Issued: September 18, 2026 Railroad Investigation Report: RIR-26-16

Norfolk Southern Railway Derailment and Collision with Hazardous Materials Release

Location	Browns, Illinois
Date	July 18, 2025
Accident type	Derailment
Striking train	Mixed freight train NS-167 2 crewmembers 2 locomotives 46 railcars
Struck train	Mixed freight train NS-33K 3 crewmembers 2 locomotives 46 railcars
Track	Signalized track
Hazardous materials	Molten sulfur Denatured ethanol
Injuries	2
Property damage	$9.2 million

Summary

On July 18, 2025, about 5:44 p.m. local time, eastbound Norfolk Southern Railway (NS) mixed freight train NS-167D818 (NS-167) derailed 24 railcars as it passed over a spring switch at milepost 139.90W, on the NS Midwest Division, Southern West Subdivision, near Browns, Illinois.[1] The derailed railcars then collided with stationary westbound mixed freight train NS-33KD817 (NS-33K), which was stopped in a siding next to the derailment site.[2] The derailed equipment from train NS-167 included 3 hazardous materials tank cars that breached and released product: 2 tank cars

[1] Visit ntsb.gov to find additional information in the public docket for this NTSB accident investigation (case number RRD25FR019), including detailed factual reports about the circumstances of the accident.

[2] A *siding* is a track auxiliary to the main track for meeting or passing trains.

containing molten sulfur and 1 tank car containing denatured fuel ethanol.[3] (See figure 1.) Two NS crewmembers from train NS-33K, the engineer and an engineer trainee, were injured. The crew of train NS-167 and the conductor of train NS-33K were uninjured. Visibility conditions at the time of the accident were clear with no precipitation, and the temperature was 88°F.

Figure 1. Aerial scene of the derailment.

Train NS-167 was composed of two locomotives and 46 mixed manifest freight railcars, and train NS-33K was composed of two locomotives and 46 intermodal railcars. Positive train control (PTC) was active on both trains.[4]

[3] (a) *Molten sulfur* is classified as a flammable solid (Hazard Class 4.1). (b) *Denatured fuel ethanol*, alcohols (not otherwise specified), is a flammable liquid (Hazard Class 3). (c) A *breach* is when a railcar is punctured by impact from other railcars or rail components.

[4] (a) In the vicinity of the derailment area, NS authorized train movements with an automatic block signal system, where the use of each block is governed by an automatic block signal, cab signal, or both. Train movements were coordinated by a train dispatcher out of Atlanta, Georgia. (b) *Positive train control systems* are overlaid on a railroad's existing signal infrastructure and use communications systems, locomotive-mounted equipment, wayside equipment, and back-office systems to prevent train-to-train collisions, overspeed derailments, incursions into established work zones, and movements through improperly lined switches.

A few days before the accident, on July 14, 2025, an NS track inspection supervisor conducted a monthly track inspection, which included the spring switch at the west end of the Simpson siding at milepost 139.[5] The hand-thrown spring switch mechanism on the West Simpson switch was designed to automatically return the switch points back to their normal position (lined for straight movement) after a train fully passed over it.[6] The West Simpson switch was a No. 14 right-hand turnout about 151 feet in length, equipped with 39-foot stock rails and 22-foot Samson switch points.[7] (See figure 2.)

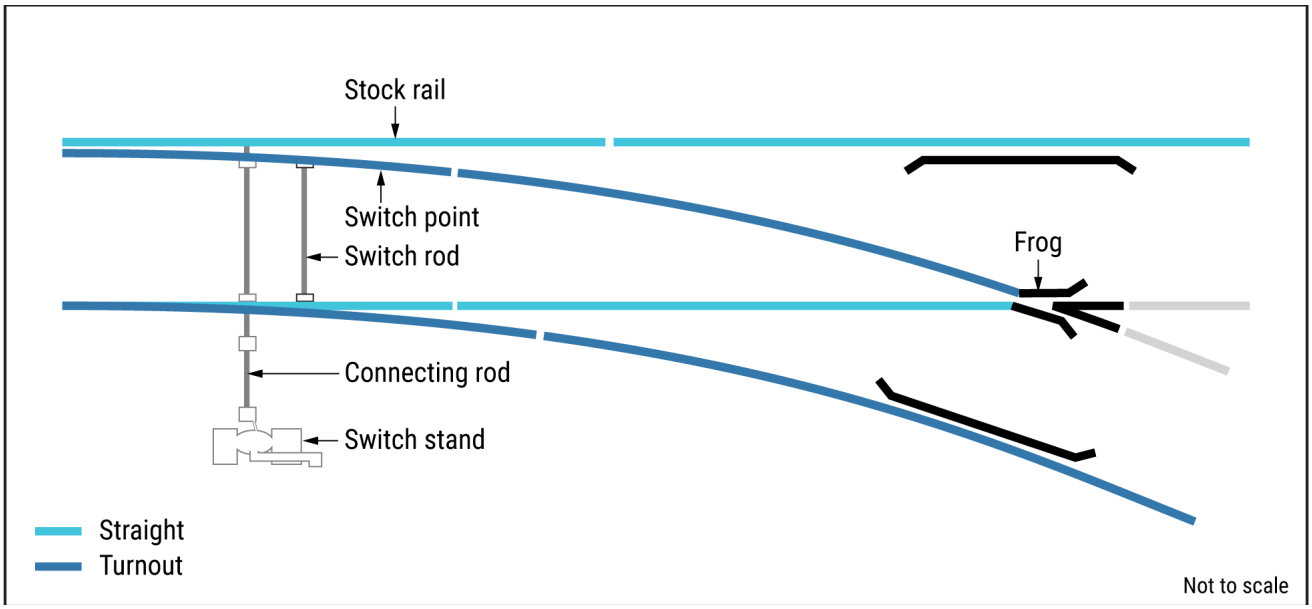

Figure 2. A right-hand turnout.

In an interview with the National Transportation Safety Board (NTSB), the track inspection supervisor stated that he inspected the West Simpson switch on July 14 and noticed that the switch points were not closed fully against the stock rail, as they should

[5] Track inspection frequency requirements are established in Title 49 *Code of Federal Regulations* (*CFR*) 213.235.

[6] A *switch point* is a tapered track rail designed to fit against the stock rail when moved into position by the switch.

[7] (a) A *turnout* is a track arrangement of switch, rails, and a frog that permits a diverging route from a track. The turnout size is designated by a number indicating the distance in feet required for the rails through the frog to diverge by 1 foot; in this case, 14. A *frog* is a track structure used at the intersection of two running rails to provide support for wheels and permit the passage of wheel flanges, allowing the train to cross from one track to another. (b) A *stock rail* is the rail against which the switch point or movable point frog rests. (c) In a *Samson switch point*, one side of the stock rail has been machined at an angle so the point fits securely beneath the top of the stock rail.

have been when the switch was in the normal position. The supervisor observed an unsatisfactory gap of about 1/4 inch between the switch point and stock rail and saw that one end of the spring switch cylinder was contacting a mounting bolt on a switch control box next to the cylinder. He determined that the bolt was obstructing the full movement of the cylinder and preventing the switch from closing fully. Figure 3 shows the switch control box and spring switch cylinder and their wear marks indicative of contact.

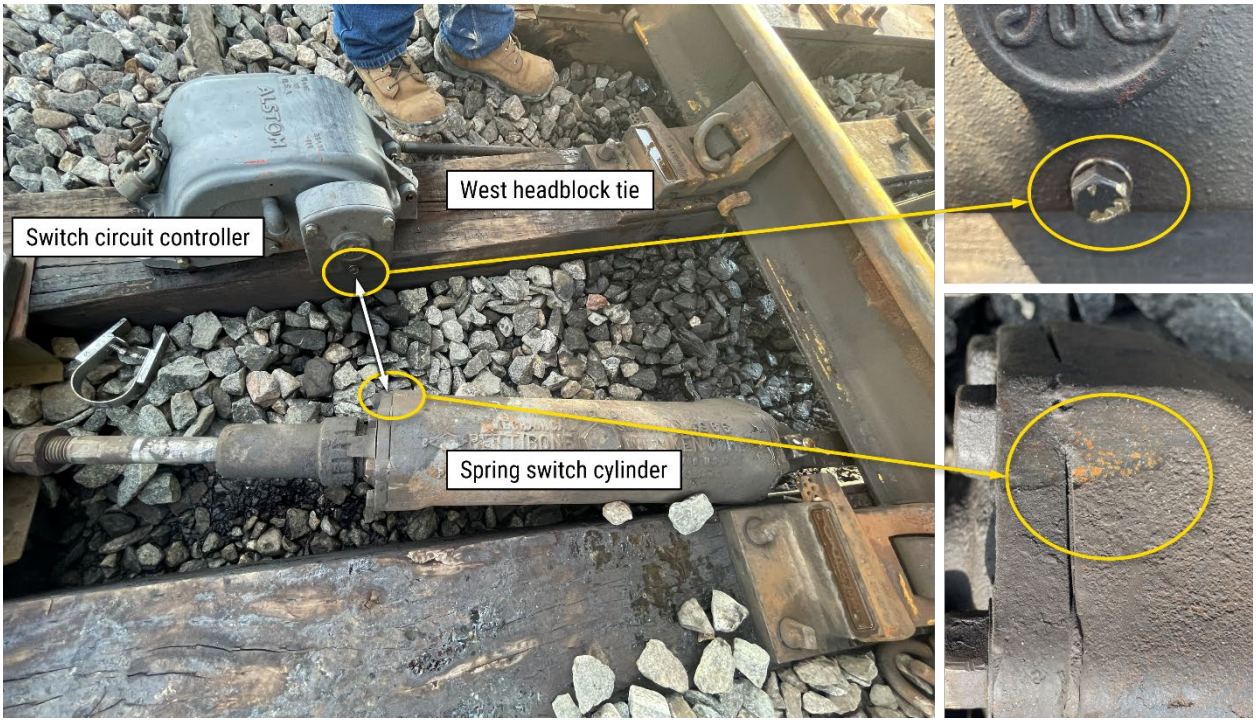

Figure 3. Switch circuit controller and spring switch cylinder after the accident.

The track inspection supervisor told the NTSB that he worked with a colleague to move the switch mechanism away from the control box to fix the issue. To do this, they used a jack and hammer to shift the west headblock tie an inch or two to the west, away from the cylinder.[8] The track inspection supervisor operated the switch several times and observed that both switch points were fully closed. He told the NTSB that he did not notify the NS signal department about this work because he believed the adjustment was minor. He did not record this work on his inspection report or on any other NS maintenance reporting forms.

On July 17, 2025, the track inspection supervisor told the NTSB that he returned to the West Simpson switch with a backhoe and backhoe operator to perform additional

[8] A *headblock tie* is a railroad tie, located at the moveable-switch portion of a turnout, which provides a stable mounting surface for the switch operating components.

maintenance work to prevent further movement of the headblock tie that he had adjusted on July 14. The backhoe operator and track inspection supervisor used the backhoe to shift the west headblock tie about 2 inches to the west, installed clip-on anchors on the east side of the tie, and ensured the ties were level. The track inspection supervisor then operated the switch several times to verify the switch points closed fully and notified the signal maintainer about the adjustments. He did not formally document this work either. The NTSB also interviewed the signal maintainer, who stated that other than helping resolve a signal issue about 5 weeks before the accident, he had not done any work at the West Simpson siding switch.[9]

In the period between completion of the switch work (about 10:53 a.m. on July 17) and the derailment the next day, data from the wayside signal system and NS's internal PTC monitoring platform showed a total of 455 instances in which the switch registered an out-of-correspondence condition.[10] These out-of-correspondence conditions cleared on their own (the switch went back into correspondence within seconds). About 1:17 p.m. on July 18, right after a westbound train traversed the main track, the West Simpson switch registered an out-of-correspondence condition, which did not clear up on its own like the earlier conditions had. The NS signal maintainer was alerted to this condition by a colleague who had seen the switch out-of-correspondence condition on the PTC monitoring platform.[11] The signal maintainer notified his supervisor and received direction to respond to the site to make a repair. He arrived at the switch about 4:57 p.m., adjusted the switch to restore correspondence, visually confirmed that the switch point was closed against the stock rail, and performed a 1/4-inch switch circuit controller test using a 1/4-inch testing gauge.[12] The signal maintainer released track authority about 10 minutes after completing the repair.

The signal maintainer told the NTSB he did not perform hydraulic test fixture testing and switch-point tension measurements because he was not equipped with the

[9] The signal maintainer could not recall the nature of the problem that generated the earlier trouble ticket at the West Simpson siding switch.

[10] A switch is considered *out-of-correspondence* when the actual position of the switch points does not correspond with the switch indication provided to the signal or control system.

[11] The PTC monitoring platform display is not accessible to all NS employees. Because the territory in which this accident occurred was operated under an automatic block signal system, the dispatcher could not see switch positions or out-of-correspondence conditions. The signal maintainer's colleague happened to have the display open at the time the switch registered the out-of-correspondence condition.

[12] NS's maintenance standard MS-1914 requires spring switch inspections to ensure switch point tension on the stock rail has at least 1/4-inch spring compression for both the normal and reverse switch positions.

training to do so or the necessary tools such as a hydraulic test fixture and pry bar.[13] These tests are required by NS maintenance and inspection standards for spring switches and other signal system components. He noted that he had minimal experience with spring switches, and training records do not indicate NS gave him training specific to spring switches.

Table 1 is a timeline of events leading up to the accident based on interviews, NS's PTC logs, wayside signal logs, the outward-facing camera and event recorder on the lead locomotive of NS-167, and audio recordings from the NS dispatch center.

Table 1. Events leading up to derailment on July 18, 2025.

Time (CDT)	Event
1:17.41 p.m.	Out-of-correspondence condition at West Simpson switch
3:59.42 p.m.	Dispatcher generated a trouble ticket for the out-of-correspondence condition, signal maintainer received direction to respond
4:39.55 p.m.	Westbound NS-33K entered east end of Simpson siding
4:52.57 p.m.	NS-33K stopped in the siding
4:57.00 p.m.	Signal maintainer arrived on site and received track authority
5:03.07 p.m.	Signal maintainer completed switch work
5:07.10 p.m.	Signal maintainer released track authority
5:16.20 p.m.	Main track signal showed green; switch in correspondence
5:43.57 p.m.	Eastbound NS-167 began traversing west end of Simpson siding
5:43.58 p.m.	Spring switch loses normal correspondence
5:44.00 p.m.	Derailment logged by NS-167 event recorder
5:44.07 p.m.	Derailed cars from NS-167 struck lead locomotive of NS-33K

[13] (a) Federal Railroad Administration rules for switch circuit controller inspections established at 49 *CFR* 236.103 require testing and inspections every 90 days. NS maintenance and inspection standards for the signal system require signal department personnel to conduct a visual observation of switch operation, evaluate the mechanical performance and responsiveness of the spring switch through hydraulic test fixture testing, and measure switch point tension. (b) *Hydraulic test fixture testing*, which uses hydraulic pressure to move the switch points, is detailed in NS's maintenance standard MS-1914.

About 5:43 p.m., eastbound train NS-167 entered the West Simpson spring switch, which was signaled and aligned for straight-through movement, and derailed seconds later. The engineer and engineer trainee of NS-33K, who had been standing on their lead locomotive's platform to perform a visual safety inspection of NS-167 as it passed by, leapt out of the path of the derailing tank car just before it struck the NS-33K locomotive about 5:44 p.m.[14]

During the postaccident investigation, NTSB investigators identified that the right-hand switch point at the West Simpson switch was gapped open, with a train wheel positioned between the switch point and stock rail.[15] (See figure 4.) Investigators also noted impact damage to the right-hand switch point.

[14] A passing inspection, when a train crew inspects a passing train for its entire length for any defects or exceptions, is required by NS Operating Rule 140.

[15] In a properly operating spring switch, tension holds the switch point tightly against the stock rail, ensuring the switch point remains fully closed under train load. When train wheels enter a gap between the rail and switch point, it prevents the wheel from traveling down the intended route.

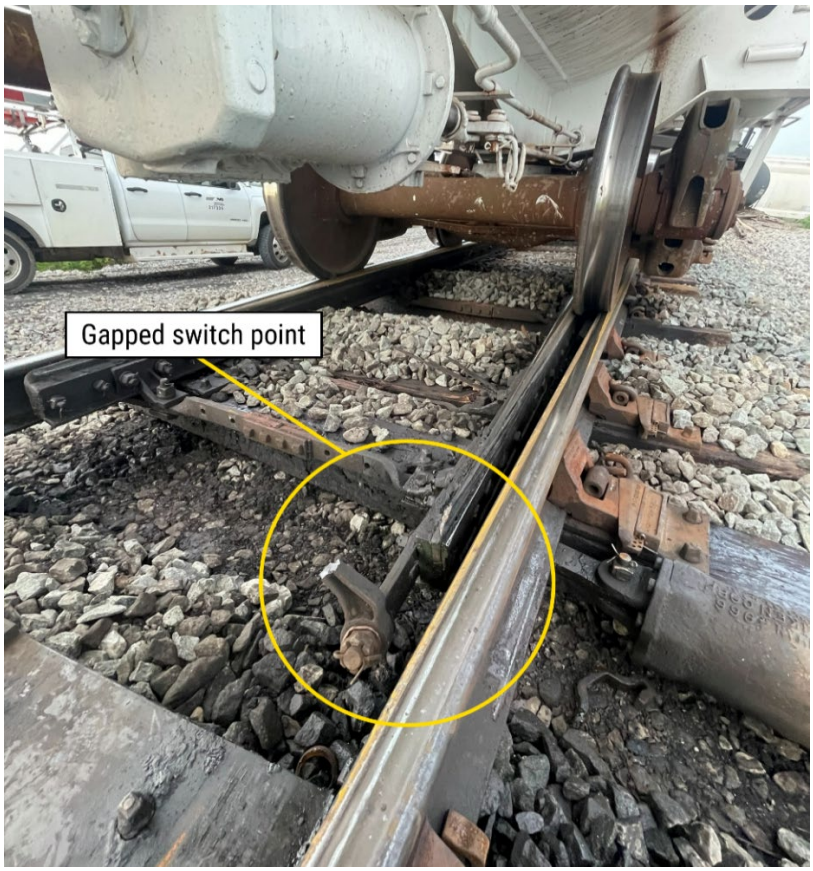

Figure 4. West Simpson switch after derailment.

NTSB investigators examined tank car ITDX 299097, the first car to derail and documented a wheel with a flange thickness of 0.943 inches, which approached the Association of American Railroads thin-flange limit of 15/16 (0.9375) inches.[16] Additional mechanical evaluations revealed wear on the bearing adapter relief portion on wheels L2 and R2 of the same railcar consistent with progressive component wear in the relief portion of the car.[17] The NTSB identified witness marks on the R3 and R6 wheels of locomotive NS4812 consistent with contact with an object at the wheel–rail interface on the right side of the locomotive.[18] (See figure 5.)

[16] The flange thickness remained within allowable limits at the time of evaluation.

[17] (a) In this report, axles are numbered 1–4 from a railcar's A end (the end of the railcar without the hand brake, or the front end of a locomotive) to its B end (the end to which the hand brake is mounted). Wheels are numbered L1–L4 (left side) and R1–R4 (right side) in the same direction. (b) A *bearing relief adapter* is a component that transfers load between the roller bearing and truck side frame while reducing stress on the bearing assembly.

[18] A *witness mark* is a visible impact depression, scratch, or other mark caused by wheel–rail contact.

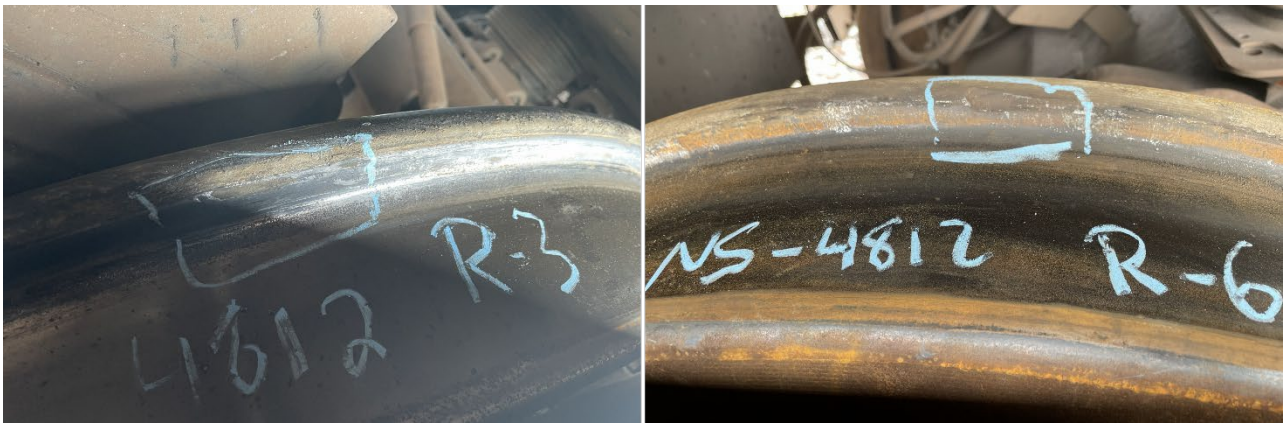

Figure 5. Witness marks on the R3 (*left*) and R6 (*right*) wheels of NS 4812.

The NTSB reviewed data from an NS wayside truck/bogie optical geometry inspection (TBOGI) detector, which assesses the geometric behavior and stability of railcar trucks as they pass the detector at track speed. The review of TBOGI detector records for tank car ITDX 299097 showed that the tank car's second axle was tracking about 22 mm to the right.[19]

After the accident, NS evaluated its Midwest Division to confirm that its signal maintainers responsible for adjusting and testing spring switches were properly equipped with required tools to accurately test the operations of a spring switch, such as a pry bar and hydraulic test fixture. This evaluation has since been expanded across NS's entire system and any maintainers who lacked the necessary tools have received them. Between July 21 and July 25, 2025, the NS engineering team worked with the maintenance of way and structures department and the communications and signals department to inspect all 205 spring switches on NS mainline track.[20] These inspections also served as field training on spring switches.

On July 28, 2025, 10 days after the accident, NS installed a new turnout at the West Simpson siding and equipped it with a new spring switch. Further, NS presented lessons from the derailment to engineering leadership and developed a spring switch inspection form to document required quarterly inspection findings and provide a record of inspections, switch conditions, and any necessary corrective actions. In November 2025, NS also revised its engineering standard procedures for maintenance and repairs to add the following requirements:

[19] TBOGI data may indicate truck performance issues, but TBOGI detectors do not produce real-time alerts for NS wayside desks to defective conditions in the same manner as other wayside defect detectors.

[20] The inspections did not identify any systemic issues requiring remedial action.

- For switches equipped with point-indication detection systems, a representative from the signal department must be notified in advance before any work is performed that could affect the detection system.[21]
- If a signal department representative is unable to test the point-indication detection system after maintenance work is completed, the switch must be taken out of service and secured until required testing can be performed.

NS also developed training that incorporated the new instructions for spring switches and the joint spring switch inspection form.

Analysis

On July 18, 2025, train NS-167, traveling eastbound on the Midwest Subdivision, approached a spring switch at the west end of the Simpson siding. The lead locomotive passed over the switch, but hazardous materials tank car ITDX 299097 (coupled to the locomotive) derailed and struck stationary westbound train NS-33K, which was stopped in the siding. The collision resulted in the derailment of 24 railcars from NS-167, a hazardous materials release, and fire.

Upon review of signal data and forward-facing video from NS-167, investigators found that as the train approached the Simpson siding from the west, the spring switch at the west end of the siding was properly aligned for the main track and the signal displayed a clear aspect authorizing train movement. The derailment occurred during daylight hours under clear, sunny weather conditions, and there were no sight obstructions or environmental factors that limited the engineer's ability to observe the track or switch while approaching. A review of locomotive recordings, event recorder data, and dispatch records confirmed that the crew's actions did not contribute to the accident.

Postaccident evidence revealed impact damage to the right-hand switch point and impact markings on two right-side wheels of the lead locomotive of NS-167, confirming that contact occurred between the locomotive wheels and the switch point. This contact initiated the sequence of events that led to the derailment. The physical evidence supports two plausible conditions at the time the locomotive entered the switch:

- Before NS-167 approached the West Simpson spring switch, the switch point was already slightly gapped open from insufficient holding tension,

[21] A *point-indication detection system* like the one at the West Simpson siding switch monitors and signals whether the switch points are open or are closed against the stock rail.

but not enough to trigger an out-of-correspondence alarm (that is, the gap was less than 1/4 inch), or

- The switch point gapped open under the locomotive's weight and from lateral dynamic loading as the locomotive traversed the switch.

The available evidence did not indicate definitively which of the scenarios occurred, but in either case, the locomotive's wheel contact likely forced the switch point farther open, increasing the gap between the switch point and stock rail. The second wheelset on tank car ITDX 299097 was already tracking rightward, in the direction of the switch point, and its right-side R2 wheel had a thin (but within allowable limits) flange. Because of this, wheel R2 on tank car ITDX 299097 was able to enter the gap between the switch point and stock rail.[22] Because of the multiple conditions—the gapped switch point, the wheelset tracking rightward, and the right-side wheel with a thin flange—the tank car's wheels then lost full wheel–rail contact, causing the train to derail.

The NS track inspection supervisor told the NTSB that before the accident, on July 14, 2025, and again on July 17, he had completed work on the West Simpson switch after finding an excessive gap issue at the switch during a monthly switch inspection. No coordinated inspection or mechanical testing followed this work. Between July 14 and July 17, NS signal data indicated normal correspondence of the spring switch, but repeated out-of-correspondence events in the data logs from July 17 to the time of the derailment indicate that the work on July 17 likely altered the geometry and mechanical tolerances of the spring-switch assembly.

Just before the derailment on July 18, an NS signal maintainer investigated the out-of-correspondence switch condition. The NTSB found no evidence the signal maintainer was aware of the July 14 maintenance activities, but the track inspection supervisor had notified him about the second round of maintenance on July 17. The lack of coordination between the track and signals departments prevented either group from having full knowledge of how the track work affected the switch points and signal system functionality.

Coordination between the signals and track departments could have prompted track or signals employees to verify the spring switch's mechanical integrity after the maintenance work on July 14 and 17. Instead, the signal maintainer adjusted the switch circuit controller attempting to address the out-of-correspondence condition at the West Simpson switch on the day of the accident. After investigating the out-of-correspondence condition on July 18, the signal maintainer restored and confirmed electrical correspondence to the switch. He was neither trained nor equipped with the

[22] In the railroad industry, this is known as "picking the switch."

proper tools to pressure test the spring switch cylinder, however, preventing him from identifying the mechanically unsafe condition. Had the signals and track departments coordinated during the track work that took place on July 14 and 17, the signal maintainer likely would have identified the cause of the out-of-correspondence condition and which tests and adjustments were needed.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the July 18, 2025, derailment of Norfolk Southern (NS) train NS-167 near Browns, Illinois, was NS's inadequate procedures to ensure proper repair, testing, and coordination between track and signal departments, which prevented verification of the mechanical integrity of the West Simpson spring switch following repairs and led to a gapped switch point, which allowed a wheelset to enter the switch point, lose wheel–rail contact, and derail into standing train NS-33K.

Lessons Learned

This accident demonstrates the importance of cross-departmental communication and processes to reinforce that communication. In the investigation, the NTSB identified an organizational gap at NS by which track maintenance and inspection actions affecting switch alignment were performed without coordination with the signal department and without testing the switch after the work was completed. NS revised their engineering standard procedures to add a procedure that would alert the signal department to planned work on certain types of switches and require post-work testing. These actions would prevent switches returning to service without confirmation of their mechanical and signal integrity, and could be applicable throughout the railroad industry.

Employees also must have appropriate training and access to the correct tools to conduct required tests. When the switch at the west end of the Simpson siding showed an out-of-correspondence condition on the day of the derailment, the responding signal maintainer was not equipped to perform mechanical performance testing and therefore could only restore electrical correspondence. After the accident, NS conducted audits across its system, developed training related to spring switch inspection, and equipped signal maintainers with the required tools.

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