claims that no single-point fault could cause an accident. However, no such exception or exemption exists in the regulation;
19. CSX's plan to "mitigate" human factors errors is to aggressively monitor locomotive engineers, not to prevent errors through ongoing training and support;
20. CSX's human factors analysis and cognitive workload does not appear to have included examination of response times, violating the regulation that requires the analysis to assess the ability to catch errors before they propagate through the system;

21. The field-testing CSX performed does not appear to have included all types of terrain or atmospheric conditions, meaning there are many types of common situations that trains will encounter where we have no real-world testing to know how TO/ABC will respond;
22. This filing does not include post-implementation monitoring and testing of the TO/ABC software at specified intervals, as the regulation requires;
23. CSX's plan does not include periodic inspections or testing of the TO/ABC software to ensure that it is operating as intended.

The CSX version of the TO/ABC software PSP will not increase safety for our members, and BLET has stated that the proposal that CSX has offered may introduce new risks. In addition, the BLET wants FRA to know we do not believe it to meet minimum regulatory guidelines for approval. The FRA should reject this product safety plan.

A BLET member said it best following an accident where the deskilling of the engineer and the use of energy management software at CSX might be a factor. He said,

“It decreases probably -- if anything, it decreases our skills due to the fact that we're just sitting there letting a computer run it. You don't get the, you know, okay. I mean you know where your grades are and stuff like that. It's like your car. If you've got it on auto control, you don't know how much it's accelerating or decelerating, going up and down the hills on the highway. Same thing with energy management. And then you get thrown into a manual mode. Now, you've got to sit and figure, okay, how much (braking) do I need to apply, how much do I need to accelerate, you know.”

We appreciate the opportunity to comment on this docket and look forward to working with the FRA on this and other issues in the future.

Sincerely,



National President

cc: M. L. Wallace, First Vice President  
D. P. Estes, National Secretary-Treasurer

## **Appendix A**



Public Law Board No. 7694  
Award No. 32

At the formal investigation, Road Foreman Bush testified that on the date of this incident, he was performing radar checks in the vicinity of milepost S 500, where a permanent speed restriction of 20 mph was in effect between milepost S 499.9 and S 500.3. Mr. Bush stated that the head end of Claimant's train was travelling well within the authorized speed when he clocked him but that prior to the rear end of the train clearing the area of the restriction, the radar gun showed a speed of 26 mph. The Road Foreman noted that he did not want to rely on the radar gun for a definitive indication of the speed of the rear of the train, so he downloaded the DVR and event recorder from the engine to determine the speed of the train both before and after it entered the 20 mph speed restriction.

According to Road Foreman Bush's testimony, he coordinated the time stamps on the DVR to the timestamps on the event recorder, which he believed gave an accurate record of the speed of the Claimant's train at various times and locations. Based on the data, Road Foreman Bush testified that the speed of the train entering the restriction was 6 mph which increased to 11 mph approximately 1/10<sup>th</sup> of a mile into the restricted area, both speeds well below the authorized speed. The next piece of data that was entered into the record showed that when the head end of the train was 4,356 feet past the end of the restricted area, the train speed was 25 mph and that when the train was 4,732 feet past the end of the permanent speed restriction, the train speed was 26 mph. Based on a tonnage graph showing the length of the train at 5069 feet<sup>1</sup>, Road Foreman Bush testified that 713 feet of the train was still in the restricted area when the train was travelling at 25 mph and 337 feet of the train was in the restricted area when the speed of the train was 26 mph.

The record also indicates that the Claimant's engine was equipped with a trip optimizer, which is technology that maximizes fuel efficiency when placed into automatic mode. Information regarding the consist of the train and the route to be travelled is loaded into the optimizer and based on the route, including permanent speed restrictions contained therein, the optimizer controls the speed of the train. Since the trip optimizer gives no type of wayside signal notification, the engineer can disengage the optimizer and run in manual mode.

The Claimant testified at the investigation that approaching the speed restriction the signal indication was medium approach and that he was operating in manual mode since it was possible that the next signal could have been a stop signal.<sup>2</sup> The next signal that the Claimant encountered was approximately 956 feet after the head end had cleared the permanent speed restriction and this signal displayed a medium clear indication. At this point, the Claimant placed the trip optimizer in automatic mode and the trip optimizer then controlled the speed of the train. Road Foreman Bush testified that it was not "normal" for the trip optimizer to permit the train to exceed the authorized speed of 20mph in the area of the permanent speed restriction, though there had been some instances where the trip optimizer operated a train over the authorized speed. The

<sup>1</sup> The tonnage graph that was issued to the crew showed a train length of 4924 feet.

<sup>2</sup> The Claimant's testimony relative to his use of the trip optimizer was also supported by data supplied by Road Foreman Bush.

Public Law Board No. 7694  
Award No. 32

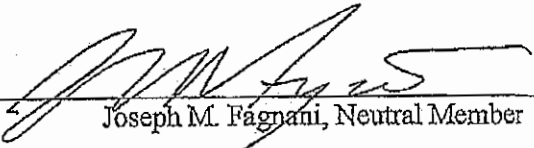
Claimant also stated that during his trip he had extensively used the trip optimizer without incident through 10 to 12 permanent speed restrictions and Road Foreman Bush testified that he took no exception to any other speeding incidents during the Claimant's entire trip. In addition, when asked by the Claimant's representative whether there was an ERAD notification of an over speed in the restricted area, Road Foreman Bush replied in the negative although "it should have."

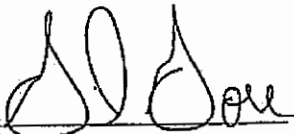
The Board would first note that the fact that the Claimant utilized the trip optimizer does not, in and of itself, absolve him from the responsibility to insure that the train was being operated at the authorized speed. However, the Board also finds that the discrepancies between tonnage reports, the possible malfunction of the trip optimizer and the absence of an ERAD notification produce serious doubts whether the analysis of the data done by Road Foreman Bush was totally accurate. In fact, there was some discussion at the investigation which indicated that there was a possibility that there could have been synchronization issues between the event recorder and the DVR. Upon a review of the totality of the evidence, the Board finds that the Carrier failed to sustain its burden of proving that the Claimant was guilty of the charged offense.

Accordingly, the Board rules that the discipline should be removed from the Claimant's record and that the Claimant should be reinstated to service with seniority rights unimpaired and paid for all time lost as provided for in Article 30 of the Agreement.

AWARD

Claim sustained. The Carrier is directed to make the Award effective within 30 days of the date of this Award.

  
\_\_\_\_\_  
Joseph M. Pagnani, Neutral Member

  
\_\_\_\_\_  
Gil Gore  
Employee Member

  
\_\_\_\_\_  
Benjamin Mathews  
Carrier Member

Dated: 7/15/2015

**PUBLIC LAW BOARD NO. 7384**

**PARTIES ) BROTHERHOOD OF LOCOMOTIVE ENGINEERS AND  
          ) TRAINMEN (EASTERN LINES)  
      TO )  
          )  
DISPUTE ) CSX TRANSPORTATION, INC.**

**STATEMENT OF CLAIM**

Claim of CSXT Engineer M. C. Hester, CSXT ID 199328, (hereinafter Claimant) for removal of all notations on his personal service record and pay for all time lost associated with investigation and discipline assessed in the amount of sixty (60) days actual suspension as a result of the formal hearing conducted on July 14, 2014 at Savannah, GA for alleged violations of CSX Transportation Operating Rules 300.2 and 301.2.

**OPINION OF BOARD**

After investigation held July 14, 2014 and by letter dated August 8, 2014, Claimant – an employee in the Carrier’s service since January 1996 – was assessed a 60-day suspension for operating his train at a speed of up to and including 23 mph in a 10 mph temporary speed zone on June 10, 2014.

On June 10, 2014, Claimant was assigned as Engineer on the F75710 operating between Savannah and Cayce. In the vicinity of milepost S 466.1 (the Savannah River Bridge), Claimant’s train operated at 23 mph in a 10 mph temporary speed zone. Claimant’s locomotive was equipped with a GE Trip Optimizer – in effect, a programmed auto-pilot – which Claimant was required to use and which failed to function as represented by GE as it did not slow the train to the programmed slow speed, which required Claimant to take over and manually slow the

train (which he was not able to do in sufficient time to slow the train to the 10 mph speed).

Investigation by GE showed a failure of the Trip Optimizer to function correctly and, according to GE, “[t]his issue has been identified and repaired in newer SW.” Carrier Exh. 6 at 5. Further, according to Senior Road Foreman of Engines F. P. Cokley, in addition to the Trip Optimizer’s failure to reduce the train speed as required, the Trip Optimizer should have warned Claimant that it would not be able to function correctly and that he should take manual control, but the Trip Optimizer also did not perform that function. Tr. 33.

In the notification of discipline dated August 8, 2014, although assessing Claimant with a 60-day suspension, the Carrier determined that “... the above incident was not a revocable event ... [and] CSXT is not revoking your FRA Engineer Certificate ....”

This case involves the same issues discussed in *Award 56* of this Board – another case where an Engineer was disciplined for speeding in a restricted speed zone after the Trip Optimizer malfunctioned. This Board held in *Award 56*:

From a technical standpoint, even with the Trip Optimizer in operation, the ultimate responsibility for not speeding and safe operation of the train falls on the Engineer – in this case, Claimant. Under the simple facts showing that Claimant was operating at some 17 mph above the restricted speed, given Claimant’s overall responsibility for not speeding and safe operation of the train, substantial evidence shows Claimant acted inconsistent with his obligations under Rules 40 and 55.

However, because of the requirement that employees had to use the Trip Optimizer and because there was a software error in the Trip Optimizer, we refused to impose any suspension time on the employee [emphasis in original]:

... [I]mposing a 65-day suspension against Claimant in this case was arbitrary. Claimant was *required* to use the Trip Optimizer – in effect, an auto-pilot – that GE represented “[e]liminates over-speeding”. However, on the date in question and although GE represented that the Trip Optimizer “[e]liminates over-speeding”, the Trip Optimizer had the speed restriction programmed into it, but clearly malfunctioned when the programmed speed restriction dropped off the Trip Optimizer screen and the train did not slow down as GE represented it would. Moreover, as shown by RFE Brumfield’s testimony, GE *confirmed* the malfunction was caused by a software defect. ... And as RFE Brumfield also testified, the incident involving Claimant was not isolated as other employees have reported the same kind of malfunction experienced by Claimant. ... In short, Claimant was required to use a product sold to the Carrier by GE that malfunctioned due to a software defect that was solely GE’s responsibility and those malfunctions were experienced by other employees but, nevertheless, Claimant was given a 65-day suspension caused by GE’s malfunctioning product.

Arbitrary conduct is action that lacks a rational basis or justification. To impose a 65-day suspension on an employee because he relied upon a defective system that he was required to use that malfunctioned lacks a rational basis or justification and therefore is arbitrary.

The same logic in *Award 56* applies to this case. Although Claimant is ultimately responsible for safe operation of his train and not speeding, it is arbitrary for the Carrier to impose suspension time when there is a software defect in the Trip Optimizer (which Claimant was required to use) that caused the Trip Optimizer to malfunction and not reduce the speed of Claimant’s train to the pre-programed requirement and where the Trip Optimizer further failed to even give Claimant a warning that it was malfunctioning as it was supposed to do. As a remedy, Claimant shall be made whole for losses stemming from the 60-day suspension.

The Carrier also argues that Claimant did not report the incident as required. However, the record shows that Claimant attempted to do so at 9:30 p.m., but the individual who would have received the report (Road Foreman of Engines E. Betts) was on vacation and did not answer his phone leaving a message for callers

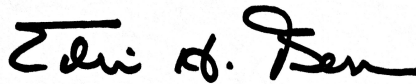
to contact another RFE (J. Jordan). Tr. 37, 45. Claimant testified that he arrived at midnight and did not have RFE Jordan's contact information when he got off duty and, after looking up RFE Jordan's contact information, Claimant reported the incident to Jordan the next morning. Tr. 45-46.

The record shows that Claimant took sufficient action to report the incident. In any event, the thrust of this case is about Claimant's alleged speeding in a restricted speed zone and the malfunctioning of the Trip Optimizer. The reporting allegations do not change the result.

Claimant shall be made whole for losses stemming from the 60-day suspension.

**AWARD**

Claim sustained in accord with the opinion.



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Edwin H. Benn  
Neutral Member



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Carrier Member



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Organization Member

Dated: 03/15/2016

**PUBLIC LAW BOARD NO. 7384**

**PARTIES ) BROTHERHOOD OF LOCOMOTIVE ENGINEERS AND  
          ) TRAINMEN (EASTERN LINES)  
TO )  
      )  
DISPUTE ) CSX TRANSPORTATION, INC.**

**STATEMENT OF CLAIM**

Claim for CSXT Engineer W. F. Suber, CSXT ID 202751, (hereinafter Claimant) is for full compensation for all time lost attending the investigation and for all earnings lost while in suspension and revocation status. Such reinstatement to include removal of all record of discipline administered by CSXT in this case from Engineer's Suber's personal record.

**OPINION OF BOARD**

After investigation held February 20, 2014 and by letter dated March 21, 2014, Claimant – an employee in the Carrier's service since December 1997 – was assessed a 65-day suspension for failing to monitor and control his train speed and exceeding the maximum speed permitted by more than 10 mph as well as failing to sound his horn in the proper sequence over a public crossing on January 14, 2014.

On January 14, 2014, Claimant was assigned as Engineer on the Q12414 operating between Jacksonville, Florida and Manchester, Georgia. In the vicinity of milepost ANB744.1, Claimant's train operated at 42 mph, which was 17 mph over the maximum authorized speed of 25 mph.

If those were the only facts in this case, this Board would deny the claim. However, there is more.

Claimant's locomotive on the Q12414 was equipped with a GE Transportation Trip Optimizer. According to GE (Organization Exh. A at 1-2):

Trip Optimizer is an intelligent, fuel-saving cruise control for locomotive that optimizes fuel consumption based on a specific train's make up and the route traveled.

Trip Optimizer System calculates the most efficient operation by considering such factors as train length, weight, grade, track conditions, weather and locomotive performance. The trip's profile is updated continuously through a complex network of on-board computers, GPS systems and advance algorithms that make adjustments, enabling the train to use less fuel while maintaining smooth train.

\* \* \*

**Key features:**

**Automatic throttle and dynamic brake control**

Automatic controls of throttle, dynamic braking ...

**Builds individual plan for each train over a given territory**

Optimizes fuel consumption based on a specific train's make up and the route traveled

**Improved and consistent train handling**

Proven to reduce break-in-twos with improved train handling by reducing operator performance variance

**Eliminates over-speeding**

**Provides Auto-Independent Distributed Power control**

For auto train handling of longer trains over difficult terrain

**Provides for dynamic plan adjustments**

Monitors actual HP, speed, wheel slip, engine health, wind effect ...

According to the Carrier's Road Foreman of Engines R. Brumfield, employees are required to use the Trip Optimizer when it is installed. Tr. 34. RFE Brumfield

described the Trip Optimizer as "... an automatic cruise control, it controls the train speed according to speed restrictions and permanent timetable restrictions." Tr. 10-11. Brumfield testified that during the time the Trip Optimizer is operating, the engineer does not control the speed or the braking of the locomotive. Tr. 12.

Claimant testified that he initialized the Trip Optimizer and a 25-mph speed restriction between ANB744.4 and ANB744.5 was entered into the Trip Optimizer as part of the initialization process. Tr. 60. For the first approximate 230 miles of the trip, the Trip Optimizer functioned as designed adhering to speed restrictions that existed. Tr. 37, 56. However, the Trip Optimizer malfunctioned as Claimant's train approached the 25-mph speed restriction between ANB744.4 and ANB744.5.

According to Claimant, two miles before the speed restriction, he had communication with K. P. Laramore who had control of the track and received permission to proceed; Claimant observed the speed restriction on the Trip Optimizer's screen; the Trip Optimizer requested the selection of a track and Claimant entered Track 1 to allow for recalculation by the Trip Optimizer. Tr. 44-46. Claimant testified that he then turned his attention to blowing the horn for workers around the tracks. Tr. 45.

According to Claimant, he then saw the temporary slow board and instinctually looked at the speedometer and "... realized we weren't slowing ...." Tr. 46. The 25 mph indication which previously appeared on the Trip Optimizer "... was not there anymore" and Claimant took manual control and slowed the train. *Id.*

Claimant stated (Tr. 60):

[A] ... [T]his restriction was again checked to make sure it was in the profile as it came into ... as we came into its range. The trip optimizer then malfunctioned the trip optimizer should have slowed the train. The trip optimizer did not slow the train, when I realized the trip optimizer

had malfunctioned I took over and slowed the train manually.

However, although manually taking over control of the train, Claimant entered the restricted speed zone some 17 mph over the 25 mph designation.

Later at a stop, Claimant called RFE Brumfield to report "... that the speed restriction was there [on the Trip Optimizer] and then something happened and it wasn't there and it [the Trip Optimizer] didn't slow the train and when I realized it I took over manually and slowed the train." Tr. 47.

RFE Brumfield testified that GE found a software defect in the Trip Optimizer which corroborated Claimant's contention that the 25 mph restriction disappeared from the Trip Optimizer's screen (Tr. 37):

[Q] Have you found that there's a defect with the trip optimizer?

[A] A software defect was found according to GE.

[Q] So according to GE they did find a defect with the software on these engines that would corroborate Mr. Suber's story of the miles per hour disappearing from the screen of the trip optimizer?

[A] Yes.

Further, according to RFE Brumfield, the incident involving Claimant was not isolated as other employees have reported the same kind of malfunction experienced by Claimant "... where the speed had dropped out ahead of them." Tr. 38, 40.

Claimant testified that he and RFE Brumfield had several conversations about the Trip Optimizer and RFE Brumfield told him that "[i]f it fails if it messes up, you will not be responsible if it is active." Tr. 51-52. Further, according to Claimant, those assurances were given by other Carrier officials ("... he [Brum-

field]’s not the only official and I’m not the only engineer with that understanding.”). *Id.*

RFE Brumfield testified that he did not recall the specific conversations alluded to by Claimant. Tr. 56. However, Brumfield testified that he has told employees that as long as they were running the Trip Optimizer they would not be held accountable for speeding (Tr. 58):

[Q] ... I think you just stated that you had had conversations with employees that as long as they were running trip optimizer they wouldn’t be accountable for their speeding. Did I hear that correct?

[A] Yes.

Along with the notification dated March 21, 2014 that Claimant was assessed a 65-day suspension, the Carrier revoked Claimant’s FRA Certificate for six months. The parties advise this Board that, after appeal, the Locomotive Engineer Review Board remanded the revocation to the property; a hearing was held; the Carrier stood by its decision on revocation; and the revocation was again appealed to the LERB. As of the proceedings in this matter before this Board on December 10, 2015, there was no further action by the LERB.

Operating Rules 40 and 55 provide, in pertinent part:

**Speed Rules**

**40.** Train speeds must be maintained to the extent feasible, consistent with safety. They must not be exceeded. ...

\* \* \*

**GR-55** The following are responsibilities of the engineer, conductor, and other crewmembers.

### **1. Engineer Responsibilities**

The engineer is responsible for safely and efficiently operating the engine. He is also responsible for the proper handling of the train.

\* \* \*

### **3. Engineer and Conductor Responsibilities**

The engineer and conductor are responsible for:

- a. The safety of the train, and
- b. The observance of the rules.

They must take every precaution for protection in the event of conditions not provided for by the rules. ...

From a technical standpoint, even with the Trip Optimizer in operation, the ultimate responsibility for not speeding and safe operation of the train falls on the Engineer – in this case, Claimant. Under the simple facts showing that Claimant was operating at some 17 mph above the restricted speed, given Claimant’s overall responsibility for not speeding and safe operation of the train, substantial evidence shows Claimant acted inconsistent with his obligations under Rules 40 and 55.

The real question in this case is whether a 65-day suspension was warranted? Specifically, we find that under the unique circumstances presented, the Carrier’s assessment of discipline was arbitrary and the Carrier is also estopped from imposing any discipline against Claimant.

First, imposing a 65-day suspension against Claimant in this case was arbitrary. Claimant was *required* to use the Trip Optimizer – in effect, an auto-pilot – that GE represented “[e]liminates over-speeding”. However, on the date in question and although GE represented that the Trip Optimizer “[e]liminates over-speeding”, the Trip Optimizer had the speed restriction programmed into it, but clearly malfunctioned when the programmed speed restriction dropped off the Trip Optimizer screen and the train did not slow down as GE represented it would.

Moreover, as shown by RFE Brumfield's testimony, GE *confirmed* the malfunction was caused by a software defect. Tr. 37. And as RFE Brumfield also testified, the incident involving Claimant was not isolated as other employees have reported the same kind of malfunction experienced by Claimant. Tr. 38, 40. In short, Claimant was required to use a product sold to the Carrier by GE that malfunctioned due to a software defect that was solely GE's responsibility and those malfunctions were experienced by other employees but, nevertheless, Claimant was given a 65-day suspension caused by GE's malfunctioning product.

Arbitrary conduct is action that lacks a rational basis or justification. To impose a 65-day suspension on an employee because he relied upon a defective system that he was required to use that malfunctioned lacks a rational basis or justification and therefore is arbitrary.

Second, although we find a 65-day suspension was arbitrary, the question then becomes whether any discipline short of that amount is warranted? We find that in this case no discipline can be imposed even though Claimant was ultimately responsible for safe operation of the train.

Claimant was told by RFE Brumfield (and, according to Claimant, by other Carrier officials) that if the Trip Optimizer malfunctioned, employees would *not* be held responsible for speeding – statements which Brumfield admitted he made to employees. Tr. 51-52, 58. When an individual in a supervisory capacity assures an employee that he will not be held responsible for speeding if the Trip Optimizer malfunctions, the Carrier is estopped from imposing any discipline because the Trip Optimizer malfunctions.

Therefore, no discipline can be imposed in this case. Claimant shall be made whole for losses stemming from the 65-day suspension.

The Carrier has provided this Board with a decision of the U. S. Department of Labor, Occupational Safety and Health Administration, dated December 9, 2014 (Case No. 4-1510-14-023) (“*OSHA Decision*”) denying a complaint filed by Claimant with that agency against the Carrier alleging retaliation in reprisal for his reporting the malfunction of the Trip Optimizer. The *OSHA Decision* does not change the result.

The *OSHA decision* addresses an allegation made by Claimant contending retaliation. That is not the issue in this case. The ultimate issue in this case is whether, *under the Agreement*, the discipline imposed was arbitrary and whether any discipline can be imposed. The OSHA decision addresses statutory provisions and interprets the relevant statutory and regulatory provisions. This award addresses matters arising under the parties’ collective bargaining agreement. The determination of the existence of a violation of a collective bargaining agreement is not OSHA’s function, but is the function of this Board.<sup>1</sup>

In the end, the underlying cause of these kinds of disputes may become academic. This dispute arises as a result of a malfunctioning system sold to the Carrier by GE. According to the Organization (Organization Submission at 6):

... GE has installed, since its inception, no less than five (5) different versions of TO software on CSXT's fleet of locomotives. These versions include: (1) Unnamed, (2) Baltimore, (3) Ohio, (4) Bessemer, and (5) Smart HPT. At the time of this incident, Claimant's engine (CSXT 417) was equipped with the Baltimore version, which was the second generation of TO.

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<sup>1</sup> See *Alexander v. Gardner-Denver, Co.*, 415 U.S. 36, 53, 57 (1974) (“... an arbitrator is confined to interpretation and application of the collective bargaining agreement’ ... the specialized competence of arbitrators pertains primarily to the law of the shop, not the law of the land ... the resolution of statutory or constitutional issues is a primary responsibility of courts ...”).

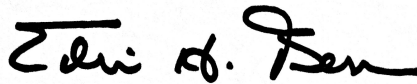
Hopefully with its later versions of the Trip Optimizer, GE has been able to program out the software defects which set in motion the dispute in this case.

We have considered the Carrier's contentions that Claimant did not properly sound his horn in the proper sequence and find that even if demonstrated, Claimant should not have received the disciplined imposed.

Therefore, while the Carrier is correct that Claimant technically did not comply with Operating Rules 40 and 55, for reasons discussed above, we find the 65-day suspension given to Claimant was arbitrary and that the Carrier is estopped from imposing any discipline. As a remedy, Claimant shall be made whole for losses stemming from the 65-day suspension.

**AWARD**

Claim sustained in accord with the opinion.



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Edwin H. Benn  
Neutral Member



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Carrier Member



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Organization Member

Dated: 03/15/2016

## **Appendix B**

## **Field Reports**

(Quotes from BLET locomotive engineers have been de-identified)

### **Locomotive Engineer 1:**

Sometimes when turning on the microwaves, it will kick TO out and will not come back until you reset the breakers. (2 engineers reported this)

While going through a signal that restricts your speed to a speed lower than authorized track speed TO will not slow you down for the restriction. Example: medium approach medium through a 45mph crossover TO will run you 45mph if you do not take over. (This happens every time)

Going downhill with a heavy train 15k+ tons TO will kick out if you encounter a speed restriction. (This happens if TO is running at track speed)

TO fails to integrate with PTC a lot of the time. I have reached out to TO desk and the response they gave me was they don't know why sometimes they work together and other times they don't.

TO will randomly make you take over for no reason. Sometimes it'll comeback but a lot of times it doesn't.

### **Locomotive Engineer 2:**

TO comes in hot to sidings, I also have common drop outs and areas that are manual control only. I've also had trips where it has been manual control only the entire trip.

### **Will Orbach-Schultz (source: NTSB):**

Even after nearly two decades, Trip Optimizer continues to suffer from critical failures.

One incident I personally experienced, involved Trip Optimizer refusing to relinquish control of the locomotive's power system. The system was in dynamic braking, slowing for a siding, when I was prompted to take manual control. However, despite my inputs, it remained locked in auto mode. To stop the train, I had to apply the air brakes. Once stopped, the locomotive became completely unresponsive to throttle, dynamic braking, or direction commands. It wasn't until I performed a full reset of the onboard computer and PTC system that I was finally able to regain control. While this occurred in dynamic braking, I have no doubt that a similar failure could happen while in power as well.

Another concerning event was reported to me a few weeks ago. In this case, Trip Optimizer failed to recognize a stop signal. On CN, our Trip Optimizer is fully integrated with PTC, receiving real-time signal, speed, and restriction data. Yet, no alarm was issued to alert the engineer. Fortunately, the engineer was fully aware of the situation and manually brought the train to a stop in compliance with the signal. While PTC should have intervened before the train passed the stop indication,

winter weather and braking performance make it impossible to say with certainty that it would have.

It has become clear that Trip Optimizer is still far from capable of reliably operating a train in “less-than-ideal” situations. While it handles large trains over undulating terrain fairly well, it consistently struggles with unplanned events. Many of us find it difficult to trust Trip Optimizer when slowing for restrictions, as it often over-relies on dynamic braking or makes incorrect slack adjustments that an experienced locomotive engineer would avoid based on train makeup or terrain.

I cannot imagine using Trip Optimizer in a situation where it would be allowed to operate a train all the way to a stop indication. No doubt, they will still mandate that the locomotive engineer “monitor it” or something along those lines. With the certification of everyone in the cab on the line, I find it completely unreasonable to allow this technology to be used in such a manner.

#### **Locomotive Engineer 4:**

The fact the system still “freezes” or constantly loses communication with the locomotive (a very common reason for not being able to initialize Trip Optimizer), should show that it is not ready for such advanced testing. In fact, the system as a whole should be the topic of great scrutiny by regulators before being advanced further.

I have 3 scenarios where a locomotive engineer needs to take over TO...

At [a control point] we get a medium approach medium where TO wants to operate at track speed of 40 mph but we have to operate on signal indication.

When following a train that is slower you have to go in and out of TO constantly.

We often get kicked out of TO for no automatic brake and have to run manually for the entire trip.

#### **Locomotive Engineer 5:**

[On a trip in NY] Trip Optimizer's handling of the train caused excessive slack action which resulted in a violent separation, ripping out the entire drawbar and draft gear from the cushioning mechanism of the car, and initiating an emergency application of the brakes.

Operating over undulating terrain, trip optimizer advanced throttle position on lead locomotive and trailing unit from 6 to 8 as the train ascended the grade approaching a milepost. As the train crested the elevation and began to descend, optimizer reduced throttle position to 3, in preparation for a 45-mph permanent speed restriction (which TO planned to enter at 35 mph). The grade again begins to ascend at [a subsequent] milepost. Approaching this, trip optimizer began to increase throttle position back up to 8. With the rear end still ascending, middle of train both cresting and descending, and head portion level and beginning to climb, this rapid decrease and increase of throttle caused uneven draft and buff forces throughout the train. The rear end of the train had just cleared a defect detector, which reported [speed above the allowed restriction].

The five cars immediately behind [the separation contained flammable hazardous materials].

Engineer finished with 96% Trip Optimizer automatic usage for the day

