UNITED STATES OF AMERICA

NATIONAL TRANSPORTATION SAFETY BOARD

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Investigation of: *
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POSITIVE TRAIN CONTROL *
SPECIAL REPORT * REPORT No.: DCA21SR003
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Interview of: JEFF KERNWEIN, Director of Engineering
WABTEC

Via Microsoft Teams

Wednesday,
October 20, 2021

APPEARANCES:

JOHN MANUTES, Rail Accident Investigator
National Transportation Safety Board

GREG SCOTT, Rail Accident Investigator
National Transportation Safety Board

RUBEN PAYAN, Electrical Engineer
Office of Railroad Safety

MIKE JACOBI, Product Manager
WABTEC

I N D E X

I N T E R V I E W

(10:00 a.m.)

MR. MANUTES: Okay. All right, good afternoon, my name is John Manutes, I'm an NTSB rail accident investigator. Today is October the 20th, 2021, and we are meeting virtually via Microsoft Teams to conduct an interview with Jeff Kernwein, who is employed by Wabtec. This interview is being done in conjunction with the NTSB's special investigation report regarding PTC systems. The NTSB Reference Number is DCA21SR003. This interview is being recorded. We will transcribe the interview and provide you a copy for your review. The text transcription will be placed into the docket for this report.

Before we begin, we will go around and introduce ourselves. I'll start off and then since this is a virtual environment, I'll just call on individuals to prevent us from talking over each other. So again, my name is John Manutes. The spelling of my name is J O H N M A N U T E S and I'm an NTSB rail accident investigator.

Ruben?

UNKNOWN PARTICIPANT: Yeah, meet Ruben. It never happens.

MR. PAYAN: Oh, man, I'll tell you what. All right, let's try that again. My name is Ruben Payan, R U B E N, last name, P A Y A N. I'm an electrical engineer with the Office of Railroad Safety in Washington, DC.

MR. MANUTES: Thanks, Ruben.

Greg?

MR. SCOTT: Hi, my name is Greg Scott. The spelling of my name is G R E G, Scott, S C O T T, and I'm a rail accident investigator with the NTSB.

MR. MANUTES: Thanks, Greg.

And then for the transcriptionist's sake, Mike, if you don't mind going next? Name -- spell your name and title, that way, if you read yourself into the record later, the transcriptionist already has it.

MR. JACOBI: All right. My name is Mike Jacobi, M I K E, last name, J A C O B I. I work for Wabtec as product management.

MR. MANUTES: Thanks.

And Jeff?

MR. KERNWEIN: All right. Hello, this is Jeff Kernwein, J E F F K E R N W E I N. I work for Wabtec as vice president of engineering and digital electronics.

MR. MANUTES: Thanks, Jeff, thanks, Mike, I really appreciate that. Thank you for meeting with us today. I will pass it over to Ruben.

MR. PAYAN: All right, well, thanks.

INTERVIEW OF JEFF KERNWEIN

BY MR. PAYAN:

Q. Thank you for being here today and as we spoke before, there's several areas that NTSB's interested in in future technology as far as PTC goes. I have about four of them here

that I would like to discuss with you and I'll just go down the list. The first one is restricted load. We had an accident in Carey, Ohio, where the engineer was operating in restricted mode and he operated for over two miles in restricted mode and eventually, ran a red signal and caused an accident. So, I know the ITC committee as been doing some changes to their IETMS to address this. Can you tell what Wabtec is and have they done any work regarding restricted mode, and how to prevent an engineer from staying beyond what's required in restricted mode?

A. Yeah, I know that there's -- you know, one thing about the IETMS product and -- is we're engaged with all of our Class One customers and actually every customer we have here in North America. We have ongoing updates to the product to make it, you know, as reliable as possible and to have it in its active state as much as possible. That's one of the primary purposes for the support that we provide to our customers with regular software updates.

So, over the course of this past year, we've made, you know, updates to the system to make sure that it stays active, to make sure it goes active prior to getting onto a PTC track and that helps certain cases of being able to select track ahead of time, before PTC entry, things like that. So, there's always an ongoing evolution with the product for the goal of making it more and more available and for the goal of dealing with any interruptions it might have in the railroads' operations.

Now, specifically to restricted mode or restricted state, there have been some changes over time. One of them was, originally there was something called switching state which allowed a crew to basically disable PTC all together when they were doing setouts and pickups or, you know, basically maneuvering the train. That's now no longer in the system. Instead, we got to restricted state, which basically holds the train below a certain speed, allowing the crew to operate their train for those kinds of maneuvers of building up a train or setting out a car and then forcing them to confirm consist when they finished that activity.

Now, that may not be the restricted mode that you're talking to, but I just wanted to bring that up because it's called restricted or switching state. But the -- as far as restricted speed operations are concerned, the PTC system does hold the train to the speed limit for restricted speed. That is different between railroads, some are at 15 miles an hour, some are at 20 miles an hour. That's configurable so that it operates with their operating rules.

And as far as limiting their time in restricted speed operation, at this time I don't recall that there was a time limit that, you know, forced them to only comply with that rule for a certain period of time. If the railroads were to decide that's something they wanted to, you know, put upon their crews to make sure they regularly confirm that they were supposed to stay in

there, we would deal with that through regular software change request by them and then we'd go ahead and implement something. So, that's certainly possible, it doesn't sound like a big stretch if that were the path we would have to go down.

The biggest challenge with restricted speed is that there is -- half of the rule is being able to stop within a sight of distance for some kind of obstacle up ahead and without a vision system on a locomotive, it's a bit limited in what it can do there. So, you know, there are some changes that can been made, some changes that have been made to, you know, make this more and more applicable. But I'm not aware of a specific one in that regard.

MR. KERNWEIN: That's possibly, something, Mike, we could just double back and check on.

BY MR. PAYAN:

Q. Okay. So yeah, I was referring to the switching state -- I guess the mode. But that's kind of a nice segue into the next topic. Does Wabtec -- are they part of the ITC committee that operates --

A. We are, obviously, a supplier. The ITC committee is really just the four signatory railroads. So, we basically take our directions from them.

Q. Okay. So, you don't have a vote or anything in that committee?

A. We don't have a vote, but we provide plenty of information

for them to take action on.

Q. Oh, okay. I know we're meeting with them in two weeks.

A. Okay.

Q. So, we're -- I was just curious about the relationship.

A. Yep.

Q. So, you mentioned restricted speed, one of the areas that the NTSB has had several accidents is following rules in restricted speed where one trains catches up to the other one in restricted speed. And of course, when there's a collision, that's when we get involved. I remember talking to Wabtec out in Gaithersburg when we were on the Granite Canyon accident and they were mentioning something about eventually tying to marking the -- making the rear of a train a marker for PTC. Can you kind of talk to that a little bit -- that technology?

A. Yeah, I can speak a little bit to what our teams have been working on for end of train devices. The standard up to this point does not include conveying the end of train position to the front of the train. But our team has been working on some proposed updates to that standard that would have to go through committee for approval. And the goal of being able to provide that -- basically the GPS coordinates of the end of the train would be so that the front of the train could -- or the PTC system could act upon it and confirm train length or confirm exactly where the back of the train is.

So, that is something that we -- we're basically putting some

building blocks in place by having an end-of-train device with a GPS receiver and the ability to get that information to the front of the train. Then if we were to go the next step of protecting the back of the train, you know, that would require some kind of communication to a following train. That hasn't been discussed yet in any of the ITC application team meetings. It's conceivable to do it, it's -- you kind of need the building blocks in place first to make it practical.

So, I think we're under good trajectory to support something like that and, obviously, the ability to do that would be summated upon, you know, rolling out the technology across the North American customers and such. But, you know, I think conceivably it's something that could be done. There are still hazards in restricted speed that go beyond the back of the train and so what we have to be careful in cases like this is we don't set up some kind of expectation that the only thing the engineer has to worry about is the back of that other train up ahead of them. So, those are the kinds of things we have to consider as we get into these technology discussions. Making sure we can add some protection without setting up the driver of the train for a trap.

Q. Okay. So, let me make sure I understand you right. The bigger challenge is conveying the rear of the train to other trains?

A. Right.

Q. The first challenge is going to be getting the rear -- the

location of the rear to the front -- the heading of that train?
A. Right. So, once that first train knows where its back end is, that's half the equation. Then you've got to convey that information to somebody that cares or somebody that needs to protect it; that's the other challenge. And when -- and throughout that whole process, you want to make sure that as you convey that information to another train, you don't lead them to think that's the only thing they have to care about.
Q. Oh, absolutely. That make sense. We talked to the FRA research and development and they were talking about precision train location and it sounds sort of like what you're describing. You're almost -- they're not calling it a moving block, but the description is just shy of what a moving block can do with a bubble. The front end behind the train kind of grows and shrinks as the train moves.
A. Yeah.
Q. Do you envision that eventually?
A. So, precision train location is -- I would say it's another building block for the system. We are actually integrating with Wabtec's version of precision train module -- precision navigation module on the locomotives today. Basically, what that module allows for is a more precise GPS location. GPS technology continues to evolve, it's gets better and better and the ability to reject things like multi-path in dealing with urban canyons or dealing with actual canyons in the mounts.

The newer GPS receivers allow for better precision in those areas and, you know, we've been working with the railroads on evaluating some of that technology. The ultimate goal would be that the accuracy of those receivers would be high enough that it can distinguish one track from another. And that's a goal that we are working towards with our customers so that we can -- you know, again, to the goal of making the system more available and stay active and more of the time basically to automate that track selection process. So, with that more accurate receiver on the front, you have less uncertainty of where the front is. So, that helps the front end.

As far as putting a receiver with high precision in the back of the train, that's a little more challenging because you have this -- the back of the train is usually flat, although it doesn't have to be. It could be a tank car or something. But generally, there's a fair amount of the sky that's blocked, you know, at the back of the train. So, there are limitations on how well a receiver can work in that environment. That's not to say that with the GPS receivers we're planning to put in the end of train we'd still get a reasonable accuracy, it just means that the uncertainty bubble's probably a little bit bigger. At the end of the day, all that builds up to a good location of the front, location of the year with some level of uncertainty. And with those levels of uncertainty, then we could protect those places on the train.

As far as moving block and how that plays into it, that would be a natural progression. It's really not anything necessary for a safety improvement in the system. We get that already with fixed blocks, with track warrants, you know, those all set up boundaries within which to operate. The whole point of moving block would really be more about getting more capacity out of the rail and still doing it safely. So, you know, the precision nav module is kind of a steppingstone to knowing where everything is with high fidelity and moving block is -- it would use that, but it's a whole separate discussion.

Q. Okay, interesting. So, we talk about being GPS dependent a lot. What if -- or not what if, how about in situations -- and I'm kind of getting away a little bit from freight train and more towards commuters. You go underground to these terminal stations where you lose your GPS. What kind of work is being done to get trains underground with very little GPS signal and making the end of tracks -- I'm talking about terminal stations, making those platforms a marker for PTC to enforce an absolute stop? We've had a couple where they ran in at restricted speed and just at the last minute, they just kept going instead of stopping at the platform and they ran into the station.

Q. Yeah. I think, if I recall correctly, at one of our operators out west, one of the commuters, they actually did set up a -- basically a zero-speed target at the bumpers to protect those. So, I think that's actually been used in some cases by

some of our operators. I don't know if everybody's using that ability. So, it can be done and it would protect the end of the track.

As far as operating underground, our system has the ability to continue to dead reck and even when we lose GPS. So, the -- you know, as the train is going from view of the sky and then underground to a terminal area, it still has the ability to navigate. As long as the switches are monitored and they've got the track mapped, it will be able to accurately find its way through that area underground. So, that's already there. It's really just a matter of being able to identify what you'd want to protect down there and remaining -- you know, being able to navigate with the switches monitored.

There is a challenge with bringing up a system on a cold start and being able to navigate out of that terminal area. But in that case, they'd be held to restricted speed. It's a little different operating case because you're moving away from that bumper post. So, you know, those are different operating modes.

Q. Now, that was my next question. So, coming into the station, you can monitor the switches and provide an absolute stop. But once you've reversed your train, that's, like, the cold start you're talking about?

A. Right. Now, there's a -- you know, once you're back out in view of the sky, then they can once again select the tracks. So, the exposure there is usually a lot less prevalent because the

leading edge is already pretty close to getting out from whatever underground area they are.

Q. Oh, okay. So, is there a limitation as to distance wise how far you can go without a GPS?

A. We -- I know it's over ten miles. We've got tunnels out west that are over ten miles long. I don't recall the exact length. But yeah, they're navigating today in the Rockies under -- through long tunnels.

Q. Oh, okay, so ten miles, wow. That's -- I was thinking, like, less than a mile, so that's impressive. So, the other area that we have as far as where we've had accidents is railway workers. We had an accident on the Metro North where there were some track workers out on the rail with a work zone and the dispatcher took away the work zone without them knowing -- he lifted up the protection without them knowing. So, they were basically out there on a live track without them know. Do you -- does Wabtec get involved with dispatch systems or anything?

A. We do. We have two different dispatch systems. Actually, when Wabtec and GE came together, each company had a dispatch system, so we have two of them in our product family. Yeah, so removing a work zone, that's a bit of a process problem is what it sounds like. And, you know, both dispatch systems, obviously, support work zones Form B's and there's an expectation of working with the crew to release that work zone, doing the read and repeat. But, you know, that's one of the expectations that we've

got on operating the dispatch system.

Q. Yeah. What we found was it was set up to where there was a single-point failure. The dispatcher didn't have any -- if it did involve procedures, there was nothing to back him up in case he made a mistake. FRA was talking to us about a tablet that they're working on where all that stuff that the dispatcher does, has to be okay by the employee in charge and the tablet that he has so that no trains can enter and the work zone isn't given up until he okays it on this tablet. Is Wabtec doing anything -- involved with any of that?

A. So, there's a couple different things here. One is a dispatcher removing a work zone and that whole process. We have a product that works with our dispatch systems and I believe it's principally for work crews to request a work zone to do their work. I don't believe -- it may also require -- allow them to release their work zone after they're done with their work. I'm not completely familiar on that second part of it. But we do have a tablet that does allow them to request a work zone to do work.

The -- I think the reference that you got from the FRA was more about the employee in charge in the work zone using a tablet to grant authority for a train to enter that work zone and right now, that's a verbal process. As you probably know, the train approaches a work zone, they're expected to reach out to the employee in charge, get permission to enter the work zone, and then they can proceed on through, and the IETMS system has prompts

in the cab that require the crew to acknowledge they've spoken with that employee in charge. I think it even requires a secondary confirmation so there's not a single point of failure there. But once they've done that confirmation that the employee in charge is allowing them to enter, then the restriction from the work zone is lifted for the train. Now, if there's a speed restriction, they'll still have that; they'll still be held to a speed through the work zone. But they will be allowed to enter.

The FRA's reference, I think, was to the interest to having a tablet for the employee in charge where they could just electronically allow entry into the work zone instead of the verbal process and then having the crew on the locomotive push a button and be able to enter. So, that is on the road map, it's something we worked through with ITC as far as, you know, priority of getting that implemented and worked out. But as far as the other case that you talked about a work zone just being lifted without the crew being knowledgeable, that really wouldn't apply to that condition.

Q. Okay. So, it's just basically, like you said, trains coming into the work zone?

A. Right.

MR. PAYAN: Okay. Let me ask some of my colleagues here.

Greg, John, you guys have any questions?

MR. SCOTT: Actually, the couple I had written down, you've already asked him. So, that's part of it, so I really don't have

anything else right now.

MR. MANUTES: Yeah, Ruben, I think I do.

BY MR. MANUTES:

Q. Could I, Jeff, for a second try and jog your memory? You mentioned a property out west that might have end-of-track, end-of-terminal as a red signal -- as a target. That doesn't happen to be Denver RTD's commuter rail does it?

A. I think it is. I was thinking it was either between that or Metro Link, but I couldn't recall for sure.

MR. MANUTES: Okay.

MR. JACOBI: I think it's Metro Link.

MR. KERNWEIN: Is it Metro Link?

MR. JACOBI: Yeah, I think Metro Link for sure has those.

MR. KERNWEIN: It might be both, actually.

MR. JACOBI: Yeah, it could be.

MR. MANUTES: Okay, thanks.

BY MR. MANUTES:

Q. And along that same topic, technologically, what prevents a property -- a hypothetical property who has an underground, end-of-terminal track from turning on the end of the track as a target using dead reckoning today? What's that hurdle?

A. I think the biggest hurdle would be the switches that -- the switch monitoring. Usually, when you get into a terminal area, the number switch is profound. So, monitoring those and all the paths through them now, it could be set up in a track database

that way. I don't think we have limitations on that. But the ability to monitor those switches might be limited. It's a little bit different than, you know, a sighting on a mainline and the ability to monitor that. But that's not an area of expertise for me, so that feels like it'd probably be one of the more challenging areas.

MR. MANUTES: That's all I had, Ruben, thanks.

MR. PAYAN: Okay.

BY MR. PAYAN:

Q. So, we're limited -- NTSB's limited in its view of the enhancements that we would like to see. You have a much broader view of PTC from the railroad side. Is there anything you can share as far as future versions of PTC?

A. You know, I -- you mentioned previously of some work with BNSF on their virtual block. You know, that's something that we've discussed, probably not at the depth that you have with BNSF. But, you know, that would be something that we'd be interested in learning more about with them and making the system be able to handle more capacity.

But the -- really, the primary goal that we're working toward right now is just to minimize any disruption in the system. We want to make sure it's available all the time. We really have virtually no downtime on the system. And at the same time, making sure we don't have disruption to the railroad's operations because that's equally bad. If they have to run at a much reduced speed

just because of something that we implemented in software, that's no good for either of us as well.

So, really the goal this year and has been reducing variability and making the system as available as often as possible and I'm sure that's the same theme that we're going to have as we get into next year with more and more use on the system. It's what, over a million miles a day across the operators, so it's getting used, which is great.

Q. No, that's good. One of the interesting things that came up when we talked about BNSF, which we didn't think about, but the way they described their virtual tracks. So, they're going to be giving up more territory in the back of the train. They were looking at this as a possible side-effect solution to the rear end, restricted-speed accidents that we see because now they're going to be -- they're going to know where the rear of the train is more closely. They can actually maintain the distance and enforce that. So, I thought that was an interesting side effect that they presented.

A. Yeah, as I understand, they're technology, it allows a greater fidelity of understanding where the train is in the block, so that would certainly apply, yeah.

MR. PAYAN: Yeah. I never put in that term, but it was interesting to hear that discussion. That's all I have, guys.

Greg, John, unless you have anything else?

MR. MANUTES: No, I don't.

MR. SCOTT: No, sir, I'm good.

MR. PAYAN: All right, so we'll -- don't hang up, but we'll end the recording here and end the interview here.

MR. KERNWEIN: All right.

(Whereupon, the interview was concluded.)

CERTIFICATE

This is to certify that the attached proceeding before the

NATIONAL TRANSPORTATION SAFETY BOARD

IN THE MATTER OF:	N2716Q CESSNA 182K AIRCRAFT ACCIDENT NEAR CORDOVA, ALASKA ON MAY 29, 2021 Interview of Jeff Kermwein
ACCIDENT NO.:	DCA21SR003
PLACE:	Via Microsoft Teams
DATE:	October 20, 2021

was held according to the record, and that this is the original, complete, true and accurate transcript which has been transcribed to the best of my skill and ability.

PII [redacted]

Carolyn Hanna
Transcriber