UNITED STATES OF AMERICA

NATIONAL TRANSPORTATION SAFETY BOARD

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Investigation of:	*	
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CONRAIL DERAILMENT/HAZARDOUS	*	
MATERIAL RELEASE	*	Docket No.: DCA-13-MR-002
PAULSBORO, NEW JERSEY	*	
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Telephonic Interview of: HANS HEIDENREICH

Thursday,
December 13, 2012

The above-captioned matter convened, pursuant to notice.

BEFORE: CYRIL GURA
Accident Investigator

APPEARANCES:

CYRIL GURA, Accident Investigator
Safety Engineer
National Transportation Safety Board
Office of Railroad, Pipeline and Hazardous Materials
DuPage Airport

[redacted]

JOSEPH GREGOR, Electronic Engineer
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DAVID KILLINGBECK, Chief Engineer Structures
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TIMOTHY TIERNEY, Vice President and Chief Engineer
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THOMAS BILSON, Assistant Chief Engineer
Maintenance of Way and Structures
Conrail

CAMERON CHASTEN, Chief
Engineering Management Branch
Philadelphia District
Army Corps of Engineers

I N D E X

I N T E R V I E W

(9:10 a.m.)

MR. GURA: Okay. This is Cy Gura with the National Transportation Safety Board. It is December 13th at about 9:10 a.m. and we are going to interview Hans Heinrich [sic], who is a contractor that provides a service for Conrail on their bridge. And I will identify myself as Cy, C-y, last name Gura, G-u-r-a.

Hans, please identify yourself.

MR. HEIDENREICH: I'm Hans Heidenreich, H-e-i-d-e-n-r-e-i-c-h; first name Hans, H-a-n-s. I run Heidenreich Associates, Incorporated. I'm involved in upgrading and renovating moveable bridge control systems. In the past 20 years, we have done more than 20 bridges on the East Coast all the way to the Chicago area.

MR. GURA: Okay. The next person that will be talking is Joel [sic] Gregor. Joel, will you please identify yourself for the record?

MR. GREGOR: Joe Gregor, J-o-e, G-r-e-g-o-r. I work in the Recorder Division at the NTSB.

MR. GURA: Second would be Tim. Please identify yourself.

MR. TIERNEY: Yeah, Tim Tierney, Chief Engineer for Conrail.

MR. GURA: Next would be Tom. Please --

MR. BILSON: Tom Bilson, T-h-o-m-a-s, B-i-l-s-o-n, Assistant Chief Engineer, Maintenance of Way and Structures,

Conrail.

MR. GURA: Dave?

MR. KILLINGBECK: David Killingbeck, D-a-v-i-d, last name, K-i-l-l-i-n-g-b-e-c-k. I am Chief Engineer Structures for the Federal Railroad Administration.

MR. GURA: Next, Cameron?

MR. CHASTEN: This is Cameron Chasten. I work with the Army Corps of Engineers. I am assisting NTSB as a structural engineer. I'm the Chief of Engineering Management Branch in the Philadelphia District for the Corps. Cameron is C-a-m-e-r-o-n. Chasten is C-h-a-s-t-e-n. Over.

MR. GURA: Okay. Next we have Tom Noon.

MR. NOON: Thomas Noon, T-h-o-m-a-s, Noon, N-o-o-n. I am Federal Railroad. I am a signal inspector.

MR. GURA: Okay.

INTERVIEW OF HANS HEIDENREICH

BY MR. GURA:

Q. Okay. We're back to you, Hans. That's all the people that will be asking you questions in a sequence. And basically, getting back to your job as a contractor for Conrail, how did you get involved with the bridge most recently? Did you receive a call from Conrail saying that they're having problems with the bridge, and when did you go there to investigate the problems?

A. Just hold on a second. I went on there on 11/13 and on 11/20 -- on 11/13 as well as on 11/20. I went there on originally

other details, not the bridge. There was time left over, so it was a side effort to try to identify the problem which they had recorded to me after Sandy.

The problem that was recorded was that the north span bridge link, the track link actuators, did not indicate a retracted position, so the automatic sequence could not continue and the bridge got stuck in the closed position -- not closed -- lined-up position, yet the links were retracted. The local testing on 11/13 as well as 11/20 revealed that a fault latch was set in the control program telling me that after the link actuator motor stopped, there was no signal, that it was retracted.

Subsequently, we simulated this with our train going over this, and the system worked. It was intermittent. The assumption I made at this time was that possibly a train coming -- going south and going over the locking bars would exert in some fashion pull on them and made the limit switches in the actuator lose contact. The actuator limit switches are redundant. There are two normally open and two normally closed contacts for each position. Both normally open contacts will be active and both normally closed contacts are active in either position. The normally closed contacts are stopping the drive and the normally open contacts indicate positive positions. The fault routine investigates -- the original program investigated continuously the condition of the nth (ph.) limits.

What I did is, to make sure that no train is up there, I

limited the interrogation time only when a signal was given, an open or closed signal. So before you gave an open signal or closed signal, you arm the fault logic. So the idea was this could possibly solve the problem. Well, it didn't. It didn't, and it was reported to me on 11/20 that it still does the same thing. So it was an intermittent problem.

So I recommended to the local, the Conrail man, to check the junction box at the pivot point for possible water problems. This junction box, which is to the left side of the pivot point, is at the bottom. It's a flat box. It's at the bottom of the track tie. So the water supposedly has gotten up to that point during Sandy. And that is actually all that I have to say. If the track -- if the span locks are not extended, then you, you can't get the passage signal.

Q. Okay, Hans. Were you there -- did he check that box while you were present?

A. No, no, no. I -- no, I wasn't there long enough. I was a couple of hours there and then I left. I mean, I didn't check the boxes. That's actually electrician work.

Q. Okay. And did you give any recommendations to Conrail or anything like that to close the bridge and keep it closed or manually lock it in place, or anything of that nature?

A. Yeah, that obviously is always a recommendation, yeah.

Q. So, no, what was your recommendation to Conrail and who did you give it to? What did you say to them, besides check the

electrical box?

A. Well, we were about 10 days away from keeping the bridge closed. As of December 1st, the bridge is locked and closed because the pleasure boat harbor there, you know, there is nothing going on. So I recommended to them to talk to the harbor guy and keep the bridge closed until the problem is resolved.

Q. Okay. In your opinion, then, the problem was more on the electrical side; is that correct? Am I understanding you correctly?

A. Well, of course, it was -- it could also be mechanical reason for this. That's not determined yet.

Q. Okay. Okay. It wasn't determined whether it was electrical or mechanical, but you --

A. It was not determined. All we know is if you do not have the limit switch feedback, you are stopping the sequence.

Q. Okay.

A. So if a command is given, you have to get a positive feedback that it has been executed correctly.

Q. Okay. On the mechanical side, did you investigate anything with the hydraulic ram or the filter in the hydraulics system?

A. No. There was no problem on that.

Q. Okay. Going back to the recording of this in the -- I'm going to call it just the PLC, for program logic controller?

A. Right.

Q. Program logic controller, and I'll just refer it to PLC. As this information is being recorded in the PLC, is that data preserved for a while or is it just when you make your adjustments?

A. Yeah --

Q. Go ahead.

A. The fault logic is set up such that any fault is stored in retentive memory. And this is derived from a fault latch, which not only indicates on the message display, but it prevents further action so that a bridge control system cannot self-destruct. So if you do not see that an action has been -- has taken place, you shut off that action. So the next step in the action, which would have been slewing the span out or -- no, first raising the span and then slewing it out, because that would jam, possibly, if the locks aren't retracted, would do damage to the mechanicals.

Q. Okay. And then that PLC, then, that is the program that you put into the PLC for the logic for what it needs to do and how to do it?

A. Correct.

Q. Okay.

A. Let me repeat what the sequence is. The bridge is open. When the train is off the block, the system initiates a bridge close command which swings the span into the closed position until the closed position is confirmed by switches. If that is the

case, it lowers the span onto the seat. And again, if this is confirmed, it extends the locks.

Now, if we open the bridge, the whole process goes backwards. The opening command retracts the locks. If the retraction command is executed corrected by limit switch feedback, it then raises the span, and then the span slews out until it's open. This has to be executed in a certain time plus 15 percent, approximately. If the command that the bridge is open doesn't fulfill that time limit -- it's called a watchdog timer -- a fault annunciation is given on the local display, "bridge failed to open" or "bridge failed to close," and it's also transmitted via voice to the train engineer.

Q. Okay, Hans. So there is some interconnection between the PLC and the track signal circuit?

A. Yes, definitely.

Q. Okay. And did you have the signal circuit then troubleshot also to see if there was any problems with the shunting or the passing, or would that have anything to do with the PLC at all?

A. That has nothing to do with the PLC. There's a duplication of signals. The bridge control details or components, like the cam limit switch in the actuator, they pass on this information on to the signal system in the form of a common and detailed trouble command; on top of it, totally independent signal switches from the signal department making sure that the span is

closed and locked.

Q. Okay. And then what you're telling me, then, is the interaction or interfeed between the signal system and the bridge system, the PLC, if there is an indication by the bridge system that something through the limit switches or the proximity switches, the signal system will display a red signal or stop signal?

A. Correct.

Q. And the only way that it would change to any other, like, a proceed signal, is once those conditions on the bridge have been corrected?

A. That is correct.

Q. Okay. Now, once a train passes through that area, it would do the exact same thing? Once it clears the bridge, it tells the signal system the reverse, "we are now clear," and then the bridge has to operate for the signal system to display something else?

A. Correct.

Q. Okay. I have no further questions.

MR. GURA: I'm going to pass it on to Mr. Gregor, Joe. Will you please identify yourself for the record and ask any questions?

BY MR. GREGOR:

Q. Yeah, Joe Gregor again from the Recorder Division at the NTSB. Hans, first thing, can you tell me what retentive memory

actually is?

A. Retentive memory is a memory block inside the PLC which retains output bits in its position, and that is battery-backed.

Q. Okay. And was there a backup battery in the PLC? Do you know?

A. Every PLC has a battery backup.

Q. Okay. And do you know how long that would last in the event it was shut down, how long it would maintain the data?

A. I had batteries last 5 years. So these are lithium batteries which need to be replaced every couple of years, but, you know, it is also annunciated if the battery is low; you get a warning.

Q. Okay. So it's battery backed-up RAM is that design?

A. Yeah.

Q. How deep is the -- I guess you're maintaining a queue of errors somewhere, the last X number of errors? How deep is that queue?

A. We can -- the queue, you can have over 250 -- I think 254 messages can be queued, which is -- actually, you would have to have every fault come on, which is, you know, just hypothetical and it's not going to happen. But there is no limitation, practical limitation on the number of messages. The message system works such that any new fault, the first new fault, is freezing the display and shows the message with a number. The message list is part of the operating instructions. So if you

just record the number, you look in the list, and it tells you what the problem is.

Now, if one fault triggers another fault, that fault would be in the queue. So in order to read them, you need to first push the acknowledge button, which puts the frozen fault indication on the queue, and then, with a 2-second interval, it sequentially shows everything that's in the fault list.

Q. Okay. So once you've done that, you've seen every fault that's recorded in the system?

A. Right.

Q. Okay. Now, you're talking about a secondary box that's talking to the PLC that's displaying these errors?

A. No, no, no, no. The entire fault logic design is in the PLC memory. It's part of the PLC logic. The display is a parallel address binary display; 8 bits will do the trick. Whenever the bit pattern changes, it changes the display -- the display.

Q. Okay. After an error code is recorded, does the PLC ladder logic stop until it's been manually reset?

A. No, the ladder logic does not stop. It just internally -- you see, there are about five 16-bit fault words, sequentially, and they indicate -- pass on this information to the display and also form a common output. The display not only shows the faults. It also shows statuses. If you switch to local test, for instance, it tells you on the display that you're in local test.

Q. Okay. So once the problem that created the error was mechanically or electrically fixed in the real world, the bridge would just start operating normally again?

A. The control logic cannot differentiate between a mechanical problem and an electrical problem. It only records what the problem is. What the cause of the problem is, is only in a way that it indicates a switch that did not make, but it does not know whether the switch was not made because of a mechanical problem or because of an electrical problem.

Q. Yeah, I understand. I guess what I'm trying to ask is, you say that when a fault is flagged that the PLC will stop that action so that the bridge can't destroy itself?

A. That's right.

Q. What do you have to do to make it start working normally again after you've fixed the problem?

A. You would have to -- after reading out the faults and making a determination what the problem is, you would reset the fault by pushing the reset button. And then you usually can operate the bridge again.

Q. Right. So if you --

A. Also --

Q. I'm sorry. If you tried to open the bridge automatically and some fault occurred, you would not be able to get the bridge to function again until you had cleared that fault from --

A. That's correct.

Q. Okay. I've got just one more kind of series of questions. We have the fault codes that were written down before the control system was powered down.

A. Right.

Q. Describe to me exactly what would have to happen to cause the, you know, the first one or two of those codes to have been --

A. Okay. I have --

Q. -- (indiscernible).

A. -- to look at them here on pages 14 and 15 and 16 on the fault list. The first fault is number 5, local lockout. That's --

Q. Well, the first one I have in this e-mail was number 45, which is a hydraulic tank low-low oil level trip.

A. Okay. Loss of control power, this was caused by the accident. There's a normally closed contact in the float fish of the tank. If you lose that, you'll get the low-low oil level. And the same thing is for fault number 44.

Q. Okay. What is the difference between those two faults?

A. These two faults are accident-related.

Q. But, I mean, what mechanically or electrically would have to occur to create the -- and what's the difference between -- you have two different faults, so I assume there's something different about them.

A. The control system does not know what's going on outside. It only reacts to signals which should be there but aren't there under certain operating conditions, and display it. So when the accident occurred, from the pictures I've seen, the hydraulic unit was wiped out. It was -- it fell into the river -- this -- you know, ripping out all the cables. So therefore, you didn't have power or you lost the connections to the switches.

Q. Yeah, I understand that. But what I wanted to know was, okay, let's, let's pretend that you don't know about the train crashing, and what would it take -- what signals would the PLC have to see in order to flag a 44 and what signals would it have to see in order to flag a 45, or what lack of signals, whatever? What's the actual logic?

A. Okay. If you have normal oil level, the float will keep a switch closed, and you get a 120-volt signal back into the PLC. Everything is fine. As soon as you disconnect the wire by whatever means to that switch, either the 110-volt incoming, or the outgoing wires, you interrupt that signal. That registers a fault.

Q. And which fault would that register, 44 or 45?

A. Both.

Q. Both?

A. Because both wires went.

MR. GURA: I'm going to interrupt, guys, for a second. I want to clarify something, Hans, and I think what Joe might be

alluding to, when these faults are recorded, are they just recorded in numerical order or are they recorded in a sequence of events happening?

MR. HEIDENREICH: No. They are recorded simultaneously. So let's assume that we have a fault. The first fault is the first one. There's always a first one that freezes the display. Now, remember, the display logic is being manipulated in the PLC logic: new faults or old faults. So if there's a new fault, that causes the fault logic to stop and display only that one fault. But the recording of faults is totally independent of this. It has nothing to do with the display. All fault bits in sequence --

MR. GURA: Okay. That's --

MR. HEIDENREICH: -- it's looking.

MR. GURA: That's what I wanted to clarify. The fault bits are in sequence of occurrences. So if something happens first, that's recorded; then the next event occurs, it's recorded; and so forth and so on?

MR. HEIDENREICH: Yes.

MR. GURA: Okay.

MR. HEIDENREICH: But this goes so fast. Yeah.

MR. GURA: Yup, okay.

MR. HEIDENREICH: It's in the -- this is milliseconds.

MR. GURA: Okay.

BY MR. GREGOR:

Q. Right. Well, let me ask you this. I have a list of

fault codes. They're not in numerical order. So I guess my assumption was that they came in order in which the system saw those faults occur. Is that not true?

A. No. Whatever it is, it has nothing to do with the sequence. You can have fault number 10 frozen on the display, which only means that 10 came in first as far as the PLC is concerned.

Q. Right.

A. And then you have sequentially 5, 19 and anything else.

Q. Right.

A. So from a time-stamp point, the first fault always freezes the display.

Q. Correct. And as you go through the display to write the other ones down, is that the order in which they were flagged by the PLC?

A. Not necessarily.

Q. They're going to come out in some order, obviously.

A. No, no, no. The --

Q. All you -- is that the first code you see is the first one that occurred?

A. Yes. And if you --

Q. Other that, you can't say anything?

A. If you push the acknowledge button, it will put the frozen fault -- it will clear the display, put the frozen fault code on the queue, and then the queue goes in numerical order. So

if you just watch it, you see them --

Q. Okay. Well, we're probably going to have to clarify this point a little further offline, I guess. Can I ask you one more question?

A. Of course.

Q. You do have a different error code for 45 and 44. What is the difference between those two? There must be something. Or is there not?

A. 44 -- yeah. One is a low oil level, and 45 is a low-low oil level trip. So 44 tells you that it's time to top up the hydraulic tank, and 45 shuts you off.

Q. Okay. So they're like two different levels?

A. Yeah.

Q. Okay. Okay. I think that's all I have for now.

MR. GURA: Okay. Next we have Mr. Tierney. Tim, will you please identify yourself and spell your names?

MR. TIERNEY: Yeah, Tim Tierney, T-i-e-r-n-e-y, first name is Tim, T-i-m, Chief Engineer.

BY MR. TIERNEY:

Q. Hans, how you doing? How you doing, Hans?

A. I am okay.

Q. Just a couple questions on the -- one on the faults. Once you clear a fault, is there a memory of the faults that you can -- that are archived, that you can go back and look at over time, or when you clear them, are they gone?

A. No. When you clear them, you're clearing the fault bits in the PLC. These are latches. So once you push the reset button, it clears the -- it clears all the fault -- it's in the PLC program. And therefore, the display goes to the default display, which says Conrail SA Bridge 1370 Paulsboro, and no number on it. It's zero. It's called the default message.

Q. So you can't go back there a month later --

A. No.

Q. -- to look at last month's --

A. We do -- we have this only if we remote control this with a -- from a touch screen.

Q. Okay. So, I guess --

A. Then we log and time-stamp these faults. But this is a small bridge, so it's not -- it wasn't done that way.

Q. Okay. So there's no way of going back and getting an archive of the history of faults for the last 30 days?

A. No.

Q. Okay. And then the other thing is, just so I understand, and I don't -- you understand this better than I, but, you know, I think of a PLC as just a computer. And is this PLC similar to other bridges that you've put PLCs in? I mean, is it very similar as far as --

A. They are all the same. We use the Schneider-Modicon Compact Series on all bridges with the exception of an AK bridge, because that is a different -- was a different bridge, and we just

changed, totally changed the program there.

Q. Okay. So basically, you take a PLC and you write the software to make the -- to control what you want to control that's (indiscernible) each bridge; is that correct?

A. That's right.

Q. Okay. Yeah --

A. But the module is always the same, the method that you always make sure that every single action is tested. So you cannot, you cannot move -- slew a bridge if the track isn't -- the locks haven't fit -- been properly retracted, or any other problem. A brake, you make sure that you get a positive feedback that a brake has opened before you turn on the drive.

Q. Okay. So you kind of go through the design with the same methodology, but --

A. Yes, yes.

Q. -- each bridge has its unique character that you design --

A. Yes, each bridge has its unique character very much so, this one in particular, because it has a hydraulic drive and not a mechanical drive. But, you know, the methods that you apply are always the same.

Q. Okay. All right. That's all the questions I have.

MR. GURA: Next in line would be Tom Billick [sic]. Tom, could you -- you have any questions? And please identify yourself.

MR. BILSON: Tom Bilson. I have no questions at this time.

MR. GURA: Next one would be Dave Killingbeck. Dave, do you have any questions? And please spell your name.

MR. KILLINGBECK: It's David Killingbeck, K-i-l-l-i-n-g-b-e-c-k, and yes, I do have a few questions.

BY MR. KILLINGBECK:

Q. In some photographs that were taken post-accident, Hans, I noted that in the wayside or the trackside boxes where there are push buttons that can be used to open and close the bridge, that there is a fault reset button?

A. That's right.

Q. Is that button active?

A. Yes.

Q. And what does it do?

A. Okay. Let me explain to you what's behind this. There are two boxes. One is for the maintenance crew, which has a double push button, open and close, and a fault button, a reset button, and a light that tells you that you have a fault. And it is locked. This box is totally for maintenance, which requires the bridge to be manually opened or closed. Then we have a second box, which is for the train crew. It has only one button that is for closing the span in case radio communications from a handheld radio cannot be established. So the train conductor or engineer has a key to open this box and push the close button.

MR. KILLINGBECK: Somebody needs to mute their phone where they're running a printer.

MR. HEIDENREICH: I beg your pardon?

BY MR. KILLINGBECK:

Q. I'm not sure whether you were saying something. I heard that the box that was there for the train crew, there's a button that they can go to if there's a radio failure, they push that button, and that causes the bridge to close?

A. Correct. There's also --

Q. And I don't know if something was said after --

A. There's also a fault reset button there.

Q. Yes. That's what I'm asking about.

A. Correct.

Q. What function does that fault reset button perform?

A. It resets the fault latches.

Q. So if a train came up and stopped at the bridge in the proper position --

A. Right.

Q. -- and a member of the crew got down and opened that box and saw the red fault light lit, they can push that fault reset and it allows the bridge to continue?

A. Right.

Q. Does it also --

A. If it is -- if it is a temporary fault or if called that -- a fault condition that no longer exists.

Q. Does it have the same effect as a bridge maintenance person going into the bridge bungalow and pushing the acknowledge button and pushing the reset on the PLC?

A. Yes, it has the same -- it is the same function.

Q. It has the same function? And it is wired? Both boxes, both the maintenance of way box and the train crew box are wired --

A. Yes, they are both -- yup, they're both wired.

Q. Okay. I think you answered this before, and I'm sorry if I'm being repetitious, but when -- once somebody at the PLC pushes "acknowledge" and acknowledges the lock display error code, the code that's locking the display so it's not scrolling, it will then start displaying the list of error codes in a scrolling fashion and those error codes will display in numerical order?

A. Yes.

Q. So that when we had a list of error codes that were found after the accident, that the fact that code 44 was, as I recall, the first one written down, but then it went 44, 45, you know, 77, 78, something like that, and then started -- then went to 5 and continued up, it just was a case of where the person writing them down happened to catch it in the scrolling list?

A. Probably, yes.

Q. Yes. Okay.

A. But if you just watch it, it always goes in the numerical sequence. And when it has gotten to the last fault,

actual fault in memory, it goes to the first fault in memory --

Q. Right.

A. -- and so on.

Q. Okay. It'll keep running through them?

A. Right.

Q. Okay. From the design, the programming logic that you put together, do you recall or do you know the track links, those drive motors, are they equipped with motor brakes?

A. No. These are self-locking worm gear drives.

Q. Thank you. That's what I couldn't find out.

A. Self-locking, and they go 180 degrees. It's a crank drive, 180 degrees one way and they -- so whenever you initiate this, it goes to the next 180-degree point and back. And the crank radius is -- twice the crank radius is a stroke of the locking bar.

Q. Does this reverse direction or does it always --

A. It goes only one way.

Q. Okay. So that if it were to get stuck, were to continue to operate, we would see the track link or the slide rail operate in and out, in and out, in and out continuously?

A. Yes, but the logic wouldn't permit this. It only goes -- you would have to push -- there are two buttons. So you have one button that goes only to that position and the other button goes to the other position.

Q. Okay. Well, my question was if we were to take the

power leads for that motor and run them straight to the appropriate AC power, it would -- it wouldn't operate 180 degrees and stop and ask for a different set of inputs to go the other way? It would just keep going in circles?

A. That's right, yes.

Q. Okay. Earlier on, you were talking about these track actuators having redundant limit switches --

A. Right.

Q. -- and in some cases, both sets of contacts would be open, in some cases closed. Can you explain to me which way is which? Is a contact closed when it's rotated to its proper 180-degree position?

A. Yeah. Visualize a cam switch --

Q. Yes.

A. -- which has about a 20-degree cam till (ph.) there, okay? So it goes around, it makes two switches. These are normally open, normally closed type C switches. So you have two normally open contacts, which go closed when that position is reached.

Q. So when it reaches either its fully-driven or fully-retracted, it closes?

A. Yeah, it closes two contacts on each -- in each position. The normally open contacts are wired in parallel with the option, if you have a problem, that you can isolate it by a switch on the panel. So this is supervised; if the switches are

not going in synchronism, you also get a problem, get a trouble indication.

Q. Okay. This is out of my league, but you were -- you said that there is retentive memory in the PLC?

A. Yes.

Q. But that retentive memory gets cleared every time the reset is pushed?

A. Correct.

Q. Okay.

A. Now, the retentive memory, only if it is programmed to be reset. So all the fault latches have a reset function. There are other fault latches in there that do not have reset. They are reset by program action.

Q. Okay. So if nobody pushed the reset button post-accident, there still should be something in that retentive memory?

A. Correct. I should be able to interrogate the system and find all the fault latches closed which had been recorded.

Q. Are those fault latches, do they contain any type of timestamp?

A. No. There's no timestamp on them.

Q. But they are in the order that, within milliseconds, that they were detected; is that correct?

A. Yeah, they are in the -- but this is immaterial, because that's so fast that, you know, it appears at the same -- it

happens at the same time.

Q. Okay. Let me ask this question, then. If a train had crossed the bridge some hours prior and the -- after the train cleared the circuit, the signal apparatus would send an open request or an open permission back to the PLC telling the PLC to open the bridge --

A. Correct.

Q. -- and the PLC at that point attempts to open the bridge and encounters an error, whether the error is in the action of trying to retract the track link or whether it was a loss of indication from the track link under the action of the previous train, would that still be recorded?

A. Yes.

Q. And then there would be the sequence of rapid fire errors at some point after that when the hydraulic unit got wiped out?

A. Well, you got all -- you got fault 78 and 79.

Q. Which had to do with the track links?

A. No, it has to do with the fact that when the bridge was commanded on the previous passage to open, it did not open. It started the opening process, but it got interrupted because the track links failed to transmit the signals from the cam switch. So that's --

Q. Indicating that they had been fully retracted?

A. That is correct. And that --

Q. And the point of --
A. And that signal, that is also transmitted to the dispatch system.
Q. Okay. The point of commonality of the south track link and the north track link is this junction box located on the bottom of the tie near the pivot?
A. Right. Everything that is on the moving span goes through this junction box.
Q. Okay. Do you know how easily accessible this box is?
A. It is accessible. It has a hinged cover on the top.
Q. Ah, okay.
A. And it is accessible.
Q. Okay. One last question. You said that there's a watchdog timer that will, I guess, trigger an error fault if it takes too long to either open or close?
A. Correct.
Q. What percentage of the normal operating time did you say that was set for?
A. Let me take a look in the control program printout.
Q. I wasn't sure whether you were saying it was a percentage of that or it was a fixed amount, and then you were giving --
A. Well, you usually set at least 20, sometimes 50 percent more, which is not critical. You want to make sure that if there is a problem that is not temperature-related, because on the cold

temperatures it may be a little -- it may take a couple of seconds more. So you generally allow for the bridge to close if it's -- let's assume that the bridge takes the 3 minutes or 2 -- 3 minutes to open or close, you put the fault latch at 4 minutes, and you know --

Q. Okay.

A. -- if it's exceeding 4 minutes, it's -- there's a problem.

Q. Okay. Do you know what the time set on this particular fault latch is, on the watchdog timer?

A. If you want to hold on for a second, I can get the -- okay, hold on. Okay. On network 94, we have a 4-minute opening and a 4-minute closing time limit. So when the automatic sequence logic command comes in for closing and for opening, if after 4 minutes the open or close limit isn't making, you set a fault.

Q. Okay.

A. Okay.

Q. Does -- well, if the first action to open the bridge after a train is to retract the track links --

A. Correct.

Q. -- does this 4-minute time enter into that or --

A. Yes. It includes the entire sequence.

Q. Well, what I'm trying to figure out is if the PLC tells the actuators on the slide links to retract the slide link --

A. Right.

Q. -- and it's waiting for an acknowledgement --
A. Right.
Q. -- how long will it wait for that acknowledgement before it decides that there's a problem?
A. Two seconds.
Q. Two seconds?
A. Right.
Q. So that's -- 2 seconds is the normal --
A. Less than 2 seconds.
Q. It takes less than 2 seconds for that to make 180-degree turn?
A. Right.
Q. Oh, at that point, if it says I got a slide link or a track link error, does that immediately send the signal back to the signal side to broadcast the message that -- failure to operate?
A. No. That sets a fault in the PLC.
Q. And the PLC at that point stops? The logic doesn't continue?
A. The PLC logic then prevents the span to lift.
Q. Right. At what point does the PLC say -- send the signal back saying the bridge is not operated so that the failure to operate broadcast --
A. After another 4 minutes.
Q. Okay. So the failure to operate broadcast takes 4

minutes to occur?

A. Right. So 4 minutes after the last train passed, the signal went out, "bridge failed to open."

Q. Okay. That's all the questions I have, Hans. Thank you very much for your patience and putting up with me.

A. Oh, (indiscernible).

MR. GURA: (On the phone) Hold on one second.

(To the interviewers) Okay. If you're finished, Cameron, do you have any questions?

MR. CHASTEN: Yeah, I just -- I want a -- have a clarification. I have one question and then a clarification.

MR. GURA: Please identify yourself and --

MR. CHASTEN: Want me to spell my name?

MR. GURA: Yeah, please identify yourself and go through it.

MR. CHASTEN: Okay. This is Cameron Chasten, C-a-m-e-r-o-n, C-h-a-s-t-e-n.

BY MR. CHASTEN:

Q. Okay, Hans. I got a question. You said earlier a fault can trigger another fault. Can you give an example of that?

A. A fault can trigger another fault? I think -- well, but we are just -- what we just discussed here is you have the first fault from the track link not indicating a retracted position. That registers on the display. And the next fault is that the bridge didn't open. That also registers on the display. But

you're not seeing the second one unless you push the acknowledge button.

Q. Okay.

A. Okay?

Q. All right. Now, I want to -- it may be redundant, but I do want to clarify something. Just let me give you an example. And I'm not sure that faults could occur in this order, but say -- just say fault 77 occurred on day one, and then the next day, fault 45 occurred. Now, when you look at your display and printout, would that sequence be displayed in the order of 77, 45 or would it be 45, 77?

A. No, it would -- if you today have a fault and tomorrow you have another fault, which doesn't get reset, okay?

Q. Yeah.

A. If you push the acknowledge button, the display goes from the first bit in the first word to the last bit in the last word and then repeats, but only the ones -- only the fault latches in the PLC program which have been set. So it skips everything in between, of course. Make sense?

Q. I think I understand. Okay. I don't have any other questions.

MR. GURA: Tom Noon, do you have any questions?

MR. NOON: Yes, I do.

MR. GURA: Please identify yourself --

MR. NOON: This is Thomas Noon, T-h-o-m-a-s, Noon, N-o-

o-n. I'm with the Federal Railroad Administration. I am a signal inspector.

BY MR. NOON:

Q. I have a couple questions. First of all, I'd like to backtrack a bit. November 13th and November 20th, you were called to the bridge for a problem?

A. Yes.

Q. Okay. First question involving that. The PLC download fault log, can that be recovered for those 2 days?

A. No.

Q. Okay.

A. You cannot. You can only -- because the faults at that time were reset, so they're gone.

Q. Okay. All right. I gathered that. I'm just double-checking on that one. What was the reason that you were called out on November 13th?

A. On November 13th? The same problem.

Q. Yeah, what was the problem, yes?

A. Same thing, bridge didn't open.

Q. The bridge didn't open?

A. It was -- you know, it was an intermittent -- you know, you have to understand, intermittent problems are very difficult to --

Q. Oh, I understand. I've troubleshot --

A. -- to track down.

Q. Yes, yes, I understand. I'm just clarifying things. And on November 20th, it was the same thing?

A. It was the same thing.

Q. Okay. And when you went out there and you were troubleshooting it, could you duplicate the failure?

A. No. I got a call the next day -- I mean, we did not find the problem.

Q. Okay. So you went out --

A. Without --

Q. -- on November 13th and you didn't find the problem, and the problem was that the bridge failed to open, correct?

A. Yes, yes.

Q. Okay. Now, in the very beginning of this conversation, you had mentioned that you may have made an adjustment to the logic?

A. Yes.

Q. Okay.

A. And let me explain to you --

Q. What adjustment was that?

A. It was the adjustment of the supervisory time --

Q. Supervisory time. All right.

A. The original control program, the original control program continuously monitored the north side span lock position in (indiscernible) --

Q. Span lock position, okay.

A. Retracted and extended.
Q. Right.
A. In order to see whether train action, a train passing was causing this --
Q. Oh, I see. Okay.
A. -- yeah, was causing this, I limited the time to the beginning -- from the beginning of the mode closed, the mode open command.
Q. Now, this had -- what you were making adjustments, was not the signal system; it was the bridge system?
A. No, no, that was the PLC system. So instead of checking that supervisory time continuously, I wanted to check it only when no train was on the bridge --
Q. Okay.
A. -- to possibly causing an interruption of that signal. You follow me? It was --
Q. In other words, what you were looking for was that if a train was on the bridge moving, that it would somehow affect the signal?
A. Exactly.
Q. And you found no evidence of that happening?
A. Well, when you have a situation, you are working on suspicions what could cause an interruption of a signal.
Q. Okay.
A. Remember, the signal didn't always fail.

Q. Um-hum.

A. It was there. So could it be that the train was -- a train passage was causing it? Now, once the train is gone, the fault latch is still made.

Q. I see what you're saying.

A. You see? I wanted to prevent this fault latch from staying in when it wasn't necessary, so it was important to make sure that the fault is only recorded when we need to move the span.

Q. Okay. I think I understand that.

A. Yeah. So I was limiting the time during which the fault logic was armed for this from the time a command came in to either close or open the span.

Q. Yes.

A. It still did this.

Q. Okay. So you made the --

A. It was still (indiscernible) --

Q. So you made the adjustment on the 13th, and it basically didn't tell you what you wanted to know?

A. Exactly. It still did not fix the problem.

Q. Okay. So now on November 20th, you came out to the bridge again for the same problem?

A. That's right.

Q. The same intermittent problem?

A. Right.

Q. Okay. And the problem was that the bridge did not open for river traffic?

A. Well, the second time it worked -- you see, I had no -- we did not find a problem then, but it was recorded as a -- it was -- there was a problem, but not during the day. We simulated opening and closing.

Q. Yes. And it failed while simulating an opening and closing?

A. Yes.

Q. And what was the failure with that one?

A. There was no failure.

Q. Oh, I thought you just said there was -- you simulated an opening and closing --

A. No, no, no. It was reported to me that there (indiscernible) --

Q. Oh, okay. There was no failure, but the report said there was a failure?

A. Before I went there.

Q. Before you went there. Okay.

A. Right.

Q. So you -- a failure was reported, you went out there, you -- the bridge was closed, and then you opened the bridge, you closed the bridge, and there was no problem?

A. That's right.

Q. Okay, okay. At this point did you make a recommendation

about anything, about whether you should --

A. Well, you know, the only -- I told them to, you know, if possible, keep the bridge closed until we solve the problem.

Q. If possible, keep the bridge closed until December 1st when it would have been closed anyway?

A. Correct.

Q. Okay. If possible. Okay.

This is a bridge question now, or a signal question. All right, the bridge goes from open to closed, and it raises up a little bit, and then it seats down, and if all the limit switches are working correctly and everything, at that point the rail locks are then driven in; is that correct?

A. Let me repeat it for you.

Q. Okay. No, no, no --

A. When you --

Q. Well, the question I'm asking is if the bridge was not seated, the command to drive the rail locks would not have been given, correct?

A. If the bridge was -- that's correct.

Q. Okay. So it's not seated --

A. Yeah, the control logic is set up so that you cannot incorrectly operate this bridge.

Q. Right, right.

A. The conditions have to be right. So if you have the bridge open, the bridge is only -- can only be open if it is

raised off the seat about --

Q. Yes.

A. -- an inch, okay?

Q. Um-hum.

A. So when you close it now and it goes into the closed position, then the next command is lowering the span onto the seat. But that's also -- now, this is a detail. Hydraulic pressure is maintained at a reduced level in order to keep the bridge against the stop.

Q. Hum.

A. Then the bridge is lowered. Once the lowered condition command is received by the PLC, the span locks are going in.

Q. Right. So if it's --

A. If the span locks --

Q. -- not seated properly, the command to drive the drive locks will not even be given?

A. That's right. Okay?

Q. Okay. That's what I'm heading to.

A. Right.

Q. So the -- although the signal system doesn't indicate what the bridge position is, it does indicate what the rail position is.

A. Right.

Q. So the signal system would say the bridge is unsafe because those rail locks never moved; is that correct?

A. That is correct. There are four track signal switches, which all must be made for the (indiscernible) --

Q. Right, the proximity switches, one on each rail and each side.

A. That's right.

Q. Yes.

A. A pair on the north and a pair on the south side.

Q. Okay. Well, let me ask a question that -- you know, I don't know if this is the right question. Let's assume that the rail locks were not driven at all, okay? Would that bridge be able to move vertically -- I mean, horizontally? Would that piston be able to hold it tight enough so it wouldn't move vertically -- I mean, horizontally -- I'm sorry -- side by side?

A. I wouldn't know that.

Q. Okay.

A. It depends on the lateral forces there.

Q. Yes, I'm -- you know, I don't know, because like I say, I can't figure it out. It's way beyond me.

A. Yeah.

Q. But that's why I was asking. I'm assuming -- you know, as a signal person, I'm looking at those rail locks more than anything else, and what you're saying is if the bridge is not seated correctly, the command for those locks to be driven will not even be given, okay?

A. That's correct.

Q. So, you know --

MR. GURA: Hey, guys --

MR. NOON: -- then of course you can't get a signal if they're not driven.

MR. GURA: Hold on one second here, Tom.

MR. NOON: Okay.

MR. GURA: I got -- you got this conference call for about 3 more minutes. I think we're starting to get into rehashing here, and --

MR. NOON: Oka**y**. All right. I'm done.

MR. GURA: Okay.

MR. NOON: Yup.

MR. GURA: All righty. And since I only have 3 minutes left on this conference call, because I know it'll probably just drop out on us, do we need to reschedule another conference call?

MR. NOON: I'm okay.

MR. GREGOR: If I could ask Hans a question or two offline just to make sure I understand what he said, that's good enough for me.

MR. KILLINGBECK: This is Dave Killingbeck. I'm good. We don't need another call.

UNIDENTIFIED SPEAKER: Conrail is okay.

MR. NOON: Tom Noon. I'm okay.

MR. GURA: Cameron, how about you?

MR. CHASTEN: Yeah, I'm okay. Thank you.

MR. GURA: Okay. Joel, if you would please, then, if you're going to ask Hans a couple more questions, just feel free to do that offline, and what I do need from you, though, if you're going to do this offline, is maybe do a little synopsis of the questions and the answers and send it to me and I will send it out to the parties so we're all inclusive on what transpired.

MR. GREGOR: Yeah. It's just going to be confirming answers we've already heard, I guess. Is that okay, Hans?

MR. HEIDENREICH: That's okay.

MR. GURA: Okay. Well, I appreciate everybody's time here. Hans, I appreciate it. And like I said later -- earlier, I should say -- I will make sure you get a copy of this transcript once it's transcribed, and all the parties that are involved will get a copy of it. So at this case, it is almost 10:30. It's about 10:29. So I'm going to have to conclude this conference call. Thank you.

UNIDENTIFIED SPEAKER: Thank you. Bye.

MR. HEIDENREICH: Okay. Thank you.

(Whereupon, at 10:30 a.m., the interview was concluded.)

CERTIFICATE

This is to certify that the attached proceeding before the

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DATE:	December 13, 2012

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.

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Danielle S. VanRiper
Transcriber