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: DANIEL PITTMAN, Chief of Train Control
BNSF Railroad

MITCH BEARD, Assistant Director of Signal and
Design and Project Manager
BNSF Railroad

Via Microsoft Teams

Wednesday,
October 6, 2021

APPEARANCES:

JOHN MANUTES, Rail Investigator
National Transportation Safety Board

GREG SCOTT, MA, Rail Accident Investigator
National Transportation Safety Board

RUBIN PAYAN, Electrical Engineer
National Transportation Safety Board

I N D E X

I N T E R V I E W

MR. SCOTT: All right. All right. My name is Greg Scott. I'm an NTSB investigator. Today is October 6, 2021 and we are meeting virtually to conduct an interview with Daniel Pittman and Mitch Beard (ph.) with BNSF Railroad.

This interview is in conjunction with an NTSB Special Investigation Report regarding PTC systems. The NTSB Reference Number is D, as in dog, C, as in cat, A, as in apple, 21S, as in Sam, R, as in railway, 003. Please forgive my unmilitary description there. This interview is being recorded. We will transcribe the interview and provide a copy to you for your review. The transcription will be placed in the docket for this report.

Before we will begin, we'll go around and introduce ourselves. Please spell your name and give your title. I would like to remind everyone to speak loud and clearly for an accurate reporting of this interview. I'll start off and then pass it off to the next person.

Again, my name's Greg Scott. The spelling of my last name is S-C-O-T-T and I'm an NTSB Accident Investigator for this accident.

MR. SCOTT: All right. Rubin?

MR. PAYAN: My name is Rubin Payan. Last name P-A-Y-A-N. I'm an electrical engineer with the National Transportation Safety Board.

MR. SCOTT: All right.

MR. MANUTES: Good morning. My name is --

MR. SCOTT: John?

MR. MANUTES: Good morning. My name is John Manutes, M-A-N-U-T-E-S. I'm a Rail Accident Investigator with NTSB.

MR. SCOTT: All right. Mr. Pittman?

MR. PITTMAN: (Indiscernible).

MR. SCOTT: You are muted.

MR. PITTMAN: Sorry. Daniel Pittman with BNSF Railroad. Last name is spelled P-I-T-T-M-A-N.

MR. SCOTT: All right. Mr. Beard?

MR. BEARD: Best for last? Mitch Beard, B-E-A-R-D, Assistant Director of Signal and Design of BNSF Railway and Project Manager for (indiscernible).

INTERVIEW OF DANIEL PITTMAN AND MITCH BEARD

MR. SCOTT: All right. I said our meeting here today is basically just to look at some of the gaps in PTC. Some of the areas that we're still having some accidents or injuries with regards so that PTC could possibly correct.

If you could, just explain the technology that y'all call up with or to the best to your ability, and then possibly how it could tie into PTC or how it interchanges with PTC, and then possibly some of the areas that it may improve the original intent behind PTC or the original law behind PTC.

MR. BEARD: Yeah. Sure.

MR. SCOTT: And we'll turn it over to -- to you, Daniel, and

you, Mitch.

MR. BEARD: All right. Yeah. So all maybe VBS is a --

(Phone ringing)

-- I'll shut off my phone. Sorry about that. That me do that -- is a new type of operation we're looking at BSNF that leverages the existing PTC system.

The technology piece, which we reference as virtual is a -- a new piece of hardware and software that is developed by a vendor that integrates with the Wayside's system, which allows to track a train through an existing track circuit, and with the tracking of that train to track circuit, it allows us to break it up into quarter sections, potentially in the future it could be -- even open it up further. But today, it is in four sections.

So now we can determine the rear end of the train plus some level of safety buffer behind that of where that train is. So what that allows is which may help with some of the constraints of PTC is how long maybe a train is running at restricted speed.

So now, today, if you come up to a restricted speed signal, you're going to go through the block the entire way at restricted speed until you get to the next signal that is more permissive, you know, maybe upgrading to an approach or approach medium or clear, something like that.

In this case, you would approach to a restricting target that would be a quarter of a block potentially, so it has the potential to reduce the amount of time going at a restricted speed, if that

makes sense. That's one piece of it. So that's where it helps from a capacity gain.

Now we can allow potentially trains to run closer together based off of their braking characteristics and the smaller restricting fence areas and the reason for -- for trying to determine what exactly saying around this, but for how we're doing that is within a block.

I said we're breaking it up at the quarter for treating for each of those four segments as, like, an intermediate so you're just having a smaller segment, and for us, when you come up to a stop target at an immediate, that's the same thing as a restricting. So that makes sense.

Feel free to stop me if you have questions.

The other piece -- that's the technology that was developed with the system. We are also evaluating monitoring of hand throw switches. So traditionally with a lot of PTC systems, the switch indication is monitored through the signal aspect.

So when a switch would open up, we would set our signal aspect at op or restricting if it's an intermediate, which would show that restriction for that entire block with monitoring the switching independently, which is a feature's done in DART territory.

We would put a -- a stop target or fence just at the switch. So if a train goes by a signal that is more permissive and for some reason a switch would open up or have some type of failure,

there's no -- there's no additional indication that can be reported on that, but with independently monitoring of every switch, it provides an indication until you get up to that switch.

Once you go past the switch, the indication is no longer available because now you've occupied and went past. Those are the two major technology pieces that are associated with that.

There is other things we're looking to elaborate or utilize with the system with monitoring of the health of the Wayside and -- and alarming of health issues potentially through the PTC network, but -- and that's possible due to the fact of putting in radios at every location reporting.

So all those pieces is really leveraging more of the features of the PTC network. They're not necessarily new technology. It's just part of leveraging those efforts with that. So I don't know. That's kind of the simplest --

MR. SCOTT: Oh.

MR. BEARD: -- way of explaining all that. But the technology, it's just taking one step more better accuracy of knowing where the rear of the train is and monitoring of (indiscernible) switches.

MR. PITTMAN: So I think it is important to not and understand that, you know, we -- you know, this is a new -- would be a new type of operation (indiscernible) today. It is not an existing type of operation. It leverages a lot of the same signal technology that works within CTC, but as Mitch indicated, the

signals are removed from the field.

So it relies on the PTC backbone. The other thing I think that's really important to understand is that we -- we are in process of discussing with the FRA. You know, it's still an exploration. It's still under testing. It's still under, you know, the development side of it.

So while we think that, you know, certainly this is -- this has -- it's a potential technology, otherwise we wouldn't be pursuing it, we do want to be clear that this has not been approved by the FRA.

And, in fact, our test submission for our first pilot is actually still with the FRA and it's, I think, going up for public comment today, Mitch, is that correct? Or tomorrow?

MR. BEARD: It's gone -- it's supposed to be posted Monday.

MR. PITTMAN: Monday. I apologize. So this is still -- we have not gotten approval from the FRA. I mean certainly we've had their involvement in the -- in the early testing of it and early development, as well as our labor involvement, as well. So --

MR. BEARD: Yeah. The other part, since Dan did mention about the -- the removing of signals, there is potential safety benefits of that, with people not having to climb signals no more to test the aspects or change lightbulbs or anything along those lines. So there's also a safety piece that comes along with that.

MR. PAYAN: (Inaudible.)

MR. BEARD: Oh, Rubin. I -- you're muted if you're talking.

MR. SCOTT: Yeah. I was muted too.

MR. PAYAN: I was.

MR. SCOTT: So we'll --

MR. PAYAN: I was trying to fill in while Greg was writing but he beat me to it. I was --

MR. SCOTT: Yeah.

MR. MANUTES: Yeah, Greg?

MR. SCOTT: We'll go around to our group because I really -- I honestly -- this is Greg Scott talking. Did not have any questions per se already written down. I was waiting to learn some about the technology before I started coming up with my questions. So we'll go around the group individually and, you know, I'll let Rubin start.

If you have any questions, Rubin?

MR. PAYAN: Yeah. Yeah. So from your description, the virtual block, is that -- is that what's usually called also, like, the moving block where the bubble of safety, you know, front --

MR. BEARD: They're --

MR. PAYAN: -- and behind the train grows and shrinks as it train goes different territories?

MR. BEARD: They're two different things, which there's a lot of different names for some of these -- the other systems, because there's also out there, like, quasi-moving block and things like that.

But from what I've been a part of, moving block type systems are more of a back office system where you --

MR. SCOTT: Oh.

MR. BEARD: -- have a server managing the position of the train based of either GPS coordinates or something along those lines and they have some type -- so it's a very dynamic position of where that's -- like if a train -- if another train is following a leading train, they're -- it's based off that rear end of that train's possible GPS location or length of the train, plus some type of safety buffer versus a virtual block is a Wayside centric technology where we're using the signal bungalow hardware there where we're tracking it through the track circuit.

So, you know, the track circuit has an electrical signal that's being transmitted to the rail and basically we're using the rear axles of the train to complete the path. So the signal goes down one rail to the axle and comes back down the other rail, so we can basically a simple Ohm's Law of things, you know, B=IR, as the train goes down the rail, you're introducing more resistance, which therefore changing your current and your -- well, your current.

And you can track where that train is based on that, and what we're doing on the Wayside, instead of getting down to a -- a, I don't know, a milepost or something like that or a distance from a location, we just, you know, broke it up into quarter segments, and once you're over 25 percent down the track, we then allow that

first virtual track segment to pick.

Once you get 50 percent down the track, you allow the two virtual track segments to pick. Once you get past 75 percent, you let three virtual track segments pick. Once you get past -- 100 percent, you're out of the traditional block, all four would pick in the most simplest state, and when I say the -- I'm saying those percentages, but there's also a safety buffer incorporated int hat because just -- and the safety buffer's for the vitality to ensure that we know that the rear of the train is beyond that point.

So, you know, it may be 27 percent, it might be 28, it might 30 percent based on the length of that safety buffer before we pick up the virtual track segment in someone, if that makes sense.

MR. PAYAN: It does. So the part that was interesting was being able to make the rear of the train a target. We've seen them in -- from our accidents, we had several PTC accidents where trains were following at restricted speed and one caught up to the other one and -- and PTC doesn't do anything in that case.

But the way you described it, are -- is there going to be an actual onboard device for the rear end or are you just talking fidelity on the track circuits, like where you compress --

MR. BEARD: It's just -- it's on the track circuits. There's no additional onboard hardware for tracking the rear of the train and they will still be restricting targets they're coming up to.

I think the difference, and this is where there will be a lot to weigh on if this helps with restricting targets or restricting

speed accidents or not is the fact that now they're -- they're smaller segments. So, in theory, you shouldn't be going at restricted speed as far of a distance.

MR. SCOTT: Uh-huh.

MR. BEARD: And this is just me proposing or assuming, you know, like, if, you know, a train is in a block today and he's three-fourths through the block and say the block, whatever, is two miles, so that rear of the train is a mile and a half past the signal, a following train has to go a mile and a half before he sees that train.

In my mind that has the potential, you know, of someone not noticing something or they're coming around a curve versus now if you break it up into four segments, it's potential, like, I'm going to go -- I know I'm clear halfway through the block. Maybe it's just that second half I'm now concerned about that restricted speed coming up to the train.

So does that help? I don't know. Intuitively, I think it -- it might, but yeah. It'll still be restricting speeds. We're not going to bring them to a stop at those targets. So they're still going to be that potential of those restricted speed accidents, just hopefully it does minimize it a little bit.

MR. PAYAN: So there probably won't any enforcement, just I guess more --

MR. BEARD: The --

MR. PAYAN: More awareness of where the rear of the train is.

MR. BEARD: I think that's a fair assessment. The only time and enforcement comes into play is if the train crews do not reduce down to that below 20 mph. If he had come up, which is the same
-- I mean and this is all based off the PTC system. We're following the same rules, a restricted speed target if the same for OMR GPS as it is in CTC or ABS, you know, with the PTC system involved.

If they come up to that restricted speed and don't slow down, PTC will bring them to a stop. As they get down to 20 and then there's a train right there and they do not come to a stop based off their visual view of that train, it'll still allow a collision.

MR. PAYAN: I see. Okay. That's interesting. So this onboard movement authority, does that become the method of operation now and then the PTC is just overlaid on top of that?

MR. BEARD: Yeah. So yeah. PTC is involved with -- is part of it. The type of operation change, that's based off of the really new rules. We've had -- we bring some additional rules based off not having signals in the field in leveraging the onboard. Yeah.

MR. PAYAN: Okay.

MR. BEARD: So the new of operation is based off of -- of new rules associated with it.

MR. PAYAN: Okay. So -- okay. Well, interesting. John or

Greg, do you have any questions before I -- I don't want to hog up all the questions.

MR. SCOTT: Do you want to go next, John?

MR. MANUTES: Yeah, just to follow up on a couple things and, Rubin, hog away please. I'm curious about how the system -- or if you've expired how the systems responds in the event that the train -- the rear of the train clears up say -- say 60 percent of the way through the -- the existing block, which means you could theoretically open up two blocks behind -- two virtual blocks behind it, if I understand this correctly.

What happens then if the train begins to reverse the other direction and now takes up 50, 40, 30, 20 percent. Does the system react to that and put in your restricting virtual block?

MR. PITTMAN: So that's -- that's part of the development that's still ongoing is around rules.

MR. MANUTES: Okay.

MR. PITTMAN: And so some of that -- some of those, like Mitch said, there are rules within LMABBS that -- that change compared today and in CTC there are rules that allow you to do movement within block. Some of that stuff changes with LMABBS, and so we're still -- that's part of our pilot is to look at those rules and -- and make sure that those, you know, are the right rules for things exactly like you just said.

MR. MANUTES: Okay.

MR. BEARD: Yeah, and I'll say that from the hardware side,

there are safety checks to protect backup moves also. the rules piece keeps the separation of the trains with respect to backup moves and for the vitality side, if we see movements that do not look a valid train move, we would -- we would set the virtual track segments to the most restrictive state.

If you back up and were watching the rear of your train, we will stop -- start dropping those virtual track segments also. So the rules piece helps facility when you want to start bringing two trains up to each other.

MR. MANUTES: Okay. Thank you. That's -- those are both very helpful, and then this is a dumb mechanical guy question to four really smart signal guys. Does the Ohm's Law piece change when the train stops moving or does the signal -- does the track circuit recognize if you send a signal down one rail through the axle and back down the other rail that it's still there even without the movement? That --

MR. BEARD: Yeah. That's correct. You don't have to be moving --

MR. MANUTES: Okay.

MR. BEARD: -- for it to detect where you're at.

MR. MANUTES: It's all good that --

MR. BEARD: We --

MR. MANUTES: -- way? Okay.

MR. BEARD: We did have some safety checks to where if a train is going to be sitting there for a long period of time, we

will then fall back to a more restrictive state to set the entire block to its most restrictive state, because we don't -- we want to continuously have checks to make sure that things clear up.

So there's some additional checks with that, which is part of the safety key.

MR. MANUTES: Okay. That's all I had. Thank you.

MR. SCOTT: So some questions. This is Greg Scott. How are the trains receiving this information? Is it part of the monitor, like the PTC display or how are they receiving this information on the virtual blocks if there --

MR. BEARD: Yeah. It -- we're leveraging the existing PTC system --

MR. SCOTT: Okay.

MR. BEARD: -- today, you know. The Wayside maps the PTC signal aspect or the signal aspect then sends it up via PTC code to the locomotive to be displayed on their onboard.

MR. SCOTT: Okay.

MR. BEARD: Basically, we've broken up each of those virtual segments into either, like, a -- a virtual signal or a virtual track circuit, and so if the train is one of those virtual track segments, we send that -- that status directly to the locomotive onboard, so it -- it's just fully leveraging the existing infrastructure of PTC.

MR. SCOTT: Okay.

MR. BEARD: (Indiscernible) virtually.

MR. SCOTT: So at that point, if they're using the system, there -- there are not physical signals. They're actually paying attention to the virtual fence or whatever you want to call it. Some people use the terminology fence -- that the trains travel. That would be what they would be monitoring, correct?

MR. BEARD: That's correct. We -- and our rules currently, we're referencing them as PTC track lines. Yeah.

MR. SCOTT: Okay. Okay.

MR. PITMANN: Okay. Your authority is fully governed by the onboard and -- and something I don't know if you mentioned this, or may not mention, but we -- one thing that is important to note is that it works with the current on board, and that's mainly for interoperability.

So other trains moving onto our system would be able to work under those rules using their onboard.

MR. SCOTT: Okay. Now in one of these locations, do -- since it's the smaller -- I guess a smaller virtual circuit and you keep talking about the different rules, are the rules that allow trains to enter the same virtual block as another train per se?

MR. BEARD: That's the --

MR. SCOTT: Or do you restrict them --

MR. BEARD: -- same --

MR. SCOTT: -- try to keep them separate, like, trying to think of a for instance. If a train stopped, the -- the train proceeding behind it would get the virtual block and see that

there's a train there and -- and know -- I guess what I'm trying to think of a better way to ask it.

How do you allow trains to proceed into a virtual blocks if a train's already occupying I guess is -- is it all by --

MR. BEARD: Can --

MR. SCOTT: -- rules or --

MR. BEARD: Can we pause for a second?

MR. SCOTT: Yeah.

MR. MANUTES: Yeah. Stand by. Give me a second.

(Off the record)

(On the record)

MR. SCOTT: All right. So y'all were talking about a testing ground. Where is that? Do y'all already have a testing ground picked out on your territory per se that you're -- you're wanting to try this after you get approval or --

MR. BEARD: We do have a test site set up. That's part of our test request. Can't share that location with you because that's something that we have as redacted and just trying not to have a lot of people just coming out there while we're trying to perform our testing.

MR. SCOTT: Understand.

MR. BEARD: But --

MR. MANUTES: Makes sense.

MR. SCOTT: All right, and just for my knowledge, you're -- you talked about putting communications, radio communications,

into your intermediate locations. Do your intermediate locations have any communications at this point or is it all done from a control point on your -- before you came up with this technology?

MR. BEARD: Yeah. So CTC intermediates, well, prior to PTC, we didn't have any radios at any of our intermediate locations communicating out. Now with PTC, all our intermediates do have the CTC radios there, which establishes that communication backbone.

We're just going to further elaborate (indiscernible) PTC backbone at those locations. Part of that is how we'll be able to communicate the additional alarms and have the potential to maybe even potentially create -- convert intermediates to control points to give additional control for the dispatchers to a more defined segment of track versus going from traditional control point to control point, which could be 20 miles which can now be broken down to two, four, six, eight miles of control.

MR. SCOTT: Okay. Now do your under PTC, and not talking about the virtual track circuit, they don't -- you don't have any, let's say, IP base systems that you're intermediates now, like a satellite or sail or any of that kind of stuff. Am I correct in saying that?

MR. BEARD: Just only thing that was required for PTC, some PTC locations have cell modems. Some subdivisions have fiber connectivity.

MR. SCOTT: Okay.

MR. BEARD: Just based on the location and availability.

MR. SCOTT: Okay. Let me look over my questions. I think that answered most of my questions.

MR. PITMANN: If -- one thing that I want to make kind of clear too is that we talked about OMA. We really talked a lot about the virtual track segments and so forth. I think that the one -- one thing that we want to be clear of too is that OMA is really the type of -- OMABBS is the type of operation.

It's really moving the authority from the Wayside -- the interpretation of the Wayside signal to the onboard, right? The VTS or Virtual Track Segments is when we subdivide that, and so it is possible to run an OMAVBS type of operation without those virtual track segments.

It just CTC would run like it does today, except just using the onboard for the authority if that makes sense.

MR. SCOTT: Yeah.

MR. PITMANN: Okay. I want to make sure that was clear and I think --

MR. SCOTT: Okay.

MR. PITMANN: -- we kind of talked about it. I wanted to be clear about that.

MR. SCOTT: So I think part of what Mitch was saying, and correct me if I'm wrong here, Mitch, when you were talking about the length of the virtual track circuit versus the natural track circuit now is, to me, it takes away some of the complicity maybe.

You know, you have a train crew going in and they get complacent on a two or three or four mile restricting speed versus, all right, now they're going in on a -- a virtual track circuit that they know, hey, this is -- there's something up there that's pretty close to me.

You know, I really need to pay attention versus getting kind of complacent on, you know, an actual circuit that may be miles long. Am I correct in saying that?

MR. BEARD: Me, personally, I believe that there's a potential to that. That's what I think. We will be part of our testing doing human factors analysis, which is done by a third party vendor, which I think what that study will kind of help facility that answer.

MR. SCOTT: Okay

MR. BEARD: But me, personally, I think that's a valid statement.

MR. SCOTT: Okay. Rubin, anything else?

MR. PAYAN: Yeah. So one of the areas we're looking at where PTC has a little bit of shortcomings, we had an accident on the East Coast where -- where this track group was working out on the tracks.

They had an authority to be out there and then without them knowing, the dispatcher took -- lifted their authority and sent a train down on them and -- and there was some fatalities. Is this virtual block going to help? I can't think of it, but maybe you

know better.

Do you see any interaction how this, the single point failure, can be -- can be handled with the virtual block?

MR. BEARD: First of all, I was going to say that is a bad deal.

MR. PAYAN: Yes.

MR. BEARD: Being an engineering employee myself, your authority, well, you know, is -- has never been protection in the past. It's just an authority to file a track.

MR. PAYAN: Uh-huh.

MR. BEARD: I think PTC is taking steps to help solve that problem with some of the work zones that are involved in there, especially like our Form Bs. Right now, only VBS doesn't have anything additional to add to help support any additional efforts.

I would say that's something that's constantly being evaluating and, you know, trying to work towards but it -- right now, we're just leveraging what is there today --

MR. PAYAN: Okay.

MR. BEARD: -- and the track circuit won't help solve those problems today.

MR. PAYAN: Okay. I wasn't sure. I just want to -- I just thought I'd ask the question, but thank you for that.

MR. BEARD: Yeah. No, that's a good question and it's a big deal.

MR. PAYAN: Well, I appreciate it. Yeah, it's just one of

those single point of failures in PTC that we've found that it's unless the crews are out there shunting the track, a dispatcher can pretty much take away their authority without them knowing, and so hopefully the next version of PTC will address that somehow.

I think that's all I have. I can't think of anything else.

MR. SCOTT: John, anything else?

MR. MANUTES: Yes. This is John. Just one quick follow up. Does the technology that's to be tested add a screen in the locomotive cab or does it integrate with the existing screens in the cab?

MR. BEARD: Just leverages the existing screens in the cab.

MR. MANUTES: Okay. No, that's all I have.

MR. BEARD: It --

MR. SCOTT: All right. Do either one of y'all have anything recorded that you need to add, Daniel or Mitch?

MR. PITMANN: No. I think we covered it, you know, about the, you know, it's still -- obviously still in its testing and exploratory phases with the, you know, we do not have any approvals yet from the FRA. So certainly as we continue to work through it with them, that will -- that will continue to develop, I guess.

MR. SCOTT: Okay. I really appreciate y'all working with us today and, John, if you're ready to stop recording?

(Whereupon, the interview was concluded.)

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CERTIFICATE

This is to certify that the attached proceeding before the

NATIONAL TRANSPORTATION SAFETY BOARD

IN THE MATTER OF:	BNSF EMPLOYEE FATALITY IN LA MIRADA, CALIFORNIA ON OCTOBER 6, 2021 Interview of Daniel Pittman and Mitch Beard
ACCIDENT NO.:	DCA21SR003
PLACE:	Via Microsoft Teams
DATE:	October 6, 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]

Lisa Smith
Transcriber