Brotherhood of Maintenance of Way Employes Division
of the International Brotherhood of Teamsters

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March 10, 2017

Mr. Ryan Frigo, Investigator in Charge
National Transportation Safety Board
490 L'Enfant Plaza East, S.W.
Washington, DC 20594

RE: Proposed Findings, Proposed Probable Cause, and Proposed Safety Recommendations in the matter of Amtrak Train 89 Collision with a Backhoe and Engineering Employees near Chester, PA on April 3, 2016; NTSB Docket No: DCA16FR007.

Dear Mr. Frigo:

The Brotherhood of Maintenance of Way Employes Division (BMWED) of the International Brotherhood of Teamsters has been granted party status by the Board in the above-referenced investigation. BMWED respectfully submits these Proposed Findings, Proposed Probable Cause, and Proposed Safety Recommendations to the Board for consideration.

Accident Synopsis

On Sunday, April 3, 2016, at 7:50 a.m., National Railroad Passenger Corporation (Amtrak) passenger train 89 struck a roadway maintenance machine (backhoe) at milepost 15.7 on the Amtrak Northeast Corridor near Chester, Pennsylvania. The train consisted of one locomotive, eight passenger cars, one cafe car, and one baggage car.

Amtrak train 89 was operating on main track 3 at 106 mph, within the maximum authorized speed of 110 mph. The locomotive struck a backhoe occupying track 3, and the debris struck and damaged several passenger cars. The backhoe operator and a supervisor working with the backhoe died in the accident. The train had 7 crewmembers and 337 passengers on board at the time of the accident, including two employee passengers; 41 people were transported to local hospitals.

The weather at the time of the accident was scattered clouds, winds from the west at 38 mph gusting up to 50 mph, and a temperature of 37°F. Amtrak estimated damages of $2.2 million.

The weather during the night shift of Saturday April 2, 2016 started out relatively mild and seasonal before turning cold, wet, windy, and miserable around 11:00pm and extending into early Sunday morning April 3, 2016 as the night shift progressed. Periodic weather readings recorded at

Philadelphia, PA airport and published/archived by the Weather Underground (full archived weather reports for 4/2-3/16 enclosed) show the rapid deterioration of weather conditions as work progressed Saturday night into Sunday morning. Timestamped excerpts from the Weather Underground's records are captured below. See enclosed Weather Underground reports for more detailed information.

Weather Underground Metrological Report, April 2, 2016 (Excerpts)

Time	Temperature	Wind	Wind Gusts	Atmosphere
6:54pm	55.9°	SSW 16.1 MPH		Mostly Cloudy
11:16pm	53.1°	SSW 11.5 MPH		Thunder (T)
11:38pm	46.0° (WC[1] 36.2°)	W 33.4 MPH	46 MPH	Hvy Rain/T

Weather Underground Metrological Report, April 3, 2016 (Excerpts)

Time	Temperature	Wind	Wind Gusts	Atmosphere
12:11am	46° (WC 39°)	W 17.3 MPH	38 MPH	Overcast
1:54am	46° (WC 35.5°)	W 39.1 MPH	39.1 MPH	Mostly Cloudy
3:54am	43° (WC 32.2°)	WNW 32.2 MPH	49.5 MPH	Mostly Cloudy
4:54am	41° (WC 30.2°)	W 27.6 MPH	51.8 MPH	Mostly Cloudy
6:54am	37.9°(WC 25.9)	NW 28.8 MPH	41.4 MPH	Scatter Clouds

Track Maintenance Work

The Amtrak engineering department routinely operates trains with instrumented wheel sets (accelerometers), as well as automated geometry test vehicles, over the Northeast Corridor (NEC) to measure track geometry. Upon a review of recent test data and field inspections, engineering department managers scheduled a location on Amtrak's PW Line in the Northeast Corridor located at milepost 15.7 on main track 2 for ballast removal and replacement to address track geometry conditions determined to be caused by fouled ballast.

Ballast in the NEC is primarily trap rock (stone) which forms the foundational support of the track structure's ties, rail, and rail fasteners. Ballast essentially forms the "track bed" and is integral to the stability and geometry of the track structure. Amtrak engineering personnel developed a program to eliminate a series of fouled ballast locations in the accident area, using a Loram ballast vacuum train, maintenances crews, and a backhoe to facilitate loosening and removal of the fouled ballast.

[1] Wind Chill

The Federal Railroad Administration (FRA) regulates ballast conditions. The FRA Track Safety Standards § 213.103 Ballast; general, states:

> Unless it is otherwise structurally supported, all track shall be supported by material which will-
> (a) Transmit and distribute the load of the track and railroad rolling equipment to the subgrade;
> (b) Restrain the track laterally, longitudinally, and vertically under dynamic loads imposed by railroad rolling equipment and thermal stress exerted by the rails;
> (c) Provide adequate drainage for the track; and
> (d) Maintain proper track cross-level, surface, and alinement.

When ballast becomes contaminated with mud, dirt, sand, fines, or other foreign debris, its ability to provide drainage and maintain proper track cross-level, surface, and alinement is compromised. Such contaminated ballast is referred to as "fouled" ballast.

Chester, PA Ballast Removal/Replacement Project

To accomplish the removal of fouled ballast on track 2 in the accident area, Amtrak planned a 55-hour track outage for track 2. Main track 2 was taken out-of-service between control points (CP) Baldwin (MP 11.7) and Hook (MP 16.8) with a Form D (track authority) beginning Friday evening to allow the vacuum train to occupy track 2 for the duration of the 55-hour project. The track outage was scheduled to begin on April 1, 2016, at 10:00 p.m. [Friday night] and would continue through to April 4, 2016, at 5:00 a.m. [Monday morning].

To oversee the continuous operation of the ballast removal and to coordinate track authorities, foul time, and maintenance crew activities for the project, the engineering department assigned one MOW[2] foreman to work a 12-hour night shift and another foreman to work a 12-hour day shift during the 55-hour track outage. [Night shift at job location was approximately 7:00 p.m. to 7:00 a.m.; the day shift at job location was approximately 7:00 a.m. to 7:00 p.m.] Different foremen were assigned to work the Friday night and Saturday night shifts. The same foreman worked both the Saturday and Sunday day shifts.

The Loram vacuum train was brought down from Philadelphia on Friday, April 1, 2016. The vacuum train, manned by Loram contractor employees, worked Friday night [April 1, 2016] into Saturday morning under the authority of a night shift foreman. According to interviews with maintenance of way personnel, nothing remarkable occurred Friday night at the work site or during Saturday's work shifts. The day shift foreman worked the Saturday morning to Saturday evening shift (approximately 6:00 am to 6:00 pm] with the vacuum train. His crew consisted of himself, a truck driver, and a trackman. There was no backhoe operator assigned to the day shift foreman on Saturday,

[2] Maintenance of Way. All "foremen" referenced in this document are MOW foremen.

April 2, 2016. Testimony established that the backhoe was scheduled for use during the night shifts because train traffic during the night and early morning was less frequent, allowing more time for the backhoe to work during the nightshift hours.

The backhoe operator's shift was scheduled from 6:00PM to 6:00 AM on Friday. However, unbeknown to the day shift foreman, the backhoe operator's shift for Saturday night was changed by the track supervisor to begin at 11:00pm, which meant that the backhoe's shift would, for the first time during the 55-hour track outage, extend into the day shift beginning Sunday morning, April 3, 2016.

The backhoe was equipped with a cribbing bucket on an articulated arm. During the track outage, the nightshift foreman would request and receive foul time from the dispatcher as needed on tracks 1, 3 and 4. Foul time was required on tracks 3 and 4 to allow the backhoe to drive off the access road over track 4 and onto track 3. The backhoe would then position itself on (straddle) track 3 and reach into adjacent track 2 with the cribbing bucket to break up the fouled ballast between the ties on track 2. The vacuum train, positioned on track 2 under Form D authority, would then vacuum the ballast into a holding car while protected by fouls on adjacent tracks 1 and 3. The vacuum train would be emptied periodically, with the spoils offloaded on the field side of track 1, using foul time protection established by the foreman.

Accident Timeline

The day shift foreman testified that he reported to Wilmington, DE headquarters at 6:00 am on Sunday, April, 3, 2016, and drove a company vehicle towards Chester. At 7:16:42 the NTSB's Recorded Radio and Telephone Communications transcript captured the first phone contact between the day foreman and the day dispatcher. The day foreman and dispatcher exchanged greetings and general pleasantries. At 7:16:53, the dispatcher says to the day foreman, "*alright, you on, uh, you on for today?"* Day foreman replies, "*yes."* At 7:17:00 the dispatcher asks, *"where are you?"* Day foreman replies, "*I'm going to be a Hook, I'm going to be taking, uh, two track out, uh, relieving @FMN-1 [night foreman]*. At 7:17:13 the dispatchers says to the day foreman, "*give me a minute, call me back, and, uh, I'll give you, uh, I'll give you a Form D."* The day foreman replies, *"OK."* (Recorded Radio and Telephone Communications, Group Chairman's Factual Report, pages 6-7)

Upon arriving at the jobsite, the day foremen had a face-to-face conversation with the night shift foreman and they discussed transferring the Form D authority on track 2, which was under the night foreman's name, to the day foreman. The night shift foreman confirmed to the day shift foreman during that conversation that he had fouls on tracks 1, 3 and 4 at that time.

At 7:24:09am, the day shift foreman again telephoned the day shift dispatcher. At 7:24:55 the dispatcher began the process of issuing Form D number A1401 for track 2 out of service in the day foreman's name. The dispatcher asked for his location, and the day foreman responded "*at Hook, yep*." At 7:26:09 the dispatcher says, "*Form D number a fourteen zero one, time effective seven twenty six in*

the am." Day foreman then repeats back the Form D as required by the rules, "*Form D a fourteen oh one, time effective is seven twenty six in the am."* (Recorded Radio and Telephone Communications, Group Chairman's Factual Report, pages 8-9)

At 7:26:22, on the same phone call, the dispatcher says to the day foreman, "*Roger, tell, uh @FMN-1[night foreman]to give me a call whenever he's ready and I'll cancel his. Um, are you going to need all four tracks, I mean all three tracks?"* Day foreman responds, "*Yeah, I gotta check and see how much I got to do with this backhoe, cause yes he needs three and four, um, and one as much as possible for now, I don't know how much longer with that because my backhoe operator should be getting out of here in about an hour or two."* At 7:26:51 the day foreman says to the dispatcher, *"In the meantime [crosstalk], I'll tell @FMN-1 [night foreman]to give you a call."* To which the dispatcher responds, "*ok*." At 7:26:55 the day foreman says to the dispatcher "*and, um, once he starts clearing up his fouls up then I'll be uh, returning [crosstalk]."* Dispatcher replies, "*taking your, OK. Alright, not a problem, I got ya."* (Recorded Radio and Telephone Communications, Group Chairman's Factual Report, page 9)

The procedure at Amtrak for transferring a Form D authority from one foreman/EIC[3] to another foreman/EIC is called a "hold." In a "hold," the dispatcher first issues a separate Form D to the incoming foreman while the outgoing foreman's Form D is still in effect. In a "hold," the incoming and outgoing foremen's Form Ds overlap temporarily, thereby assuring that the transfer of Form D authority is "seamless" and there is no lapse in occupancy authority during the shift change. The "hold" essentially ends when the outgoing foreman cancels his Form D with the dispatcher thereby removing the temporary "overlap" of authorities between the two foremen. It is important to note, however, at the time of the accident there was no similar "hold" procedure established by Amtrak for the transfer of fouls between an outgoing and incoming foreman/EIC.

After receiving his Form D for track 2, the day shift foreman began walking the jobsite to survey the work performed the previous evening. He spoke briefly to the day shift track supervisor, who was working with the backhoe, to ascertain what work was left to be accomplished. The day foreman then boarded the Loram train, conducted a job-briefing with the Loram crew, and prepared his briefing forms in anticipation of additional workers arriving at the jobsite that morning.

The day shift watchman arrived at the jobsite ahead of the day shift foreman. He was briefed and signed the night foreman's job briefing form. He then relieved the night watchman, positioning himself on the access road adjacent to the backhoe outside (west) of the track structure watching for trains. Posting of watchmen/lookouts is standard operating procedure whenever Amtrak roadway workers are on or about the track in the NEC. Watchmen/lookouts are generally not notified when fouls are obtained or released, because it is their duty to maintain a constant vigilance for approaching trains and on-track equipment regardless of Form Ds or fouls in effect.

[3] Employee-in-Charge of Part 214 on-track safety protection. All "foreman" referenced herein were EICs.

At 7:27:23am, an outgoing recorded telephone call was placed by the day shift dispatcher to an unidentified individual. The dispatcher mentioned on the call that track 2 was out of service, and tracks 1, 3, and 4 had fouls. Dispatcher says to the unidentified individual, *"I'm here and they are already busting my butt."* The unidentified individual replies, "*Oh, what happened?*" to which the dispatcher replies "*Oh, nothing, I just got two track out of service Baldwin to Hook, but they fouling on one, three and four."* Unidentified individual responds, "*Oh, wow."* The remainder of the call between the dispatcher and the unidentified individual was non-pertinent. The call ended at 7:28:13am. (Recorded Radio and Telephone Communications, Group Chairman's Factual Report, page 10)

Seconds later, at 7:28:15, the dispatcher received a telephone call from the night shift foreman. They (night foreman and dispatcher) exchanged general greetings and at 7:28:25 the night foreman says, "*Um, I was calling to knock down Form D number a Fourteen oh three, uh, @FMN-2s (day foreman) taking over the track. I just want to release my Form D."* At 7:28:54 Dispatcher responds, *"Alright, Form D number a fourteen zero three, date four two sixteen. Form D cancel time is seven twenty eight in the am, today's date is four three sixteen, dispatcher is [name]."* Per the rules, the night foreman repeats back the cancellation of Form D 1403, effectively ending the overlapping "hold" between the two (day and night foremen's) Form Ds. Dispatcher responds, "*Roger. Alright, well, get some rest man."* To which the night foreman responds at 7:29:24, "*Uh, also [inaudible], uh, release these fouls, and, uh, @FMN-2 [day foreman] is gonna pick them up. Um, my fouls on number one, three and four between Hook and Baldwin."* Dispatcher responds, *"@FMN-1 [night foreman], I show you clear your fouls number one, three and four track, Hook to Baldwin, seven twenty nine in the am."* Per the rules, the night foreman repeats back, "*Alright, seven twenty nine in the am, @FMN-1 [night foreman] is all clear of his fouls, one, three and four between Hook and Baldwin."* The night foreman thanked the dispatcher and they each said good bye. The call between the dispatcher and night foremen ended at 7:29:49. (Recorded Radio and Telephone Communications, Group Chairman's Factual Report, page 10-11)

Approximately 20 minutes later, without any further contact with the day or night foreman, the day shift dispatcher made a phone call to an unidentified individual at 7:49.24am. At 7:49:52 the dispatcher says to the unidentified individual, *"…I just saw something I don't like."* At 7:50:04 dispatcher says to the unidentified individual, "*No, no, no, I'm looking at a light came up on number four track. I don't have nobody fouling out there."* At 7:50:25 someone [unidentified] makes radio transmission broadcast, "*emergency, emergency, emergency.*" The dispatcher says to the unidentified person on the phone, "*I hope they weren't out there fouling and didn't say nothing. I got a train going through there on track three."* Unidentified person on the phone says, "*Well, you want to find out what's going on?"* Dispatcher responds, *"Oh, I'm finding out."* At 7:51:09 dispatcher says to the unidentified person on the phone, "…*Hold on I got an emergency, let me call you back."* The phone call ends at 7:51:15. (Recorded Radio and Telephone Communications, Group Chairman's Factual Report, page 12-14)

At 7:51:34 the dispatcher answers a radio transmission from the day foreman. With anxiety in his voice, the day foreman says, *"Did, did [night foreman] have a foul on three and four?"* The dispatcher responded, *"No, he gave up his fouls."* Day foreman responds, *"Oh my gosh! You've got to be kidding me! Oh! Man!" "The backhoe got plowed, I can't believe it! I need an ambulance, I need people down here a mile north of Hook…." "Yes, people got hit." "Unbelievable, unbelievable, I didn't know!"* (Group Chairman's Factual Report, Recorded Radio and Telephone Communications, page 14-15)

Additional Interview Testimony

Interview testimony revels that the day foreman and the night foreman had a discussion about the foul time during their initial conversation on Sunday morning. After their initial conversation, the day foreman acquired his (overlapping) Form D for track 2 from the dispatcher. The night foreman testified in his interview, "*Then his [day foreman's) phone rang… Im just standing there, and then he goes… Go ahead and cancel your Form D… I said, okay and I stopped. I said, but if I cancel my Form D… I have to give up my fouls. He said, I know what you have to do…." (*Night foreman interview, page 48)

The interviewer asked the night foreman, "*What were you expecting John [day foreman] to do?"* The night foreman responded, "*The way the Form D was seamlessly transferred is the expectation that I had for the fouls…."* (Night foreman interview, page 52)

In a separate interview with the day foreman, a similar question about expectations was asked by the interviewer. The interviewer asked "*…was there a conversation of any kind about what was going to happen with the backhoe, how long he would be there and who was going to take, protect him on those tracks or anything like that?"* The day foreman answered, *"Well after I got the track out [track 2, Form D]I talked to him. I said I got the track out, and I did ask him—because I noticed the backhoe was down there…." "But I mean when I got there, [night foreman] had—he was working with the backhoe. So that's why I asked if he had a foul. He responded that he had a foul on all the tracks, and then my response to him was, well after you give your foul up, you know, I'll get the fouls…."* Further elaborating in the interview on his expectations relative to the release of fouls by the night foreman, the day foreman testified, *"Take your machine off, clear the fouls, clear all your fouls and then you go home and then Foreman [day foreman] will take over after that."* The interviewer then asked the day foreman, "*So you're saying that the expectation would be before he gave back his foul time, he would make sure all men and equipment were clear of the track and in a safe location?"* The day foreman responded, "*You would absolutely think that*." (Day foreman interview, pages 35-36)

The interview testimony also reveals that the day shift watchman was already positioned on the access road adjacent to the backhoe outside (west) of the track structure watching for trains when train 89 approached. *"So I'm probably right here on the access road, the track 4[side] and, you know, I'm watching and I see a train coming and I'm thinking to myself, you know, I'm new. I've got a year and a*

half in. I don't have anything on these 30 veterans that have been watching…. So, I blow my horn, raise my banner and I'm looking and I just keep looking, and I finally see that it's coming down on the track. It's coming down track 3 and before I know it, it was there and I ran out of the way…. As I'm running, I'm kind of looking back and I see the backhoe get hit, burst into flames." (Day watchman/lookout interview, pages 13-14)

Experience and Training

Day Shift Foreman - April 3, 2016

The day shift foreman, started working for Amtrak in 1977. He worked as a trackman (track laborer) for 3 years prior to becoming a foreman in 1980. In his nearly 40 years of service with Amtrak engineering department, he testified that he held the positions of track inspector, switch inspector, maintenance gang foreman, surfacing and tie gang foreman, and contractor protection foreman. He testified that he worked all different shifts during his career, including night shift, day shift and middle shift. (Day foreman interview, page 5)

Regarding training, the day shift foreman testified, *"I'm comfortable with my training, but then again, I've been around a long, long time…." "I just think some of these guys get put in bad spots. They just don't know everything, and maybe just assume to much…."* (Day foreman interview, page 62) *"I think—I would guess the training programs are about, you know, I can't really say they are bad. I think they're okay, you know… I think basically the safeguards are okay." It's just my problem may be is guys maybe, not having enough experience, you know, newer guys."* (Day foreman interview, page 61, emphasis added)

Night Shift Foreman - April 2, 2016

The night shift foreman, started working for Amtrak in March 2013 as a trackman. He worked as a thermite welder, electric arc welder, truck driver, and lubricator operator. He attended foreman training and became an Electric Arc Welding Foreman in December 2015. He had approximately four (4) months as a foreman prior to April 3, 2016 accident in Chester. He testified that Saturday night, April 2, was the first time he ever worked as the foreman/EIC of the vacuum train. (Night foreman interview, page 28) Most of his experience as foreman was with welding. The night foreman testified that he did not sign up for overtime work that weekend, he was called and asked if he could cover. *"I was called by my supervisor, Pat [last name], and asked if I could cover-- if I was willing to cover the Saturday night shift, and I said, okay."* (Night foreman interview, page 13)

Speaking about the experience of Amtrak's engineering personnel in his interview, the Assistant Division Engineer spoke highly of the night foreman but also acknowledged his lack of field experience. *"But you know, [night foreman] is a young foreman. [Night foreman] just graduated from our foremen training program in the Fall. We have two of them a year. One in the Fall and one in the Spring time. He just graduated, and didn't -- and in my opinion, [Night foreman] seemed to be one of those guys that were interested, showed some initiative. He seemed like he would be a good foreman and could be, you know, molded into a -- you know, a good leader, a good foreman with -- you know,*

with time, in time. You know, he's not going to come out of foremen's school and end up being, you know, like a John [last name] or Joe [last name], or what have you, you know. I mean, these are guys that have been foremen since 1977/1978." (Asst. Division Engineer interview, page 16)

Regarding training, the night foreman testified, *"The training that I've taken has been informative. In some instances, I don't think it's long enough or in detail enough, in certain aspects, but it is beneficial. But it could be a lot more in detail."* (Night foreman interview, pages 6-7) When asked if he was comfortable with his annual NORAC training, he testified, *"Was I comfortable with it? I don't think that you can go over everything in a day. I mean, it --you --, the book is just too big. You can't go over everything in a day."* (Night foreman interview, page 11)

Day Shift Watchman/Lookout – April 3, 2016

The day shift watchman/lookout was a trackman and a qualified watchman/lookout assigned to work the day shift. He had approximately 1.5 years of service with Amtrak. Another employee was also assigned to work the day shift, and the day watchman/lookout and the second employee were to rotate the watchman/lookout assignment every 2 hours in order to remain sharp and to mitigate 'watchman fatigue.'

Regarding training, the day watchman/lookout testified that he had attended the Roadway Worker Protection training class and the AMT-2 class. He also received on-the-job training for certain types of equipment including the rail saw and rail drill.

First Shift Dispatcher – April 3, 2016

The day shift dispatcher arrived at the dispatch center (CETC4) at approximately 6:45am the morning of April 3, 2016. He testified that he had 28 years of service with Amtrak, 20 years as a dispatcher. He testified that he is qualified on the entire office, Assistant Chief 1, 2, 3, 4, 5, and 6, B & C. "*So I'm qualified on the whole division*." (First shift dispatcher interview, page 5)

He and the 3rd shift dispatcher job briefed about the work being done between Hook and Baldwin, with track 2 out of service with a Form D to the night shift foreman and fouls to the night shift foreman on tracks 1, 3 and 4. After they briefed, the first shift dispatcher began his shift.

Labor Panel Interview

On August 25, 2016, the General Chairmen of the three engineering employee unions (BMWED, BRS and ARASA) were interviewed. The General Chairmen spoke at length about the lack of a cooperative and collaborative safety culture at Amtrak in recent years, and the generally poor relationship between labor and management over the past several years. They also spoke about training and experience levels of the engineering workforce.

In response to an interview question regarding the state of safety and training at Amtrak, BMWED General Chairman Dodd stated,

"The unions have come up with and is of the opinion that this management is absolutely useless in terms of making a cooperative program together. And what we've done [post-accident] is embarked on an organizing drive to reorganize the property under the auspices of the union, to enforce the rules that we think should be enforced. As for instance, the shunting rules. We think there's a significant increase in shunting [post-accident], and the use of shunt straps and enforce the rules as a result of the program that we've embarked on. In terms of overall -- but there's just so much that the union can do, and that's where I would agree with Rocco, that in terms of like, if the management and labor were actually willing to join together and enforce the rules out on the property, together, I think we'd have a much more effective operation. What we're afraid of is the inexperience foreman on the job site, the lack of training, the lack of mentoring, the confusion over some of the rules, we think another accident is virtually guaranteed. And so, when you ask me, are things better? Things are better since the Chester accident, because we [the union]made a decision that while work with this management is impossible, this management is not going to work with us, so we have to adopt our own program, and we've trained over 400 people in two-day training classes, to go out on the property and organize on the job site around these rules." (Interview with Labor Panel, pages 61 & 62, Emphasis added)

In response to a question regarding what should be done to improve safety and labor/management collaboration on safety issues, Mr. Dodd offered a number of comments and solutions including:

"I would then begin to address the gorilla in the room, and that's like 200 foreman out on the job sites with less than five years' service, and then I've gotta really spend some serious money in terms of mentoring and training out on the property to try to merge the inexperience with training with the job site in a way that would reduce the accidents and the problems out on the property. So, I would make a significant investment in the employees in terms of mentoring and training." (Interview with Labor Panel, pages 72 & 73, Emphasis added)

Supplemental Shunting Devices

Amtrak rules require the use of a Supplemental Shunting Device (SSD) when equipment will be used to foul a track for more than 5 minutes in signalized territory or within interlocking limits. An SSD will "shunt" the track, meaning the shunting device will show the track occupied on the dispatcher's display (i.e., dispatcher's display will show a Track Occupancy Light – TOL). Because a SSD mimics the presence of a train occupying the track, a dispatcher cannot clear a signal for a train into a track protected with a SSD. For automatic signals, the signal system will automatically prevent a favorable signal aspect into a section of track protected by an SSD.

Amtrak Rule 323(e) states:

(e) Supplemental Shunting Devises must be applied when equipment will be used to foul a track in signaled territory or within interlocking limits for more than 5 minutes. The EIC must apply Supplemental Shunting devices in accordance with the Operating Rules governing the territory. (See Appendix B)

During this 55-hour track outage, there were no SSDs applied on the tracks being fouled and occupied by equipment under foul time. The night shift foreman testified that he did not have an SSD available to use. (Night foreman interview, page 77) The day shift foreman testified that he did not know if a SSD was applied by the night foreman when fouling with the backhoe. (Day foreman interview, page 40) Prior to the accident, Amtrak did not have a specific efficiency testing code for SSD observation/compliance (Track and Engineering Group Chairman Factual Report, page 20) There is no evidence that anyone at any level --management, supervision, foremen, or rank-and-file workers -- took exception to the non-use of SSDs during the 55-hour track outage.

Site-Specific Work Plan

The work scheduled for the accident area April 1-4, 2016 was planned around a 55-hour track outage on main track 2, with intermittent and prolonged outages on the remaining three tracks under foul time. At numerous times throughout the 55-hour project, all four main tracks were under the control of a foreman/EIC, thereby rendering the Northeast Corridor between CP Baldwin and CP Hook inaccessible to trains. Despite the magnitude and duration of the ballast restoration project, and the fact that regularly scheduled passenger trains would be periodically operating through the work area at a maximum authorized speed of 110 MPH (for track 3), there was no Site-Specific Work Plan (SSWP) developed for the 55-hour track outage. One Amtrak manager interviewed stated that a SSWP was not required for "routine maintenance." (VP/Chief Engineer interview, page 12) The VP/Chief Engineer stated in his interview that a SSWP was used for larger projects but not the work that was on-going at the accident site; he said the length of the outage was not a factor. *"It's not about the length of time. It's about the activity itself."* (VP/Chief Engineer interview, page 12)

However, another manager provided a differing opinion on the necessity for a SSWP. Amtrak's Director of Engineering was asked in his interview, *"Did that [ballast cleaning] require a Site-Specific Work Plan?"* He answered, *"Typically, on a nightly basis I would say no. But when I've got an extended outage like this, I would say we need one."* (Director of Engineering interview, page 72) He said that this was his opinion and there was nothing in writing. He also said the extended outage would be one consideration for developing an SSWP. *"Yes, it's the transfer of activities to another crew."* (Director of Engineering interview, page 73)

During the investigation, several Amtrak SSWPs were reviewed. The following elements were found to be common to the SSWPs:

- Job Summary or Statement of work
- Scope of work
- Hazard Assessment worksheet
- Manpower and additional departments
- Equipment
- Tools and training
- Equipment line-up
- Job Briefings
- Safety and PPE
- Emergency phone numbers
- Community/public impact
- Clean-up and disposal

Job Briefings

Job briefings were conducted with the incoming (Sunday morning) crew members as they showed up for work at the job site. Due to employees showing up at slightly different times, arriving employees received a preliminary briefing by either of the two foremen present at the job site during the shift change. The day shift foreman indicated that once everyone showed up, he intended to hold a more formal job briefing for the incoming day shift crew. *"So I was waiting, like I said, for my ET guys, waiting for all the foul time to get cleared up by [night foreman] to do the job briefing."* (Day foreman interview, page 85)

Interviews suggest that job briefings at Amtrak have become rote, routine, and less effective over a period of time. When asked about worker participation in the briefing process, the day foreman offered the following answer, "*It's probably a lack of paying attention on a lot of people. They just – they -- I don't know how to say. Maybe they're bored with it maybe. I don't know. They just don't pay attention. They just feel, you know, let me sign the paper and what are we doing today and where do we got to go."* (Day foreman interview, page 64) *"It's what we have, and you know, it's for the people who sign it, it's what they take out of it I think, and some of them really don't – they just sign it to sign it."* (Day foreman interview, page 88)

It is apparent that the effectiveness of briefings and conveyance of critical information may have been diminished due to the routine and repetitious nature of Amtrak's job briefing and on-track safety briefing processes.

Radio vs. Telephone Communication

Amtrak procedures generally require foul time to be secured using a railroad radio. The use of a radio provides an opportunity for others monitoring the radio channel to hear the transmissions between the foreman/EIC and the dispatcher. This is the preferred method of communication because a radio broadcast generally improves 'situational awareness' for work crews, train crews, and dispatchers. However, due to radio interference/static on the day and location of the accident, the night foreman was forced to use a cellphone to release his fouls on tracks 1, 3, and 4 at approximately 7:28am. Because cellphone communication was necessary due to poor radio transmission, there was no opportunity for workers at the job site to hear a radio broadcast of the fouls being released.

Crew Location, Train Location, Toxicology

Immediately prior to the accident, the backhoe (with operator) was located on track 3 where it was authorized to be. The day shift track supervisor was working with and assisting the backhoe. They (supervisor and backhoe/operator) were both occupying (fouling) track 3 under foul time secured by the night foreman. There is no indication in the investigative record that the supervisor and backhoe operator were notified to get in the clear prior to the foul time being released at approximately 7:28am.

Train 89 was routed down track 3 through the accident site by the dispatcher because the fouls on track 3 had been released by the night foreman. The 1st shift dispatcher explained, "*Okay, when a foreman reports that he's clear of a file [foul], that means that all the equipment and personnel, the humans are clear of that track and that track is now clear for -- once we remove out of blocks, give him -- or once we give him a clearing time, remove our blocks, that track is open and ready for live rail."* (First shift dispatcher interview, page 37)

Southbound Train 89 was operating under signal indication on track 3 where it was routed by the dispatcher. The locomotive engineer on train 89 testified, *"I had all clears [signals], pretty much leaving Philly*." (Locomotive engineer interview, page 18)

There is no evidence whatsoever that drugs or alcohol played a role in the severity or cause of the accident.

Management and Supervisory Oversight

The investigation record points to a significant lack of management and supervisory oversight on this ballast removal/renewal project.

There was no SSWP developed for this project by Amtrak management and no comprehensive job hazard analysis conducted. There was no enforcement of the rules requiring the use of SSDs whenever equipment was fouling for more than 5 minutes. There was no formalized process in place for coordinating shift changes, transferring of fouls, or clearing all tracks to hold a joint briefing with the incoming and outgoing crews during the shift change.

Additionally, testimony suggests there may have been some animosity between the night shift Assistant Supervisor and the day shift Supervisor. The Assistant Division Engineer was asked in his interview, "*How would you describe the relationship between [Asst. Supervisor] Kyle and [Supervisor] Pete?*" He answered, "*There was none. There was no relationship between Kyle and Pete."* (Asst. Division Engineer interview, page 29)

The night shift assistant supervisor testified he was unaware that the day shift supervisor changed the start time of the backhoe operator on Saturday evening. *"So, I was kind of confused, and whenever I talked with Will [night foreman], he said when Pete [supervisor] left, he -- Pete told Will that Joe [backhoe operator] wasn't coming in until later. So, I ended up calling Joe around 10:00 [Saturday night] and asked him like, what time Pete told him to come in. He said 11:00."* (Night Asst. Supervisor interview, page 19)

When asked about the use of SSDs during his interview, the night Asst. Supervisor said, "*I mean, at times, the -- you're supposed to use -- you can use supplemental shunting devices, SSDs, but at that point, the foreman was not using that.* When asked by the interviewer, "*Do you know why not?"* the Asst. Supervisor replied*, "I do not. I did not ask him."* (Night Asst. Supervisor interview, page 24)

When the day shift foreman arrived at the job site on Sunday morning, he recounted in his interview, "*That was when I first got there, yes, that day. That's because Pete, the supervisor, is in the gauge working with the other guy that showed up."* (Day foreman interview, page 44) Speaking more about the day supervisor, the day shift foreman stated in his interview, *"Guys, I don't know, you know, [you] don't know Pete but he's a --he's a worker, and you know, you actually say he's like your best trackman really sometimes. But we do tend to disagree on the manpower situation, because he feels you don't need it and he'll go, he'll jump in there and do the [trackman/laborer] work, and that's typical of him."* (Day foreman interview, pages 44-45)

The night Assistant Supervisor recounted that he left the jobsite at the end of his shift Sunday morning around 6:45-6:50 am. He had a brief conversation with the incoming day supervisor before he left. The day shift supervisor was observed working with the backhoe by the incoming day foreman when he arrived a little after 7:00am. "*Pete was in 2 track right next to the backhoe." "...he was digging and when I walked by, I might talk to him for a little bit. Like I said, I told him that the ties*

were all crooked, you know, stuff like that. That had to be straightened or, but now he was busy digging out the dirt underneath the ties." (Day foreman interview, pages 96-97)

The interviews evidence a lack of communication and coordination between the night and day shift supervisors. Manpower decisions were made by the day supervisor without notification or discussion with the night shift supervisor. Although SSDs were required by Amtrak rules, there was insufficient managerial/supervisory oversight and enforcement of the rules. SSD were not in use during either the day shift or the night shift.

The evidence also suggests that at the critical time of the shift change, there was apparently no management/supervisory oversight of the foul time and Form D transfer, shift change, job briefing, or on-track safety briefing.

Proposed Findings

I. The night foreman was inexperienced (He was a welder foreman with approximately four (4) months of foreman experience) and never before worked as foreman/EIC of the vacuum train and ballast removal operation. This was a complex operation that would challenge even an experienced, well-seasoned foreman/EIC.

II. There was no Site-Specific Work Plan (SSWP), and no associated job hazard analysis, developed for the 55-hour ballast removal/replacement project. The project was complex as there were multiple crew shift changes, multiple transfers of Form D authorities and fouls between multiple EICs and dispatchers, impromptu changes in personnel work shift hours, known problems with radio communications in that area, the expectation that all four tracks would need to be periodically occupied/fouled during the project, and that passing trains would be operating at maximum authorized speed (90 to 110 MPH) through the work area during the 55-hour outage.

III. There was a significant lack of management and supervisory oversight of the project, particularly as it relates to the use of SSDs and the transfer of authorities and fouls between outgoing and incoming foreman/EICs. The night assistant supervisor was released from the job site by the day supervisor at approximately 6:45 – 6:50 am on the morning of April 3, prior to the fouls being released and prior to the arrival of the day foreman and day shift crew. According to testimony, the day supervisor was performing trackman/laborer work next to the backhoe during the time of the morning shift change, authority transfers, and fouls release.

IV. The foul time held by the night foreman was released via cell phone at approximately 7:28am. Radio interference/static prevented him from communicating with the dispatcher via radio. As a result, there was an unintended loss of 'situational awareness' among the work crew with respect to the release of fouls.

V. There was no "hold" procedure established at Amtrak for the "seamless transfer" of fouls from one foreman/EIC to another foreman/EIC.

VI. At the time of the accident, the backhoe operator and supervisor (decedents) were located on and within the foul of track 3 where they were authorized to be located under foul time protection. There is no indication they were aware that the foul time protection they were reliant upon for on-track safety was released.

VII. Train 89 was routed onto track 3 by the dispatcher and was operating in compliance with the rules as it approached the accident location under a clear signal indication.

VIII. No Supplemental Shunting Devices (SSD) were in use at the time of the accident on the track occupied by the backhoe. There is no evidence that SSDs were used at any time during the duration of the project.

IX. The day shift watchman blew his horn and raised his banner (paddle) upon the approach of Train 89. He tried desperately to warn the backhoe operator and supervisor that the train was on their track 3. Just prior to impact, the watchman ran in the direction of the on-coming train to protect himself from the eminent danger of the collision.

X. There is an absence of a just and mature safety culture at Amtrak and a resultant lack of communication, collaboration, cooperation, and trust between labor and management.

XI. Drugs or alcohol played no role in the severity or cause of the accident.

Proposed Probable Cause

BMWED proposes that the probable cause of the accident on April 3, 2016 was Amtrak's failure to utilize and enforce the use of Supplemental Shunting Devices, and the related failure to develop and administer a Site-Specific Work Plan (SSWP) for this significant project.

There were numerous contributing factors implicated in the accident including:

(1) The inexperience of the night foreman/EIC in overseeing such a complex and unfamiliar operation;

(2) The failure of the night foreman, due to inexperience, incomplete 2-way communications between various parties, and possible fatigue (stormy night; wet, cold and windy), to clear the backhoe from the track prior to releasing the foul time;

(3) The incomplete and unclear communication between the day and night foremen regarding the transfer of fouls during the shift change, and the incomplete and unclear communication between the night foremen and the dispatcher regarding release of the foul time;

(4) The absence of a formal "hold" procedure for the seamless transfer of foul time authority between foremen/EICs and the dispatcher during a shift change;

(5) The unrecognized degradation of situational awareness brought about by the use of cellphone rather than railroad radio broadcast to release foul time;

(6) Insufficient management oversight on the use and enforcement of SSDs, and the absence of general supervision/oversight during the shift change and transfer of authorities;

(7) The failure of Amtrak to have a written program of instruction, criteria, and training for the development of SSWPs;

(8) The failure of management to conduct a comprehensive job hazard analysis, within the context of a broader SSWP, to address the use of SSDs and the complexities of the 55-hour ballast removal/replacement project; and,

(9) The absence of a formal process to cease all work, gather the incoming crew, and perform a comprehensive job briefing & on-track safety briefing in conjunction with the shift change and transfer of track authorities and foul time.

While any of the 9 items listed above could be seen as the "single point of failure" causing the accident, the absence of a comprehensive SSWP and the related lack of redundant signal protection provided by a SSD ultimately lead to the tragic collision between Train 89 and the backhoe. The combination of the night foreman's inexperience and possible fatigue, communication deficiencies, and procedural lapses all would have been mitigated and the accident prevented had the rules requiring the use of SSDs been applied and enforced. Application and enforcement of the SSD requirements would have been identified as a critical safety measure in any comprehensive SSWP/job hazard analysis, had one been conducted. The absence of a strong and mature safety culture at Amtrak relates directly to the absence of a comprehensive SSWP/job hazard analysis.

Human error clearly played a significant role in the accident. However, the redundant protection provided by an SSD would have prevented human error from manifesting into the collision between Train 89 and the backhoe. This is exactly why the rules require the use of SSDs. Thus, BMWED concludes that the failure to use SSDs, and the related failure of Amtrak to conduct and

administer a SSWP/job hazard analysis--which would have identified the safety-critical need for SSDs -- is the probable cause of this tragic accident.

The Assistant Division Engineer hit the nail on the head when he said in his interview:

> *"But it's painfully obvious that, you know, what happened on Saturday, if I understand it correctly with John just showing up at the job site sometime after 7:00, between 7:00 and 7:15, and Will being there, obviously, supplemental shunting devices, definitely in my opinion, would have prevented this whole tragedy. Regardless of what Will did after the fact, you know, whether he gave the track back or the foul back, that's forget -- not the track, but like, you know, Will giving the foul back, you know, regardless if he gave it back or not, if he gave it back and we had a shunt on, you know, we would not be sitting here today, in my opinion."* (Asst. Division Engineer, page 18, emphasis added)

The first shift train dispatcher also independently reached the same conclusion when asked during his interview what could have been done to prevent this accident:

> *"I think that when they have a track out of service and they're filing [fouling]an adjacent track with equipment, with equipment, shunting devices should be put down behind that equipment regardless, with the file [foul], because had a shunting device been put down, the best 89 would have got was a stop and proceed. That's the best he would have got and possibly no C [signal], and then everybody would have known why this train is not getting a signal, instead of running into the back of that equipment*. (First shift dispatcher interview, page 77, emphasis added)

Post-accident, due to the safety-critical necessity of redundant signal protection, FRA issued a final rule on June 10, 2016, Roadway Worker Protection; Miscellaneous Revisions (Docket No. FRA-2008-2016) requiring railroads to assess and adopt provisions for redundant signal protection in signalized territory. FRA noted in its preamble to the final rule:

> *"NTSB issued Safety Recommendation R–08–06, after a 2007 accident near Woburn, Massachusetts in which two Massachusetts Bay Transportation Authority (MBTA) maintenance-of-way employees died. At the time of the accident, MBTA's rules required roadway workers to shunt track circuits to provide redundant signal protections to prevent trains or other rolling equipment from entering working limits…. In Safety Recommendation R– 08–06, NTSB recommends that FRA '[r]equire redundant signal protection, such as shunting, for maintenance of way work crews who depend on the train dispatcher to provide signal protection.' In 2013, NTSB reiterated Safety Recommendation R–08–06 to FRA after an accident in which a Metro-North maintenance-of-way employee was struck and killed by a train in Connecticut." (Federal Register, Vol 81, No.112, June 10, 2016, page 37859)*

The FRA final rule, which becomes effective on April 1, 2017 adds a new paragraph (b) to 49 CFR part 214.319, Working limits, generally, as follows:

> *(b) Each Class I or Class II railroad or each railroad providing regularly scheduled intercity or commuter rail passenger transportation that utilizes controlled track working limits as a form of on-track safety (under §§ 214.321 through 214.323) in signalized territory shall:*
>
> *(1) By July 1, 2017, evaluate its on-track safety program and identify an appropriate method(s) of providing redundant signal protections for roadway work groups who depend on a train dispatcher or control operator to provide signal protection in establishing controlled track working limits. For purposes of this section, redundant signal protections means risk mitigation measures or safety redundancies adopted to ensure the proper establishment and maintenance of signal protections for controlled track working limits until such working limits are released by the roadway worker in charge. Appropriate redundant protections could include the use of various risk mitigation measures (or a combination of risk mitigation measures) such as technology, training, supervision, or operating-based procedures; or could include use of redundant signal protection, such as shunting, designed to prevent signal system-related incursions into established controlled track working limits; and*
>
> *(2) By January 1, 2018, specifically identify, implement, and comply with method(s) of providing redundant protections in its on-track safety program.* (Federal Register, vol. 81, No. 112, June 10, 2016, page 37887)

It is readily apparent from the accident investigation record, and the FRA's post-accident rulemaking, that redundant signal protection such as that provided by SSDs is critical to railroad and employee safety, particularly in high-speed territory such as the NEC.

Proposed Recommendations to Amtrak

1. Emphasize and enforce the rules requiring use of SSD's anytime equipment is fouling a track for more than 5 minutes.

2. Conduct effective training on the use of SSDs and develop procedures for efficiency testing engineering employees and dispatchers on the use of SSD.

3. Require dispatchers to ask about, and foreman/EICs to verify, the use of SSDs anytime equipment will be fouling a track for more than 5 minutes. In such cases, the dispatcher must withhold making the foul time effective until it is verified between the parties that a SSD is applied and a Track Occupancy Light (TOL) is displayed on the dispatcher's terminal. When fouls are being released, the dialogue must require the EIC to state unequivocally that "all

employees and equipment are in the clear," and for the dispatcher to repeat/verify, "all employees and equipment are in the clear" before transmitting an effective time of the fouls' release.

4. Restore the rule requirements and procedures for SSD use back into the RWP manual, and retain the same rule under the NORAC rules, so that all roadway workers as well as all NORAC qualified employees, including dispatchers, have access to the same rule.

5. Develop a Site-Specific Work Plan (SSWP) for every continuous track outage where transfer of track authorities and fouls between work shifts will occur.

6. Develop training and a formal written procedure for the transfer of foul time when work shifts and/or foremen/EICs change, similar to the "hold" procedures currently in place for the transfer of Form D authority from an outgoing foreman/EIC to an incoming foreman/EIC. The written procedure should require both incoming and outgoing Foremen/EICs to communicate with the dispatcher together so all persons involved in the movement/withholding of trains and equipment are involved in the same discussion.

7. Develop a formal procedure for work shift changes/transfers that would allow all incoming employees to gather together for the job-briefing, on-track safety briefing, and a discussion/verification of the transfer of Form D authorities and foul time, prior to commencing work or fouling any track.

8. Assure that inexperience employees, especially new foreman/EIC, are properly trained, field-mentored, and supported with sufficient oversight during the process of gaining requisite experience and knowledge.

9. Identify railroad radio "dead spots" along the NEC and rectify them through upgraded radio equipment, the installation of radio "repeater" stations, and/or other technological upgrades to assure the efficacy of radio communications throughout the NEC.

10. Develop procedures for, and management/supervisory oversight of, continuous track outages involving multiple shift changes. The role of supervisors and managers should be focused exclusively on supervising, managing, and overseeing the overall operation.

11. Review and improve engineering employee training programs and delivery (i.e., content, duration, knowledge transfer, and applicability). Assure that trainers have practicable and relevant field experience in the areas and subject matter they are teaching. Assure that all trainers understand adult learners and employ adult teaching techniques.

12. Review and improve engineering employee training in the delivery and conduct of job briefings & on-track safety briefing.

13. Work with the engineering unions in a cooperative and collaborative manner to improve safety culture & railroad safety, enhance the effectiveness and utilization of the safety liaisons, and implement a mutually acceptable, non-punitive, close call reporting system for engineering department employees.

These comments constitute BMWED's proposed findings, proposed probable cause, and proposed recommendations pursuant to 49 CFR §831.14(a). BMWED appreciates the opportunity to participate as a party to this investigation.

Respectfully

Director, BMWED

Enclosures (2)

CERTIFICATE OF SERVICE

I hereby certify, on this date (3/10/17), I have electronically served Mr. Ryan Frigo, NTSB Investigator-in-Charge [redacted] and the Party Spokespersons listed below, a copy of the BMWED's "Proposed findings, Proposed Probable Cause, and Proposed Safety Recommendations" in the matter of Amtrak Train 89 Collision with a Backhoe and Engineering Employees near Chester, PA on April 3, 2016; NTSB Docket No. DCA16FR007.

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Respectfully,

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Rick Inclima
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