National Transportation Safety Board
Office of Railroad, Pipeline and Hazardous Materials
Washington, DC 20594

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COMBINED

Group Chair's Factual Report

July 23, 2024

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A INCIDENT

Location:	Decatur, AL
Railroad:	Norfolk Southern
Date:	January 31, 2024
Time:	4:15 PM
Struck Train:	A08AA31
Striking Train:	A80AA31

B COMBINED GROUP

IIC	Matthew Thompson NTSB Rail Accident Investigator/ IIC
Assistant IIC	Shane Richardson NTSB Rail Accident Investigator/Assistant IIC
Group Chair	Steve Jenner NTSB Psychologist/Human Performance Investigator
Group Chair	Ben Strot NTSB Rail Accident Investigator
Party Coordinator	Stephen Young FRA Ops Investigator
Party Coordinator	James Hall FRA Motive Power and Equipment Inspector
Party Coordinator	Chris Christianson SMART-TD National Safety Team
Party Coordinator	David Wyatt BLET

	Safety Task Force
Party Coordinator	Randy Hunt Norfolk Southern Railroad Senior Director of Operations Safety
Group Member	Shaun McCoy Norfolk Southern Railroad Division Superintendent
Group Member	Aaron Watkins Norfolk Southern Railroad Superintendent Mechanical Operations

C SUMMARY

See Docket for full description of accident.

D DETAILS OF THE INVESTIGATION

1.0 Prior to the accident

1.1 A08-AA-31

The Norfolk Southern (NS) switch job[1] working on the west end of Decatur yard in Decatur, Alabama was symbolled as the A08-AA-31(A08). The A08 job was a three-person switch crew consisting of one engineer, one conductor, and one brakeman. The crew went on duty in Decatur yard at 7:00 a.m. on January 31, 2024. The day started with gathering paperwork and job briefing on the tasks to be performed that day. The brakeman reported to investigators in interviews that they had a heavy day of switching with track space in the yard limited.

The A08 crew was switching cars from the siding into the yard throughout the day with over 100 cars in the siding. Then conductor stated in interviews with investigators that it was a normal workday and that they normally worked 8-12 hours a day. The last move of the day for the crew was to consolidate CSX cars into track CT10 for the A80 job. The brakeman stated that he made a coupling in CT4 and had crossed over to 10 track to make a cut on the locomotives after they shoved their CSX cars into CT10. The A08 conductor was in a vehicle protecting the shove movement into CT 10 track when the accident occurred.

[1] A switch job generally involves a work force and locomotives in a rail yard or within a customer facility that move rail cars from various tracks to assemble trains.

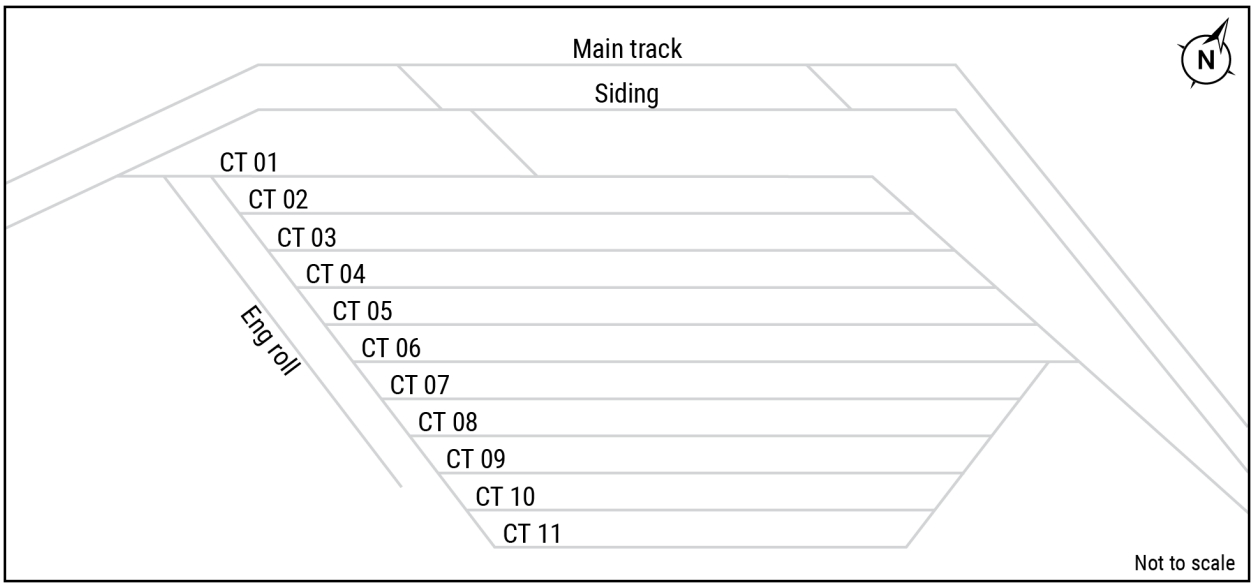


Figure 1- A track map of NS Decatur Yard in Decatur, AL

1.2 A80-AA-31

The NS switch job working on the east end of Decatur yard was symbolled as the A80-AA-31(A80). The A80 job was a two-person switch crew with a student temporarily assigned to them bringing the job up to one engineer, one conductor, and one conductor trainee. The crew went on duty in Decatur yard at 3:00 p.m. on January 31, 2024. The crew started the day in the yard office using the MTR to determine the work for the day, printing track lists, and job briefing.

After job briefing the crew was transported to the east end of the yard by the on-duty utility employee, who then returned to the west end of the yard. When arriving on the east end of the yard the A80 crew had to pull the east engine[2] off a three engine consist in CT8 for their use during switching operations. After retrieving the engine, the crew went to CT 7 track to pull eleven cars out of the track, kicking two cars to CT9 and returning the remainder to CT7. Upon coupling up to CT7 the conductor coupled the air hoses between the locomotive and the first car and cut the air in. He then released the hand brake on the car next to the engine and left the hand brakes on the second and third cars. The conductor instructed the engineer to pull out and the student conductor was positioned at the CT9 switch. As the crew pulled out of CT7 the conductor stated that he noticed the air brakes were still applied to 2-4 cars near the engine and he attempted to bleed them off.

The conductor counted the engineer down to stop at the cut car and states in interviews with investigators that he noticed hand brakes were applied to three cars

[2] Engine, another term for locomotive

that would remain in CT7. He made the cut and pulled the cars east of the CT7 switch and lined the switch down the lead towards CT9. He then gravity rolled the two cars to CT9 and lined the switch back for CT7. The conductor started the move back into CT7 and noticed that the cars had rolled.

1.3 Location of employees

A80-AA-31

- Conductor was near the CT7 track switch on the east end of the yard.
- Conductor trainee was standing at the CT9 switch on the east end of the yard.
- Engineer is in a single locomotive consist on the east lead.

A08-AA-31

- Conductor is at the end of CT10 track ready to protect the shove.
- Brakeman is at the coupling on the west end of CT10 track.
- Engineer is on a 2 unit consist on the west switch lead, facing west

After the A80 conductor rolled 2 cars to CT 9 track he lined the CT 7 switch back to recouple with the cars in CT7. The conductor started the shove move[3] back with a 6 car count followed by the comment that "they rolled back in there a ways" you're still good for at least 10. During this move into CT7 track but prior to any coupling being made by the A80 crew the A08 brakeman sees the cars in CT7 moving west at more than "a creep", and enough to get him concerned. The brakeman radioed his engineer to ask him where he was at on the lead then tells him to "clear that seven rail Flat as quick as you can." The A08 brakeman once again tells his engineer to clear seven rail and the engineer replies "I'm trying."

The A08 brakeman stated that he ran towards the lead to see what was coming out of CT7 and get a better understanding of the situation. The brakeman described what he saw in his interview with investigators.

> And as I take off running, I can see 7 rail come out and it hit our lead engine, our west engine. It hit the fuel tank first. Diesel fuel went everywhere. It was spewing everywhere as I was running up there. And then it started eating that cab up on the engineer's side and just -- it wouldn't stop. It just kept going. And I hollered on the radio to Jason, I believe. I said, get some help, call somebody. And as I said that, I just went ahead, as I was running, and I hit 911 on my walkie-talkie. And I get on up to the engine, and the cars are stopped. They fouled 7. They done their thing and they're stopped now. Our engines are stopped with our cars.

[3] A shove move is to push cars with a locomotive as opposed to pull.

> I run through that diesel fuel. Now I, I crawl up on the motor, and I seen engineer. He was laying on his back right beside the 7 rail and the switching lead, west of our engine. And the cars -- so those cars in 7 are by him and he's laying right beside the 7 rail, flat on his back. There's a big metal box of scrap. I grab it and I throw it out of the way. It was just in my way. I couldn't get to him too good. It wasn't on him; it was just beside him. And he was (indiscernible). He was intact. I thought he jumped off the engine before impact. And I said, thank God you jumped, Flat; thank God you jumped. And I was talking to him, and I got down there on top of him and looked at his eyes. He was -- he had a cut on his head, wasn't too bad. He was bleeding from his head, and bleeding from the back of head, that I found out later. And he was talking.

When the movement had stopped the cars in CT7 track were out on the west switching lead and past the CT7 clearance point by 188 feet. All cars were on the rail with only the west car, UTCX 58840 damaged in the collision. The A08 job's lead locomotive was clear of CT7 track 60 feet east of track CT8's switch points. The locomotive was heavily damaged on the right side but still on the rail.

2.0 Switch Crew Information

2.1 A08-AA-31

Engineer (fatally Injured)	
Age- 55 years old	Certification Date- 6-28-2021
T&E Hire date- 7-11-1995	Last rules training- 1-25-2024
Engineer Promotion Date- 10-21-1997	

Conductor	
Age- 48 years old	Certification Date- 7-1-2023
T&E Hire date- 1-27-1995	Last rules training- 7-28-2022
Engineer Promotion Date- 6-25-2004	

Brakeman	
Age- 47 years old	Certification Date- 10-01-2021
T&E Hire date- 1-27-1997	Last rules training- 5-5-2021
Engineer Promotion Date- 3-16-2005	

2.2 A80-AA-31

Engineer	
Age- 60 years old	Certification Date- 11-01-2021

T&E Hire date- 9-21-1998	Last rules training- 5-18-2021
Engineer Promotion Date- 5-19-2005	Last Eng Performance Check- 9-5-2023

Conductor	
Age- 33 years old	Certification Date- 7-10-2023
T&E Hire date- 7-18-2011	Last rules training- 1-24-2024
NO Engineer Date	

Conductor Trainee	
Age- 38 years old	Certification Date- Not Certified
T&E Hire date- 9-20-2023	Last rules training- 10-6-2023
No Engineer Date	

3.0 Decatur Yard

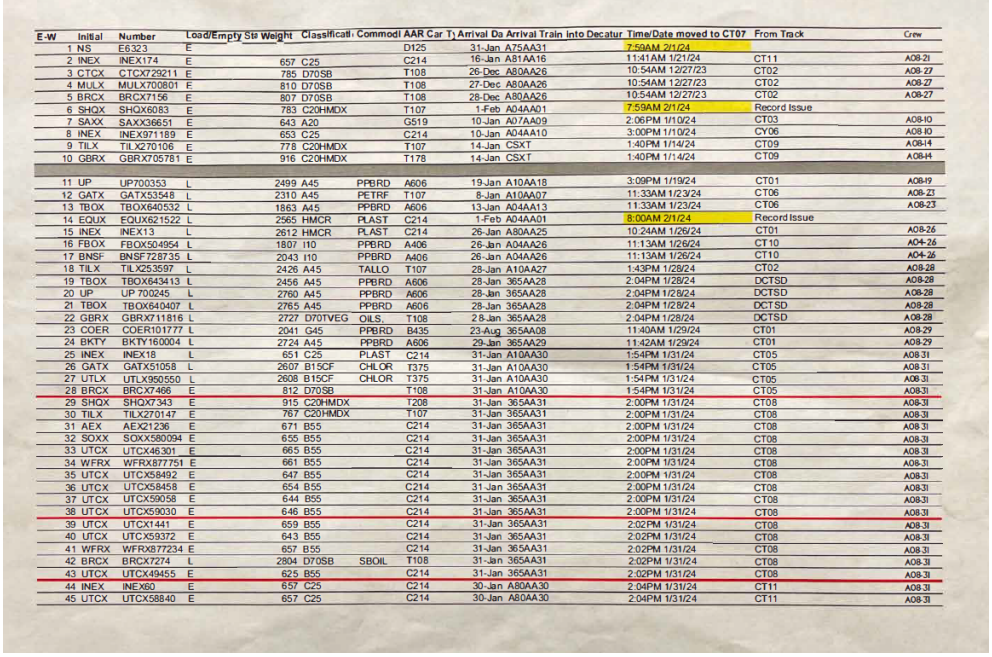
Decatur yard is a Norfolk Southern railroad switching yard in Decatur, Alabama between MP 364A and 366A on the Memphis East Subdivision. The yard consists of 11 tracks-oriented West to East and numbered CT1 through CT11, with a switching lead extending off each end. The grade of the tracks is nominally 0.2% grade, starting at the center of the track and ascending towards each lead, giving the yard a slight bowl like shape. With two switching leads, jobs can simultaneously switch on both ends of the yard but according to NS personnel interviewed this is not a daily occurrence.

In interviews with NTSB investigators, NS personnel stated that 8-yard jobs work in various shifts switching manifest cars. The primary focus of Decatur yard is on building trains to service 48 customers in the local area. The yard personnel are responsible for building one over the road manifest train per day that departs at midnight.

4.0 Cars in Track CT7

The figure below is a list of the cars in CT7 after the accident. Line 1 is on the east end of the yard and line 45 is the car that impacted the locomotive on the west end. The grey box represents the 553-foot gap between the cars A80 was holding onto and the cars they were planning to couple into. The red lines are cars that did not couple when placed into the track creating "butted knuckles."[4]

[4] Butted knuckles are knuckles that are not coupled together.



E-W	Initial	Number	Load/Empty	Sta Weight	Classificati	Commodi	AAR Car T	Arrival Da	Arrival Train into Decatur	Time/Date moved to CT07	From Track	Crew
1	NS	E6323	E				D125	31-Jan	A75AA31	7:59AM 2/1/24		
2	INEX	INEX174	E	657	C25		C214	16-Jan	A81AA16	11:41AM 1/21/24	CT11	A08-21
3	CTCX	CTCX729211	E	785	D70SB		T108	26-Dec	A80AA26	10:54AM 12/27/23	CT02	A08-27
4	MULX	MULX700801	E	810	D70SB		T108	27-Dec	A80AA26	10:54AM 12/27/23	CT02	A08-27
5	BRCX	BRCX7156	E	807	D70SB		T108	28-Dec	A80AA26	10:54AM 12/27/23	CT02	A08-27
6	SHQX	SHQX6083	E	783	C20HMDX		T107	1-Feb	A04AA01	7:59AM 2/1/24	Record Issue	
7	SAXX	SAXX36651	E	643	A20		G519	10-Jan	A07AA09	2:06PM 1/10/24	CT03	A08-10
8	INEX	INEX971189	E	653	C25		C214	10-Jan	A04AA10	3:00PM 1/10/24	CY06	A08-10
9	TILX	TILX270106	E	778	C20HMDX		T107	14-Jan	CSXT	1:40PM 1/14/24	CT09	A08-14
10	GBRX	GBRX705781	E	916	C20HMDX		T178	14-Jan	CSXT	1:40PM 1/14/24	CT09	A08-14
11	UP	UP700353	L	2499	A45	PPBRD	A606	19-Jan	A10AA18	3:09PM 1/19/24	CT01	A08-19
12	GATX	GATX53548	L	2310	A45	PETRF	T107	8-Jan	A10AA07	11:33AM 1/23/24	CT06	A08-23
13	TBOX	TBOX640532	L	1863	A45	PPBRD	A606	13-Jan	A04AA13	11:33AM 1/23/24	CT06	A08-23
14	EQUX	EQUX621522	L	2565	HMCR	PLAST	C214	1-Feb	A04AA01	8:00AM 2/1/24	Record Issue	
15	INEX	INEX13	L	2612	HMCR	PLAST	C214	26-Jan	A80AA25	10:24AM 1/26/24	CT01	A08-26
16	FBOX	FBOX504954	L	1807	I10	PPBRD	A406	26-Jan	A04AA26	11:13AM 1/26/24	CT10	A04-26
17	BNSF	BNSF728735	L	2043	I10	PPBRD	A406	26-Jan	A04AA26	11:13AM 1/26/24	CT10	A04-26
18	TILX	TILX253597	L	2426	A45	TALLO	T107	28-Jan	A10AA27	1:43PM 1/28/24	CT02	A08-28
19	TBOX	TBOX643413	L	2456	A45	PPBRD	A606	28-Jan	365AA28	2:04PM 1/28/24	DCTSD	A08-28
20	UP	UP 700245	L	2760	A45	PPBRD	A606	28-Jan	365AA28	2:04PM 1/28/24	DCTSD	A08-28
21	TBOX	TBOX640407	L	2765	A45	PPBRD	A606	28-Jan	365AA28	2:04PM 1/28/24	DCTSD	A08-28
22	GBRX	GBRX711816	L	2727	D70TVEG	OILS,	T108	28-Jan	365AA28	2:04PM 1/28/24	DCTSD	A08-28
23	COER	COER101777	L	2041	G45	PPBRD	B435	23-Aug	365AA08	11:40AM 1/29/24	CT01	A08-29
24	BKTY	BKTY160004	L	2724	A45	PPBRD	A606	29-Jan	365AA29	11:42AM 1/29/24	CT01	A08-29
25	INEX	INEX18	L	651	C25	PLAST	C214	31-Jan	A10AA30	1:54PM 1/31/24	CT05	A08-31
26	GATX	GATX51058	L	2607	B15CF	CHLOR	T375	31-Jan	A10AA30	1:54PM 1/31/24	CT05	A08-31
27	UTLX	UTLX950550	L	2608	B15CF	CHLOR	T375	31-Jan	A10AA30	1:54PM 1/31/24	CT05	A08-31
28	BRCX	BRCX7466	E	812	D70SB		T108	31-Jan	A10AA30	1:54PM 1/31/24	CT05	A08-31
29	SHQX	SHQX7343	E	915	C20HMDX		T208	31-Jan	365AA31	2:00PM 1/31/24	CT08	A08-31
30	TILX	TILX270147	E	767	C20HMDX		T107	31-Jan	365AA31	2:00PM 1/31/24	CT08	A08-31
31	AEX	AEX21236	E	671	B55		C214	31-Jan	365AA31	2:00PM 1/31/24	CT08	A08-31
32	SOXX	SOXX580094	E	655	B55		C214	31-Jan	365AA31	2:00PM 1/31/24	CT08	A08-31
33	UTCX	UTCX46301	E	665	B55		C214	31-Jan	365AA31	2:00PM 1/31/24	CT08	A08-31
34	WFRX	WFRX877751	E	661	B55		C214	31-Jan	365AA31	2:00PM 1/31/24	CT08	A08-31
35	UTCX	UTCX58492	E	647	B55		C214	31-Jan	365AA31	2:00PM 1/31/24	CT08	A08-31
36	UTCX	UTCX58458	E	654	B55		C214	31-Jan	365AA31	2:00PM 1/31/24	CT08	A08-31
37	UTCX	UTCX59058	E	644	B55		C214	31-Jan	365AA31	2:00PM 1/31/24	CT08	A08-31
38	UTCX	UTCX59030	E	646	B55		C214	31-Jan	365AA31	2:00PM 1/31/24	CT08	A08-31
39	UTCX	UTCX1441	E	659	B55		C214	31-Jan	365AA31	2:02PM 1/31/24	CT08	A08-31
40	UTCX	UTCX59372	E	643	B55		C214	31-Jan	365AA31	2:02PM 1/31/24	CT08	A08-31
41	WFRX	WFRX877234	E	657	B55		C214	31-Jan	365AA31	2:02PM 1/31/24	CT08	A08-31
42	BRCX	BRCX7274	L	2804	D70SB	SBOIL	T108	31-Jan	365AA31	2:02PM 1/31/24	CT08	A08-31
43	UTCX	UTCX49455	E	625	B55		C214	31-Jan	365AA31	2:02PM 1/31/24	CT08	A08-31
44	INEX	INEX60	E	657	C25		C214	30-Jan	A80AA30	2:04PM 1/31/24	CT11	A08-31
45	UTCX	UTCX58840	E	657	C25		C214	30-Jan	A80AA30	2:04PM 1/31/24	CT11	A08-31

Figure 2 - List of cars in CT7. Grey box represents the 553' gap in the track. The red bars represent butted knuckles.

5.0 Securement

Railroad equipment is considered secured when enough handbrakes have been applied to the equipment to prevent it from moving. This number can vary depending on tonnage, grade, weather, hand brake type.

5.1 Regulation 49 CFR 232.103 (n) 1

A sufficient number of hand brakes, to be not fewer than one, shall be applied to hold the equipment unless an acceptable alternative method of securement is provided pursuant to paragraph (n)(11)(i) of this section. Railroads shall develop and implement a process or procedure to verify that the applied hand brakes will sufficiently hold the equipment with the air brakes released.

5.2 Norfolk Southern Securement Rules

5.2.1 NS Operating Rules

5.2.1.1 224 Hand Brakes

(a) When an engine is to be detached, equipment left standing must be properly secured with a sufficient number of effective hand brakes. Air brakes must not be depended upon to hold cars or an unattended engine. After the engine is re-coupled, hand brakes must not be released until the air brake system is properly charged.

5.2.1.2 225 Hand Brake Requirements

Car(s) left standing must be secured with hand brakes as follows:

- 1 car – 1 hand brake
- 2 cars – 2 hand brakes

  * *EXCEPTION: When setting a car off on line-of-road with a defective hand brake, only 1 additional car with an effective hand brake applied will be required.
- Three or more cars – 2 hand brakes, plus a sufficient number of additional hand brakes to secure the cut of cars

NOTE: When applying brakes on cars equipped with multiple hand brakes, all hand brakes on the car must be applied and will be counted as 1 car – 1 handbrake. These instructions do not supersede Special Instructions at terminals and yards.

5.2.2 NS-1Rules for Equipment Operation and Handling

5.2.2.1 C-102. EQUIPMENT LEFT UNATTENDED

Air brakes must never be depended upon to hold unattended standing equipment.

When equipment is left unattended, the following procedure must be performed to determine that the applied hand brakes will secure the equipment with the air brakes released.

Prior to leaving the equipment unattended, all crewmembers must have verbal communication to confirm that the equipment has been properly secured."

EXCEPTION: Division or Terminal instructions will govern where it has been verified that the required number of operative hand brakes will secure the equipment with the air brakes released. However, this provision does not apply to Key Trains or cars meeting the definition of a Key Train. When securing Key Trains or cars meeting the definition of a Key Train, a test must always be performed to determine the applied hand brakes will secure the equipment with the air brakes released.

(a) Securing unattended cars with locomotives detached.

1. When cars are left unattended, at least 1 end angle cock must remain open to ensure that an undesired brake release does not occur.
2. Make a brake pipe reduction sufficient to hold the equipment if the cars are being handled with operative air brakes.
3. Apply sufficient number of hand brakes to secure the cars left standing.
4. Test the effectiveness of the hand brakes on the cars left standing:

a. On a grade descending AWAY from the location where the train separation will be made, or on level grade:

1) Release the automatic brake, if applicable, and locomotive brakes and advance throttle, if necessary, to slowly bunch or push the slack in at the coupler where the uncoupling is to be made.

2) Apply the locomotive brakes when slack has been observed bunched.

3) Observe the car(s) to be left standing for 1 minute to determine that the slack does not pull out or stretch indicating that the handbrake(s) is effective and the car(s) will remain secured.

b. On a grade descending TOWARDS the location where the train separation will be made:

1) Release the automatic brake, if applicable, and advance throttle, if necessary, to slowly stretch or pull the slack out at the coupler where the uncoupling is to be made.

2) Apply the locomotive brakes when slack has been observed stretched.

3) Observe the car(s) to be left standing for 1 minute to determine that the slack does not push in or bunch indicating that the hand brake(s) are effective and the car(s) will remain secured.

c. When grade or tonnage will not permit releasing the automatic brake, after stopping with the slack positioned as required:

1) Close the angle cock in front of the cars to be left standing.

2) Bleed the brake system on the cars behind the closed angle cock.

3) Observe the car(s) to be left standing for 1 minute to determine that the slack does not adjust indicating that the hand brake(s) are effective and the car(s) will remain secured.

d. When grade or tonnage will not permit releasing the automatic brake, after stopping and unable to position the slack as required:

1) Sufficient hand brakes must be applied on the cars that will NOT be left standing to permit the release of the automatic brake to adjust the slack as required.

2) Apply the locomotive brakes when slack has been observed adjusted as required.

3) Observe the car(s) to be left standing for 1 minute to determine that the slack does not adjust with the grade, indicating that the hand brake(s) is effective and the car(s) will remain secured.

5. After determination is made that the hand brakes are effective, the equipment may be uncoupled from the cars to be left standing.

6. When grade and tonnage conditions permit, Engineers will reduce brake pipe pressure to 20 PSI above zero (0) with the automatic brake before locomotive is cut off or any angle cock is turned, when:

a. Trains or cuts of cars being handled with operative air brakes arrive at a terminal where facilities are available and instructions provide for immediate brake inspection.
b. Locomotive is to be detached from any train when the temperature is below 32°F.

5.2.3 Norfolk Southern Timetable Specific Hand Brake Requirements

NS does not currently have a written policy regarding the establishment of location-specific minimum handbrake requirements. Across the system, NS Operating Rule 224/225 and NS-1 Equipment Handling Rule C-102 govern minimum handbrake requirements, and the test procedure to ensure the effectiveness of applied handbrakes, respectively. NS has established certain location-specific handbrake requirements that have been codified as exceptions to OR 225 and/or C-102 in Division Timetables or other Special Instructions. Each of OR 225 and C-102 explicitly provide for such local instructions regarding securement of equipment.

NS provided the following two paragraphs to explain their process for establishing minimum handbrake requirements in locations.

To establish minimum handbrake requirements as exceptions to OR 225 and/or C-102, Division-level leadership from the Transportation and Mechanical Departments arranged for responsible field officers to test handbrakes under a variety of operating conditions involving different equipment types. To establish a local handbrake requirement, the tests were aimed at identifying a "worst case scenario" involving a full track of the heaviest cars/commodity types handled at that particular location. Upon review of the test findings, and in consultation with counterparts in other operating groups, the Division-level Transportation officer would issue a local handbrake requirement for a yard or terminal that would be added to the Division Timetable during the next periodic update.

Location-specific handbrake requirements can take many forms. In some cases, the rule is a specific number of handbrakes in a specific location (e.g. three handbrakes at the east end of Decatur Yard with no required C-102). In other cases, location-specific rules might require handbrakes on both ends of standing equipment with a C-102 test performed, might require all handbrakes to be applied to all cars left standing, or might require no handbrakes at all when alternate securement means like pneumatic skate retarders are in place to prevent cars from exiting tracks. In each case, though, the same level of testing and scrutiny preceded establishment of a deviation from the standard requirements of OR 225 and/or C-102. Where these deviations are currently in effect, long histories of operation without rollout incidents has supported the continued application of the alternate handbrake requirement. Any observed failure of the alternate standard to hold equipment would trigger an immediate reevaluation of the existing requirement.

5.2.3.1 Gulf Division Timetable 1 Memphis East District Section 9 (E) Hand Brake Requirements

6. NEW YARD, DECATUR

A minimum of three (3) hand brakes must be applied to all equipment left in the New Yard at Decatur. The hand brakes must be applied on the east end of each track. A C-102 test of handbrake effectiveness is not required. At the beginning of each shift, a member of each yard assignment will verify that each track is secured with a minimum of three (3) hand brakes before commencing any switching operations in the New Yard.

6.0 FRA Definitions

6.1 Securement

Securement is defined by the FRA in 49 CFR 232.103 (n) as a sufficient number of hand brakes, to be not fewer than one, shall be applied to hold the equipment unless an acceptable alternative method of securement is provided pursuant to paragraph (n)(11)(i) of this section. Railroads shall develop and implement a process or procedure to verify that the applied hand brakes will sufficiently hold the equipment with the air brakes released.

6.2 Hand Brake

Hand brake is defined as a device that can be applied and released by hand to prevent or retard the movement of a locomotive (or car).

7.0 Internal Oversight

NS safety oversight is conducted through a written operations testing program (RP-1) developed by the railroad as required in title 49 Codified Federal Regulations (CFR) Section 217.9, Program of Operational Testing, and Inspections. This regulation requires that railroads have a written testing program and periodically conduct operational tests and inspections of their employees. These tests and inspections determine compliance with and reinforce expectations of operating rules, timetables, and special instructions.

NS managers are required to perform efficiency testing in accordance with the written program contained in the RP-1 document. Review of testing records show that managers performed 16,166 efficiency tests in the Decatur Yard area during the 12 months preceding the accident. There were 893 tests entered that covered rules NS-1 rules 224A and 225 or OR rule C102, as well as blanket securement.

According to the RP-1 program each non-RFE manager at the B3/B4 level is required to perform 20 rules check events per month and test each primary rules check category once per month. Securement is one of the primary rules check categories.

Conductors and engineers are required to be tested on certain rules annually for certification purposes. Securement rules are not included in these required tests. The A80 engineer had been tested on securement type rules 17 times in the last 12 months with no exceptions. The A80 conductor had been tested for securement rules 30 times in the last 12 months with no exceptions.

8.0 Reenactment

On February 3, 2024 the investigative group performed a reenactment on the east end of CT7 in Decatur yard. This reenactment was performed to observe the way equipment moves on the east end of the yard with and without hand brakes applied. There were a few conditions that remained constant through the scenarios, unless otherwise noted (All hand brakes were left applied as found by NS personnel after the incident and the cut in track CT7 was assumed to have been near the clearance point in CT7)

There were 5 scenarios performed:

1. Scenario 1 (hand brakes applied, 29 cars attached to locomotive)
    - The 2 cars that had been kicked to CT9 by the A80AA31 were picked up with the 9 cars that were attached to the locomotive (NS 6323)
    - These 11 cars were coupled to the 18 cars east out in CT7 (up to the butted knuckles) making a cut of 29 cars
    - The locomotive was operated east and a stop was made near the cut location using the engine brake and automatic air brakes
    - Slack was observed running east as the cars were coming to a stop then running back west with the grade
    - No significant movement of the cut was observed after the slack adjusted
2. Scenario 2 (hand brakes applied, 29 cars attached to locomotive, approximate throttle match)
    - The 29 cars were repositioned in CT7 to allow movement of the locomotive and cars east.
    - The locomotive and cars were operated east in CT7, as close as possible to the manner it was operated on the day of the incident, stopping with the engine brake in the approximate cut location
    - Slack was again observed running east as the cut was coming to a stop then back west as the slack adjusted with the grade.

- The cut of cars did not move west more than a few feet before stopping

3. Scenario 3 (Hand brakes applied, 18 cars attached to locomotives)
    - The head 11 cars against the locomotive were set out in another track leaving only 18 cars attached to the locomotive to simulate the cars left standing
    - Cars were pulled east up to the approximate speed on the day of the accident and a stop was made with the engine brake
    - As soon as the move stopped the engine brake was released to simulate the cars being left standing
    - The cars and engine were observed moving west at a slow speed below (estimated) 1mph
    - It was observed that the locomotive weight appeared to be perpetuating the move, but the move did not appear to be accelerating
4. Scenario 4 (hand brakes applied, 18 cars NOT attached to locomotives)
    - The 18 cars in scenario 3 were pulled east at the approximate speed from the day of the incident and a stop was made with the engine brake
    - When the move stopped the pin was pulled with the locomotive stopped
    - The cars detached from the locomotive as the slack ran west and the cars rolled slowly west, stopping 50 feet from the locomotive
5. Scenario 5 (hand brakes RELEASED on the head 3 cars, 18 cars attached to the locomotive)
    - The 18 cars were pulled east at the approximate speed from the day of the incident and a stop was made with the engine brake
    - The cars were left attached to the locomotive with the engine brake released
    - As the slack rolled back west with the grade the cars and engine began to move west.
    - The cars and engine traveled approximately 4 car lengths (200 feet) before being stopped with the engine brakes, the move was accelerating and reached (estimated) 2 mph in the distance it moved

9.0 Recorders

Event recorder downloads were obtained from the NS 1648, NS 6086, and NS 6323. NTSB RE event recorder specialist will provide a separate event recorder factual report.

There was no image recorder data available of the accident, either on board locomotive or stationary yard camera. One locomotive in CT8 track was equipped

with an image recorder but it was not functioning at the time of the event due to inactivity.

10.0 FRA Post accident Testing

All members of the A08AA31, A80AA31, and the utility employee were tested for drugs and alcohol in accordance with 49 CFR Part 40 and part 219. All samples were negative.

11.0 Mechanical

11.1 Equipment Involved

Yard crew A80 consisted of one locomotive; NS 6323. NS 6323 is a 3000 hp SD40E Electromotive Division (EMD) originally built in 1983 and remanufactured 2010, 68 feet 10 inches in length, equipped with a 26L brake system. Yard crew A08 consisted of two locomotives; NS 1648 and NS 6086. NS 1648 is a 3000 hp SD40-2 Electromotive Division (EMD) built in 1974, 68 feet 10 inches in length, equipped with a 26L brake system. NS 6086 is a 3000 hp SD40-2 Electromotive Division (EMD) built in 1975, 68 feet 10 inches in length, equipped with a 26L brake system.

At the east end of track CT07, nine cars were coupled to the west end of locomotive NS 6323. To the west of the locomotive and nine cars, there were 35 cars of mixed manifest freight cars. The 35 cars consisted of 18 loads and 17 empties, weighing approximately 2695 tons. The weight for the 18 cars on track CT10 was approximately 1938 tons.

11.2 Post Accident

Locomotive NS 1648 was positioned just east of Track CT08 switch on track CT10. The right-side fuel tank was torn open the entire length and the right side of the cab. Locomotive NS 6086 was coupled on the east end of NS 1648 and coupled to 18 mixed manifest freight cars. There was no accident damage to any other equipment on track CT10.

Figure 3 - Locomotive NS 1648 that was struck by the rail cars that rolled from the east end of track CT7.

The 35 railcars that rolled west and struck locomotive NS 1648 were positioned at the west end of track CT07, just west of track switch 8. Car UTCX 58840 at the west end of the 35 railcars had damage to the "AL" corner and the "A" end trucks were separated from the carbody.

Figure 4 - The west railcar UTCX 58840 that struck locomotive NS 1648

Hand brakes were set on the three east cars: UP 700353, GATX 53548 and TBOX 640532 on track CT07. Hand brakes were inspected by NTSB, FRA and NS. The NS Mechanical Superintendent brought a pry bar, approximately 4 foot in length, to try and pry the brake shoes away from each wheel of the three cars. There was no movement of the brake shoes, they were tight against the wheel except on the "L4" brake shoe on car TBOX 640532 did slightly move with a lot of force applied. TBOX 640532 (boxcar) has an Ellcon-National Peacock 31000, AAR 1993 handbrake with a long release handle and shallow dish handbrake wheel; UP 700353 (boxcar) has a Klasing 1700, long release handle and shallow dish handbrake wheel; and GATX 53548 (tank) has a Universal (some markings were illegible to get exact model), with long handle release and shallow dish handbrake wheel. All 3 cars had body mounted brake systems, which the handbrake operates all four brake beams when activated. The handbrakes were inspected for defects, proper operation and the brake rigging were inspected for binding and fouling, no defects found.

35 freight cars on track CT07 and 18 freight cars on track CT10 were inspected, FRA defects were present but did not contribute to the accident. Mechanical damage estimates are locomotive NS 1648 $50,000 and freight car UTCX 58840 $11,500, totaling $61,500.

12.0 Yard and Track

The Norfolk Southern (NS) Decatur New Yard consists of 11 tracks and is located at

milepost (MP) 365A on the Memphis East District. This yard is a flat switching yard operation. NS inspects and maintains the yard track near the accident location to the Federal Railroad Administration (FRA) Track Safety Standards (TSS) for Class 1 track, which allows for a maximum operating speed of 10 mph for freight trains.

The West end ladder is constructed with 132 lbs. rail and number 10 self-guarded frogs. The body tracks generally consist of 132 lbs. continuous welded rail (CWR) with anchors applied on every other tie. The track is constructed with 9 inch by 7 inch wooden crossties and 14 inch double shoulder tie plates spaced approximately every 21 inches. The rail is fastened with a spiking pattern of 1 rail gage spike and 1 rail field spike. Gage in the body tracks measured 56 ¼" to 56 ½". These fasteners and anchors are used to maintain gage and alinement of the track as well as restrain longitudinal movement of the continuous welded rail (CWR). The track was supported by granite rock ballast.

There is a 0.2% descending grade on the East end of the yard going West for approximately 2000' before it begins to transition to an ascending grade of 0.2% for approximately 1000'. The accident location occurred approximately 8 feet West of the West CT 8 switch points.

13.0 Interviews

NTSB investigative team interviewed 7 NS employees. On February 2, 2024, 4 employees were interviewed, the utility employee, A80-AA-31 conductor, conductor trainee, and engineer. On February 3, 2024, 3 employees were interviewed, the Decatur Yard trainmaster, A08-AA-31 conductor, and engineer. All interview transcripts are in the docket.

Submitted by:

Matt Thompson
NTSB IIC