



Brotherhood of Locomotive Engineers & Trainmen

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May 11, 2006

Docket Clerk
DOT Central Docket Management Facility
Room PL-401
400 7th Street, SW (Plaza Level)
Washington, DC 20590-0001

Re: Docket Number FRA-2006-23687

Dear Docket Clerk:

Attached hereto please find the Comments of the Brotherhood of Locomotive Engineers and Trainmen and the United Transportation Union with respect to the above-referenced docket.

Respectfully submitted,

Don M. Hahs
National President

Paul C. Thompson
International President

attachment

Federal Railroad Administration

in re

**BNSF Railway Company
Product Safety Plan
DOT DMS Docket No. FRA-2006-23687**

**Comments of
Brotherhood of Locomotive Engineers and Trainmen
and
United Transportation Union**

The United Transportation Union (“UTU”) and the Brotherhood of Locomotive Engineers and Trainmen (“BLET”), a division of the Rail Conference of the International Brotherhood of Teamsters, are filing joint comments concerning the above-referenced document. BLET and UTU are the duly recognized collective bargaining representatives, under the Railway Labor Act (45 U.S.C. §§ 151 *et seq.*), for approximately 20,000 operating craft employees and yardmasters employed by the BNSF Railway Company (“BNSF”), all of whom are directly affected by the document. For the reasons set forth below, UTU and BLET submit that FRA should not approve the petition without, first, requiring the amendments and changes we detail below.

The Product Safety Plan (“PSP”) proposed by BNSF is insufficient in several respects. The Human Machine Interface (“HMI”) specifications set forth in Appendix G.4 of the proposed PSP have been designated as “confidential” and, as such, have not been published for our review. Not only do we object to the designation, we cite below several instances where BNSF’s response to the Human Factors Analysis performed on ETMS is insufficient. To the extent HMI

specifications that have been redacted from the publicly available PSP reflect those insufficiencies, Appendix G.4 is similarly insufficient.

The ETMS Field Test Procedures set forth in Appendix H of the proposed PSP, likewise, have been designated as “confidential.” In addition to objecting to the designation, we point out that the field test procedures published thus far have created problems in assessing the safety and reliability of ETMS. We do not assert that ETMS is unsafe or unreliable; however, we maintain that there is insufficient data, at this point, for such a determination to be made.

This general concern can, perhaps, be better understood by considering the following specific problem. The braking test methodology in the proposed PSP, which is consistent with that previously published, states as follows:

The braking distance tests are based on train speed, track grade, and train consists. Tests were performed with 20, 40, 80 loaded cars at a variety of speeds, ranging from 20, 30 and in some cases 49 miles per hour. The different tests also included the variety of grades co-mingled with these different speeds. Some of the track grade conditions do not allow 49 mile per hour testing as a result of the physical speed restrictions.

PSP, App. I.2 at p. 7.

At the February 23, 2006 Public Hearing held concerning BNSF’s petition to expand ETMS testing, it was acknowledged that the baseline braking algorithm developed by the methodology set forth in the PSP was more conservative than that typically employed by locomotive engineers, resulting in “some adjustments” to the algorithm, and also by a “learning curve” among locomotive engineers becoming familiar with ETMS. FRA-2003-15432-29 at

p. 21. This is a natural part of the implementation and demonstration process, and will raise the utility of ETMS to an optimal level.

We submit, however, that the methodology published in the PSP needs to be expanded to include a greater range of operational scenarios. Freight trains can regularly be expected to exceed eighty loaded cars, for example. Moreover, if ETMS expansion contemplates operating over routes where grades are greater than those included in the baseline algorithm established in previous testing, additional testing for those specific grades must be included.¹ To the extent the field test procedures that have been redacted from the publicly available PSP reflect this insufficiency, Appendix H is similarly insufficient.

The PSP states that ETMS provides for predictive enforcement against entrance into unacknowledged work zones and reactive enforcement against continued movement after stopping within a work zone. PSP at p. 16. BNSF offered similar testimony at the aforementioned Public Hearing. FRA-2003-15432-29 at p. 69. However, elsewhere in the testimony, it appears that the portable remote terminal (“PRT”) — used to facilitate communications between the train crew and a Roadway Worker in Charge of a roadway work group — still remains under development and is not uniformly deployed. Id. at pp. 62, 63, 76. Therefore, we recommend that the PSP be modified to distinguish between work zone

¹ We would note, parenthetically at this point, that BNSF also seeks to test ETMS on Amtrak trains, which operate at speeds up to 79 miles per hour, with train consists that are distinct from freight train consists. While we address the Amtrak testing issue separately below, suffice it to say for now that the proposed braking test methodology does not include testing necessary to establish a baseline algorithm for the braking of Amtrak trains.

enforcement, which appears to be a provisional feature, and enforcement of speed and authority limits, which is mandatory.²

Section 4.2 of the PSP, which details BNSF's failure rate data, notes that some of the estimated failure rates were propagated from "[h]istorical occurrence data ... from FRA reported events and internal railroad records where available and the balance has been estimated by experienced railroad personnel." PSP at p. 22. Failure rate assumptions are a key component in assessing ETMS safety and reliability. This section of the PSP is insufficient for several reasons.

First, it is not delineated which failure rates were propagated from actual data. Second, the period of time for which the data was culled and examined is not reported. Third, it appears that the data was specific to BNSF; to the extent EMTS is intended to be interoperable with PTC systems on other railroads, we believe it is essential to consider data from those railroads prior to utilization of ETMS on those railroads. Fourth, the PSP fails to specify either the qualifications of the "experienced railroad personnel" who estimated failure rates for those items where data were not used, or the methodology employed in making such estimates. And, fifth, BNSF does not indicate whether a root cause analysis was used to identify failures, or some other methodology was employed.

² In comments filed following the Public Hearing, BNSF attached a technical white paper concerning the integration of an "Employee-in-Charge (EIT) Terminal" into the ETMS system. *See* FRA-2003-15432-32 at pp. 9-18. The EIT appears to be strictly a conceptual component at this time and, to our knowledge, has not been deployed as the mandatory "third core feature" that arguably would qualify ETMS as a genuine PTC system.

As an example of how the PSP is insufficient in this regard, the Preliminary Hazard (“PHA”) Summary set forth in Section 18.1 of the PSP rates all over-speed conditions and misrouting failures as having the potential for “marginal” severity. *See* PSP, Table 4, at pp. 83-88. “Marginal” severity is defined in BNSF’s proposed Railroad Safety Program Plan (“RSPP”) currently under review as “[e]vents that result in minor injury, severe system(s) damage, or mitigable environmental damage.” *See* FRA-2006-23686-1 at p. 21. Department of Defense (“DOD”) standard MIL-STD-882C also includes minor occupational illness in the “marginal” severity category, and DOD’s MIL-STD-882D standard further quantifies “marginal” as causing damage greater than \$10,000 but less than \$200,000. Absent greater detail concerning how over-speed failure rates were developed, it is impossible to judge whether it is appropriate to assume that all such failures have a severity potential no higher than “marginal.”

Perhaps the most egregious flaw in the PSP is BNSF’s request for permission to test ETMS in “engineer-only” operations. Indeed, this issue was the subject of considerable testimony at the public hearing on BNSF’s petition to expand ETMS testing. During the rebuttal portion of the hearing, David Dealy, Vice President of Transportation for BNSF, testified that BNSF’s “request on the line segment between Kansas City and Fort Worth for the extension of ETMS would be for the existing crew size to stay in place.” FRA-2003-15432-29 at p. 68.

Since the hearing, it has been indicated to us that BNSF will abandon the objective of testing ETMS in “engineer-only” service. However, to date, nothing in the public docket establishes that BNSF has filed a modification of its PSP, removing all references to “engineer-

only” operations. To the contrary, in its post-hearing submission, BNSF would go no further than to state that “existing crew size would be used on trains equipped with ETMS *that operate over the additional territory under the waiver extension.*” FRA-2004-15432-32 at p. 3 (emphasis added). This statement leads inexorably to the conclusion that BNSF will not modify its PSP to remove “engineer-only” operations, compelling us to briefly address this aspect of BNSF’s proposal to initiate the railroad industry’s first “engineer-only” road freight operation.

That the Human Factors Analysis of ETMS was conducted with an underlying assumption that current train crew size would be maintained is indisputable. The phrase “train crew” appears no less than twenty-nine (29) times in the HFA Report. *See* PSP at App. U (“HFA Report”). Among them was the acknowledgement that some feedback has been obtained from “train crews,” rather than merely from locomotive engineers. HFA Report at p. 5. Thus, no Human Factors Analysis has been performed “for engineer-only” operations. The cornerstone premise by which the HFA was conducted directly contradicts by BNSF’s assertion that “[a]n operational assumption of ETMS is that many over-the-road trains will be operated with a Locomotive Engineer only.” PSP at § 15.8, p. 75.

In a January 2005 Final Report entitled *Effects of Train Control Technology on Operator Performance*, DOT’s Research and Special Programs Administration (“RSPA”) — the same group that performed the ETMS Human Factors Analysis — described the work of a locomotive engineer in these terms:

Operating a rail vehicle (and, in general, operating any vehicle) can be considered a combination of divided attention and selective attention tasks. The task is divided attention, in that the locomotive engineer must attend to several different tasks at once,

including speed control, position control, system status monitoring, and vehicle status monitoring. The monitoring subtasks can each be considered as selective attention tasks. The objective is to identify a system or vehicle fault, and the engineer must monitor several channels of information to detect a fault. From a different perspective, the task of a locomotive engineer is a combination of relatively high frequency monitoring and control (to fulfill the task of speed and position control) with vigilance (for system failures and emergencies).

See DOT/FRA/ORD-04/18 at p. 5.

Six months after the publication of this report, RSPA published another, entitled *Effects of Supervisory Train Control Technology on Operator Attention*, which defined “vigilance” as “the capacity of the human operator to sustain attention and remain alert to stimuli over a prolonged time.” See DOT/FRA/ORD-04/10 at p. vii. According to the proposed PSP, ETMS presents a locomotive engineer with the following additional visual, auditory, and tactile stimuli, compared to non-ETMS operation:

- twenty-nine graphical display elements;
- seventeen textual display elements;
- eight programmable soft keys, of two colors, with the labels of active keys displayed; and
- seven audible alerts.

See PSP, App. G.2 at p. 23.

The July 2005 RSPA report, which did not consider the implications of “engineer-only” operations, acknowledged that

The human performance concern, with regard to display automation, is potential overload of the operator sensory channels. Too much information will ultimately degrade overall performance due to the inability to process that information and extract the pertinent data from it.

See DOT/FRA/ORD-04/10 at p. 3. The Report also identified the same potential for over-reliance that was voiced in the HFA Report. Id. at p. 24.

Section 9 of the proposed PSP lists numerous additional tasks the locomotive engineer will have to perform on an ETMS-equipped train. PSP at pp. 40-42. It should be obvious that a significant portion of the vigilance a locomotive engineer currently devotes to the route ahead will be diverted to monitoring ETMS. As noted in the February 21, 2006 Final Report of the Collision Analysis Working Group (“CAWG”), on “freight trains, the conductor and engineer work as a team [and o]ne member points out situations that may have escaped the other’s attention.” See CAWG Report at p. 13. We submit that the need for such teamwork increases, rather than decreases, on an ETMS-equipped train, if for no other reason than by virtue of the distraction created by monitoring the constant ETMS display.

BNSF’s Failure Rate Analysis concedes as much. When BNSF estimated various failure rates to populate its Fault Tree Analysis, it noted that “SCOPE019 [Roadway Workers Exceed Form B Time Limits] and SCOPE021 [Vehicle Sensor (Loop Sensor) Fails to Alert Approaching Train of Stuck Vehicle] have been set to zero yearly occurrences as they are out of scope and do not affect ETMS.” PSP at p. 22. In reality, these are but two of many real-world potentialities for which a timely warning from the conductor to the locomotive engineer — who is monitoring the ETMS display at the time — can save lives and prevent accidents and property damage.

In testimony presented at the Public Hearing, the labor representatives also provided FRA with numerous examples of situations arising that prevent the locomotive engineer from “substituting” for the conductor (e.g., cutting a blocked crossing or dealing with an unanticipated emergency brake application somewhere on the train). The PSP simply ignores these problems. Even worse, BNSF proposes that it be empowered to unilaterally determine *when it is “operationally necessary”* to place a conductor on a train after an ETMS failure that renders the system non-operational. Id. at pp. 76, 166-167.

Section 25 of the PSP purports to establish a “base case” for the safety and reliability of ETMS in “engineer-only” operations. Id. at pp. 134-140. This is nothing more than a mathematical exercise based on assumptions that are not supported by any reliable data whatsoever. In fact, the failure rates, themselves, to which various multipliers were then applied, are of questionable validity, as we previously established.

Section 31.3 of the PSP claims that “changes to current operating rules [required for the institution of “engineer-only” operations] will be minimal.” PSP at p. 167. BNSF then identifies some *twenty-three* specific rules and instructions that will need to be altered and notes, generally, that its hazardous material instructions may require modification, as well. Unfortunately, BNSF has prevented us from analyzing the details and potential impact of these changes by designating that particular portion of Appendix R.2 (which describes its proposed changes) as “classified.” Nonetheless, cross-referencing this section of the PSP with the current

version of GCOR in effect on BNSF discloses that the following subjects are included in the hidden Appendix:

- Operating rules pertaining to: excessive dimension loads; duties of crew members; mandatory directive; whistle failure; headlight failure; displaying headlights front and rear; approaching railroad crossings, drawbridges, and end of multiple main track; automatic grade crossing warning devices; securing cars or engines; clearing main track switches; testing spring switch; automatic switches; automatic interlockings; hand operation of dual control switches; and occupancy control system for trains and engines.
- System Special Instructions Items 15 (“General Code of Operating Rules and Maintenance of Way Operating Rules, Supplemental Instructions”) — which, itself, refers to ten (10) different GCOR rules — and 43 (“Signal Awareness/Position of Switch Form”).
- Air Brake and Train Handling Instructions pertaining to: initial terminal and road air brake tests (Part 232 Class I air brake tests); securing equipment against undesired movement; and loss of emergency application capability from rear of train.

Many of the above requirements implicate FRA regulations that impose a legal duty upon locomotive engineers, conductors and other train crew members. Among the potential outcomes for non-compliance with these regulatory requirements are civil penalty and/or disqualification from a safety-sensitive position pursuant to Part 209. It also is clear that the majority of these subjects address risk issues that ETMS is not designed to mitigate. Rather, they relate to specific work duties of a conductor that BNSF will either transfer to the locomotive engineer or find an alternate method of performing, or which simply will not be performed at all.

It is incomprehensible that BNSF can reasonably expect to gain FRA’s imprimatur for an operating method that has never been tested in this industry, while shielding all details from public review, and from being subject to any meaningful, detailed comment from the

representatives of those workers who would be directly affected. Moreover, the proposal to institute “engineer-only” operations raised in this context distracts all stakeholders from objectively assessing the merits of ETMS. Simply stated, including “engineer-only” operations in ETMS testing mixes apples and oranges, and FRA should require that BNSF delete all references to “engineer-only” operations as a condition of approval of the PSP.

The proposed PSP is similarly insufficient with respect to BNSF’s proposal to include operation of Amtrak trains in an expanded ETMS demonstration for several reasons. First, BNSF acknowledges that it is not prepared to proceed with testing ETMS on Amtrak trains. Section 8 of the proposed PSP, entitled “Deferred Action Items,” states that BNSF has yet to “[e]valuate Federal Rules regarding implementation of ETMS on passenger trains,” and it still must make “necessary modifications/amendments to PSP (or other documentation) necessary to facilitate implementation of ETMS on passenger trains.” Id. at p. 38.

Second, in PSP Section 15.6 (“Passenger Operation”), BNSF concedes “that the introduction of passenger trains into ETMS operation involves additional investigation, test, and perhaps requirement modification.” Id. at p. 74. As we noted above, existing baseline braking algorithms do not exist for passenger train consists or speeds. *See* n. 1, *supra*. Third, BNSF admitted during the Public Hearing that it had not entered into an arrangement with Amtrak for testing of ETMS on Amtrak trains. *See* FRA-2003-15432-29 at p. 19. For its part, Amtrak has noted that, due to the lack of interoperability of two other PTC systems which Amtrak has

participated in testing, it has become necessary to hold locomotives captive on lines where testing is being conducted. *See* FRA-2003-15432-27.

BNSF has not presented a cogent, fully-developed plan for testing ETMS on Amtrak trains, as required by Part 236, Subpart H. Instead, BNSF requests that FRA grant it carte blanche to test ETMS on Amtrak trains in any manner it deems fit. The PSP should be disapproved for purposes of testing ETMS on Amtrak trains until the flaws identified above are corrected and those corrections are subjected to public review and comment. Moreover, no approval for a PSP permitting testing ETMS on Amtrak trains operated with one locomotive engineer should be granted unless and until two additional steps have been undertaken.

First, a workload assessment must be performed, which compares the HMI utilized by ETMS with those employed by the three PTC systems (ACSES, IDOT, and ITCS) that Amtrak has tested elsewhere, and which demonstrates that a lone Amtrak locomotive engineer can maintain the same level of right-of-way vigilance with ETMS as with those systems. And, second, a separate analysis of GCOR rules and instructions, as well as associated FRA regulations, must be performed **and made subject to public review and scrutiny** (i.e., the PSP Section 8 deferred action item must be completed, and the results submitted to the docket). Furthermore, FRA should explicitly state that any testing of ETMS on Amtrak passenger trains is of no value in assessing any risk associated with “engineer-only” road freight train operation, because of the fundamentally different natures of the two operations.

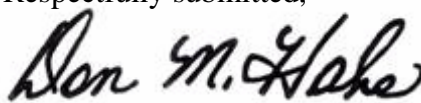
We submit that FRA should not approve BNSF's proposed PSP unless and until BNSF affirmatively addresses its shortcomings, and brings the PSP into compliance with Subpart H. BNSF should be required to revise its PSP to cure insufficiencies in its HMI specifications and field test procedures. BNSF also should revise its braking test methodology to include all consists and terrain conditions on the territory where BNSF seeks to expand the use of ETMS. The PSP should be modified to distinguish between the level of protection for work zone enforcement, as compared to the enforcement of speed and authority limits. We additionally believe that BNSF should be required to produce more information concerning the methodology used in developing its failure rate data, so that the rates may be subject to the proper level of verification. Also, the PSP should be modified by removing the capacity for ETMS-activated horn sounding for grade crossings from the system.

Lastly, any approval ultimately granted should be conditioned on the following: 1) appropriate resolution of outstanding recommendations set forth in the Human Factors Analysis Report as to both operational concerns and HMI concerns; 2) deletion of all references to "engineer-only" operations; and 3) PSP provisions pertaining to the testing of ETMS on Amtrak trains should not be approved, except under the conditions we have previously outlined. These conditions are necessary in order for the letter and the spirit of Subpart H to be fulfilled.



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Respectfully submitted,



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