



Date: September 22, 2023

To: Robert Hall, Director, RPH

Through: Robert Gordon, Branch Chief, RPH-120

From: James Southworth, IIC, RPH-120

Subject: RRD23LR006- Springfield, OH- Safety Performance of Wheelsets Investigation Closeout Memo

Synopsis:

On March 4, 2023, at about 4:54 p.m. local time, westbound Norfolk Southern Railway (NS) mixed freight train 179LC04 derailed 28 railcars at NS milepost 178.85 on the NS Dayton District near Springfield, Ohio. Twenty-one of the derailed railcars were loaded and seven were empty; none were carrying hazardous materials. The train comprised three head-end locomotives, two mid-train distributed power units, and 212 railcars. The train was 13,470 feet long and weighed about 17,966 tons.

During the derailment, three wheelsets exhibited movement on their axles. One axle had a wheel dislodged from its axle seat, one axle had a wheel dislodged outboard, and a third axle had a wheel dislodged inboard.

Initial Investigation and Industry Response:

After this derailment, on March 8, 2023, NS began removing 517 railcars built by National Steel Car from service until their wheelsets could be replaced and examined. Additionally, the Association of American Railroads (AAR) issued an equipment inspection order (EI-0033) on March 9, 2023, advising railroads to inspect and remove from service wheelsets mounted on railcars by National Steel Car between August 2022 and March 2023.

AAR Wheel Mounting Standards:

AAR develops and publishes rules governing wheel shop practices, including axle and wheel bore machining and mounting practices. These rules are included in AAR's

Safety and Operations Manual of Standards and Recommended Practices Section G-II Wheel and Axle Manual, Effective October 2022 (MSRP G-II). NTSB investigators reviewed these standards to determine those sections applicable for use in examinations.

Wheelsets Held for Investigation:

The National Transportation Safety Board (NTSB) initiated an investigation focusing on the safety performance of wheelsets involved in the derailment. NTSB placed an investigative hold on twelve wheelsets that moved on their axle seats from three coil railcars of the derailed train. Each of wheelsets held were mounted by National Steel Car (NSC). NTSB also placed an investigative hold on additional wheelsets that were mounted by NSC around the same time as those held from the derailed train. All wheel sets were shipped to an NS facility in Altoona, Pennsylvania. This examination began on March 15, 2023, and was performed before all parties.

Inspections included dismounting five wheels and performing detailed visual inspections and measurements of the wheel bores and axle seats. Additionally, on March 21 and 22, 2023, a portable coordinate measurement machine was used to gather additional data from the dismantled wheels at the NS Juniata Shop in Altoona, PA, and wheel 05544, which completely dislodged in the derailment.

The five wheelsets from the derailed cars NS 162581 and NS 162582 that did not visually appear to dislodge their wheels during the derailment were measured for wheel back-to-back spacing in three locations approximately evenly spaced around the wheels. Each of these wheelsets' back-to-back measurements was within the AAR MSRP G-II specifications for back-to-back measurements. They did not exhibit evidence of the wheels moving on their axles nor of conditions that would lead to such movement. Additional wheelsets were examined that were manufactured by National Steel Car around the same time as those that exhibited movement of wheels on their axles in the derailment. These wheelsets were obtained from two cars in Elkhart, IN (4 wheelsets each from car NS 162438 and car NKLX 400172). These wheelsets were examined in the same manner. None of these wheelsets exhibited evidence of wheels moving on their axles or of conditions that would lead to such movement.

The axle containing wheel 05544 that was completely dislodged in the derailment was cut to remove the completely dislodged wheel. The mate wheel to wheel 05544 (wheel 05508) was pressed from the axle, and the wheel bore and axle seat of each wheel from that axle were visually examined for evidence of movement on the axle, along with conditions that could lead to such movement, such as fretting. No evidence of movement on the axle prior to the derailment was identified.

Wheel Dismounts and Measurements:

The remaining two wheelsets that had wheels dislodged from their seat during the derailment from cars NS 162581 and NS 162592 were examined. The two axles with a wheel partially dislodged from its seat had each wheel pressed from the axle, recording the required force to break the wheel free from its seat and the force required to slide the wheel off its seat. There are no AAR or other industry standards for wheel dismount forces.

After dismounting the diameter, taper, and rotundity of all four wheel bores and their corresponding axle seats were measured. Axle seat surface roughness was also measured.

The bore of wheel 07340 exhibited anomalies in its bore diameter regarding the bore taper and maximum deviation in bore measurements. As a result of this anomaly, additional investigative actions were performed using 3D scans of wheelset axle seats and wheel bores. A portable coordinate laser measuring machine was used to gather precise three-dimensional data of wheel bore profiles. Six-wheel bores from three axles were examined with the equipment: the three wheels that exhibited movement on their axles in the derailment and each of these wheels' axle mates, which exhibited no movement before being dismounted as part of the investigation.

Using the scan data, the wheel bore machining profile was compared to nominal parameters and to those of a new, unmounted wheel produced on March 28, 2023, at National Steel Car.

The results show that the machining profiles of each wheel was close to the nominal and new wheel bore machining profile, although it should be noted that there are no AAR requirements for wheel bore finish on dismantled wheels.

The machined bore profiles of each wheel were examined to determine the number of machine grooves per bore, the machining groove depth, and the radius within groove cross sections. Table 4 below provides the values produced from the scans, including the nominal machining parameters and those of a new, unmounted wheel. When comparing a new, unmounted wheel to a wheel that has been mounted and dismantled, it is expected to have changes such as a reduction in groove depth due to the mounting and dismantling processes. As stated, there are no AAR requirements for wheel bore finish on dismantled wheels.

No AAR or other industry standards exist for post-dismount axle or wheel dimensions. However, all measurements indicated the axles and wheel bores were manufactured and mounted within specifications, with one exception.

AAR Cancels Equipment Instructions:

On April 13, 2023, the AAR Wheels, Axles, Bearings and Lubrication committee voted to cancel EI-0033 that it issued on March 9, 2023, which had advised railroads to inspect and remove from service wheelsets that were mounted by National Steel Car between August 2022 and March 2023. Equipment Instruction EI-0033 Supplement 01 removed all cars from the advisory and informed car owners that they may request to have wheelsets quarantined by EI-0033 placed back under their own cars. The NS also cancelled their equipment intercept instructions and completed inspections on May 3, 2023.

Conclusion:

As a result of the physical evidence and results of examinations, NTSB staff has determined that all wheelset inspected were found to be in compliance with AAR's Safety and Operations Manual of Standards and Recommended Practices Section G-II Wheel and Axle Manual, Effective October 2022. Therefore, NTSB staff recommends that this investigation be closed.

I concur:

ROBERT HALL Digitally signed by ROBERT
HALL
Date: 2023.09.27 07:40:57
-04'00'

Robert Hall, Director
Office of Railroad, Pipeline and
Hazardous Materials Investigations

National Transportation Safety Board

Office of Railroad, Pipeline and Hazardous Materials

Washington, DC 20594



RRD23LR006

SAFETY PERFORMANCE OF WHEELSETS

Specialist's Factual Report
September 21, 2023

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A. ACCIDENT

Location: Springfield, OH
Date: March 4, 2023
Time: 4:54 p.m. Local Time (EST)
9:54 p.m. UTC
Train: Norfolk Southern Railway (NS) mixed freight train 179LC94

B. SAFETY PERFORMANCE OF WHEELSETS GROUP

Group Chair / IIC	Jim Southworth National Transportation Safety Board Washington, DC
Group Member	Joe Gordon National Transportation Safety Board Buchanan, Virginia
Group Member	David Casaceli National Transportation Safety Board Imlay City, Michigan
Group Member	David Graubard Federal Railroad Administration Harrisburg, Pennsylvania
Group Member	Jamie Harbour Public Utilities Commission of Ohio Columbus, OH
Group Member	Daniel Carter MxV Rail Pueblo, Colorado
Group Member	Elizabeth Allran Norfolk Southern Railway Roanoke, Virginia
Group Member	Glenn Brandimarte ORX Tipton, Pennsylvania

C. ACCIDENT SUMMARY

For a summary of the accident, refer to the *Preliminary Report* within this docket.

D. FACTUAL INFORMATION

On March 4, 2023, at about 4:54 p.m. local time, westbound Norfolk Southern Railway (NS) mixed freight train 179LC04 derailed 28 railcars at milepost 178.85 on the Dayton District near Springfield, Ohio.

Twenty-one of the derailed railcars were loaded and seven were empty; none were carrying hazardous materials. The train comprised three head-end locomotives, two mid-train distributed power units, and 212 railcars. The train was 13,470 feet long and weighed about 17,966 tons.

During the derailment, three wheelsets exhibited movement on their axles. One axle had one wheel completely dislodged from its axle seat, one axle had a wheel dislodged outboard, and a third axle had a wheel dislodge inboard.

The National Transportation Safety Board (NTSB) initiated an investigation focusing on the safety performance of wheelsets. FRA led the investigation of this accident.

1.0 Initial Investigation and Industry Response

The NTSB initially requested that NS recover eight wheelsets from two of the derailed railcars; photographs taken on scene after the derailment show that three wheels from these wheelsets exhibited movement on their axles. The NTSB subsequently placed an investigative hold on these wheelsets. NS also held additional wheelsets, other truck components from the accident train, and wheelsets from elsewhere in the NS fleet for examination.

After this derailment, on March 7, 2023, NS began removing 517 railcars built by National Steel Car from service.

Additionally, AAR issued an equipment inspection order (EI-0033) on March 9, 2023, advising railroads to inspect and remove from service wheelsets that were mounted by National Steel Car between August 2022 and March 2023.

The wheelsets held by the NTSB and other components were delivered to an NS facility in Altoona, Pennsylvania, for an examination performed before all parties. This examination began on March 15, 2023.

1.1 Wheelsets Held for Investigation

NTSB placed an investigative hold on twelve wheelsets from three cars of the derailed train. The wheels on three of the wheelsets had moved from their seats on their axles during the derailment. Each wheelset held by NTSB was mounted by National Steel Car around the same time as those exhibiting movement on their axles in the derailment.



Figure 1. Wheelsets from car NS 162581 held by NTSB for investigation at the derailment scene.

Additional wheelsets that were mounted by National Steel Car around the same time as those held from the derailed train were also sent to the same NS facility in Altoona, PA, for examination.

The wheelsets held for potential further examination are outlined in Table 1.

Table 2. Table of National Steel Car wheelsets held for investigation.

Car Number - Axle Position	Source	Notes
NS 162581 #1	Springfield, OH derailment; derailed car, 71st of consist;	Wheel 05987 not dislodged; Wheel 05523 dislodged outboard;
NS 162581 #2	Springfield, OH derailment; derailed car, 71st of consist;	Wheel 05508 not dislodged; Wheel 05544 dislodged inboard entirely off its seat.
NS 162581 #3	Springfield, OH derailment; derailed car, 71st of consist;	n/a
NS 162581 #4	Springfield, OH derailment; derailed car, 71st of consist;	n/a
NS 162582 #1	Springfield, OH derailment; derailed car, 72nd of consist;	Wheel 07084 not dislodged; Wheel 07340 dislodged inboard
NS 162582 #2	Springfield, OH derailment; derailed car, 72nd of consist;	n/a
NS 162582 #3	Springfield, OH derailment; derailed car, 72nd of consist;	n/a
NS 162582 #4	Springfield, OH derailment; derailed car, 72nd of consist;	n/a
NS 162548 #1	Springfield, OH derailment; derailed car, 70th of consist;	n/a
NS 162548 #2	Springfield, OH derailment; derailed car, 70th of consist;	n/a
NS 162548 #3	Springfield, OH derailment; derailed car, 70th of consist;	n/a
NS 162548 #4	Springfield, OH derailment; derailed car, 70th of consist;	n/a
NS 162438 #1	Elkhart, IN	n/a
NS 162438 #2	Elkhart, IN	n/a
NS 162438 #3	Elkhart, IN	n/a
NS 162438 #4	Elkhart, IN	n/a
NKLX 400172 #1	Elkhart, IN	n/a
NKLX 400172 #2	Elkhart, IN	n/a
NKLX 400172 #3	Elkhart, IN	n/a
NKLX 400172 #4	Elkhart, IN	n/a
NKLX 400264 #1	Burns Harbor, IN	n/a
NKLX 400264 #2	Burns Harbor, IN	n/a
NKLX 400264 #3	Burns Harbor, IN	n/a
NKLX 400264 #4	Burns Harbor, IN	n/a

2.0 AAR Wheel Mounting Standards

AAR develops and publishes rules governing wheel shop practices, including axle and wheel bore machining and mounting practices. These rules are included in AAR's Safety and Operations Manual of Standards and Recommended Practices Section G-II Wheel and Axle Manual, Effective October 2022 (MSRP G-II). NTSB investigators reviewed these standards to determine those sections applicable to the movement of wheels on their axles.

Section 1.0 of this manual outlines the Mandatory Rules Governing Wheel Shop Practices as Required by Interchange Rules. Table 2 below summarizes some of the applicable standards to this investigation.

Table 3. Summary table of AAR MSRP G-II rules applicable to axle and wheel bore mounting and machining.

Rule Number	Selection of Applicable Standards
1.1	Requirements for the dimensions and specifications of newly finished axles including wheel seat rotundity, and taper. Wheel seat rotundity must not exceed 0.002 inches. Inboard wheel seat diameter must be greater than or equal to the wheel seat diameter at the centerline of the wheel seat; diameter at the centerline of the wheel seat must be greater than or equal to the outboard wheel seat diameter.
1.3.3	Bore rotundity must not exceed 0.002 inches. If a bore taper exists, the taper must have the smaller diameter on the outside of the hub bore.
1.3.4	Wheel bore must be sufficiently smaller than wheel seat diameter to enable required mounting force to be obtained. Generally, an interference fit of .001 inch per inch of wheel seat diameter will result in desired mounting forces.
1.3.5	Two or more separate cuts must be made in boring new steel wheels. Finish cuts must have a minimum of 30 uniformly spaced grooves per bore and the maximum groove depth may not exceed 0.008 inches.
1.4.1	Requirements for recording wheel mounting force records for each wheel and the requirements for maximum mounting force and additional limits on the shape and nature of the mounting forces, including upper and lower limits, maximum drop-off and different locations in the mounting force curve, tonnage build profile, entry force spikes, and pounding or slip-stick behavior.
1.4.3	Requirements for preparing wheel seats and bores for mounting including cleaning and the use of an AAR approved mounting lubricant.
1.5.3	Requirements for freight car wheel back-to-back measurements.

3.0 Wheel and Axle Manufacturing and Mounting Records

NTSB reviewed National Steel Car records created during the manufacturing process for the wheelsets and axles that had wheels dislodged during the derailment. All these records reflected adherence to proper manufacturing standards, including for wheel mounting forces upper and lower limits and the additional requirements of Rule 1.4.1 of the AAR MSRP G-II.

4.0 Wheelset and Axle Seat Investigation

On March 15 to 17, 2023, at the NS Juniata Shop in Altoona, PA, and the ORX facility in Tipton, PA, NTSB and other party members conducted a further inspection of the wheelsets held for investigation. This inspection included dismounting five wheels and performing detailed visual inspections and measurements of the wheel bores and axle seats. Additionally, on March 21 and 22, 2023, a portable coordinate measurement machine was used to gather additional data from the dismounted wheels at the NS Juniata Shop in Altoona, PA, and wheel 05544, which completely dislodged in the derailment.

4.1 Physical Inspection - NS Juniata Shop - Altoona, PA

The five wheelsets from the derailed cars NS 162581 and NS 162582 that did not visually appear to dislodge their wheels during the derailment were measured for wheel back-to-back spacing in three locations approximately evenly spaced around the wheels. Each of these wheelsets' back-to-back measurements was within the AAR MSRP G-II specifications for back-to-back measurements. They did not exhibit evidence of the wheels moving on their axles nor of conditions that would lead to such movement. Additional wheelsets were examined that were manufactured by National Steel Car around the same time as those that exhibited movement of wheels on their axles in the derailment. These wheelsets were obtained from two cars in Elkhart, IN (4 wheelsets each from car NS 162438 and car NKLX 400 172). These wheelsets were examined in the same manner. None of these wheelsets exhibited evidence of wheels moving on their axles or of conditions that would lead to such movement.

The axle containing wheel 05544 that was completely dislodged in the derailment was cut to remove the dislodged wheel. The mate wheel to wheel 05544 (wheel 05508) was pressed from the axle, and the wheel bore and axle seat of each wheel from that axle were visually examined for evidence of movement on the axle, along with conditions that could lead to such movement, such as fretting. No evidence of movement on the axle prior to the derailment was identified. The wheel bores for wheels with serial numbers 05523, 05987, 07084, 07340, and 05508 from cars NS 162581 and NS 162582 each contained between 31 and 32 machining grooves per bore.

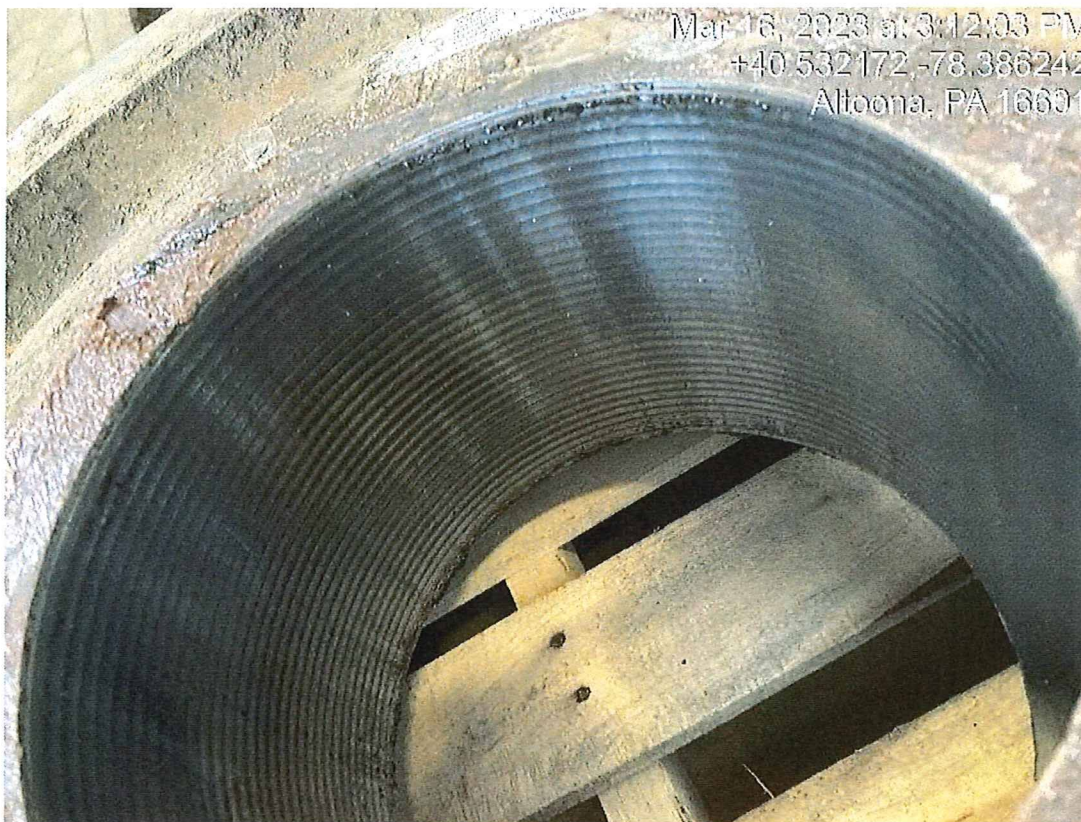


Figure 2. Wheel bore of wheel 05508 from car NS 162581 after being pressed from its axle.

4.2 Wheel Dismounts and Measurements - ORX Facility - Tipton, PA

The remaining two wheelsets that had wheels dislodged from their seat during the derailment from cars NS 162581 and NS 162592 were sent to the ORX Railway Corporation facility in Tipton, PA. The two axles with a wheel partially dislodged from its seat had each wheel pressed from the axle, recording the required force to break the wheel free from its seat and the force required to slide the wheel off its seat. There are no AAR or other industry standards for wheel dismount forces. A summary of these measurements is in Table 3 below. No destructive testing was performed on any wheels or axles placed on NTSB hold.

Table 3. Summary of wheel dismount forces recorded at ORX Railway Corporation in Tipton, PA.

Car-Wheel	OEM Mounting Force (tons)	Break Force (tons)	Break Force % of OEM	Slide Force (tons)	Slide Force % of OEM	Note
162581-05523	116	166	144%	136	118%	Dislodged outboard
162581-05987	129	160	124%	148	115%	Normal looking position
162582-07084	135	174	129%	162	120%	Normal looking position
162582-07340	128	106	83%	80	62%	Dislodged inboard

After dismounting at ORX, the diameter, taper, and rotundity of all four wheel bores and their corresponding axle seats were measured. Axle seat surface roughness was also measured. No AAR or other industry standards exist for post-dismount axle or wheel dimensions. However, all measurements indicated the axles and wheel bores were manufactured and mounted within specifications, with one exception. The bore of wheel 07340 exhibited anomalies in its bore diameter regarding the bore taper and maximum deviation in bore measurements. As a result of this anomaly, additional investigative actions were performed utilizing 3D scans of wheelset axle seats and wheel bores.

4.3 3D Wheel Bore Scans - NS Juniata Shop - Altoona, PA

On March 21 and 22, 2023, at the NS Juniata shop in Altoona, PA, a portable coordinate measuring machine was used to gather precise three-dimensional data of wheel bore profiles. Six wheel bores from three axles were examined with the equipment: the three wheels that exhibited movement on their axles in the derailment and each of these wheels' axle mates, which exhibited no movement before being dismounted as part of the investigation.

Using the scan data, the wheel bore machining profile was compared to nominal parameters and to those of a new, unmounted wheel produced on March 28, 2023, at National Steel Car.

The results show that the machining profiles of each wheel was close to the nominal and new wheel bore machining profile, although it should be noted that there are no AAR requirements for wheel bore finish on dismantled wheels.

The machined bore profiles of each wheel were examined to determine the number of machine grooves per bore, the machining groove depth, and the radius within groove cross sections. Table 4 below provides the values produced from the scans, including the nominal machining parameters and those of a new, unmounted wheel. When comparing a new, unmounted wheel to a wheel that has been mounted and dismounted, it is expected to have changes such as a reduction in groove depth due to the mounting and dismounting processes. As stated, there are no AAR requirements for wheel bore finish on dismounted wheels.

Table 4. Summary data for wheel bore profiles from 3D scans. All values are in inches.

Wheel ID	Average Groove Depth	Distance over 5 consecutive peaks	Average peak to peak value	Average valley radius
Nominal	0.0055	1.050	0.210	1.00
18135 new wheel (unmounted)	0.0041	0.952	0.190	0.93
05508 dismounted	0.0023	1.029	0.206	1.18
05544 dismounted	0.0037	1.069	0.214	0.83
05523 dismounted	0.0029	1.051	0.210	0.93
05987 dismounted	0.0030	1.042	0.208	0.87
07340 dismounted	0.0029	1.044	0.209	0.87
07084 dismounted	0.0029	1.047	0.209	0.98

Wheel 05544, which moved off its seat in the derailment, showed asymmetric distortion of the wheel bore on the front side (outboard) and a smaller localized area of distortion on the inside (inboard), directly opposite. A similar pattern of distortion, though of a lesser magnitude than that present on wheel 05544, was present on the outboard front side of wheel 07340, which dislodged in the derailment.

Damage was noted on the rim of wheel 05544, opposite of the area of distortion in the wheel bore. Additionally, damage was present on the bearing end cap on the opposite end of the axle of dislodged wheel 05544.

Heavy damage was noted on the rim of 07340, opposite of the area of distortion in the wheel bore. Damage was also noted on the bearing end cap on the opposite end of the axle of dislodged wheel 07340.

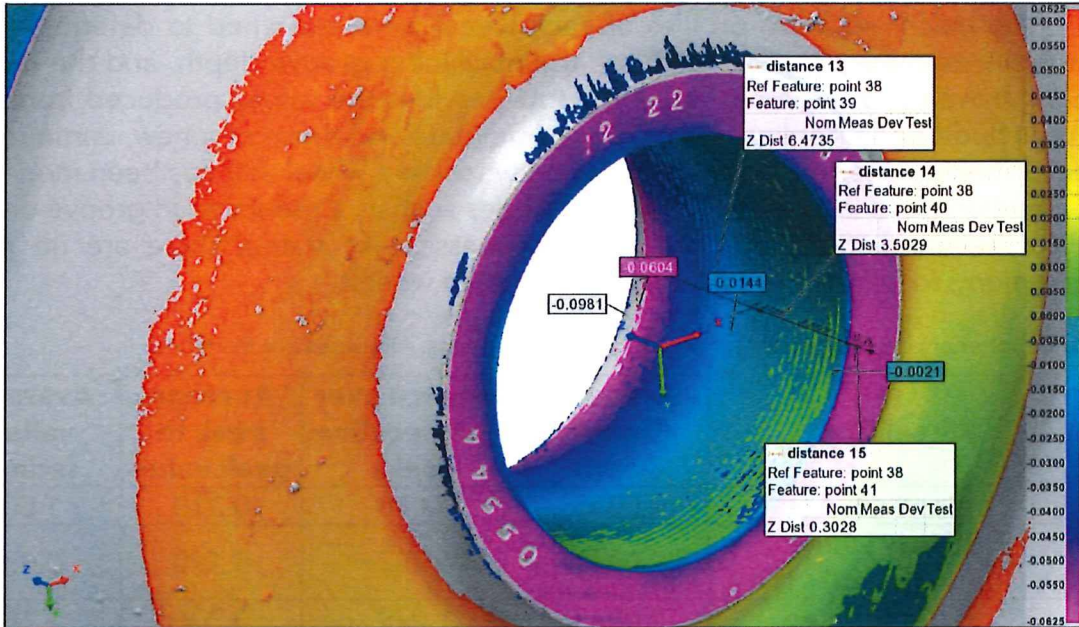


Figure 3. Image generated during 3D scan of wheel 05544 showing the overall variation in the shape of the wheel bore compared to a 3D model of a nominal wheel. A large amount of distortion on the outboard side is evident. View from inboard side of wheel.

5.0 AAR Cancels Equipment Instructions

On April 13, 2023, the AAR Wheels, Axles, Bearings and Lubrication committee voted to cancel EI-0033 that it issued on March 9, 2023, which had advised railroads to inspect and remove from service wheelsets that were mounted by National Steel Car between August 2022 and March 2023. Equipment Instruction EI-0033 Supplement 01 removed all cars from the advisory and informed car owners that they may request to have wheelsets quarantined by EI-0033 placed back under their own cars.

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Figure 3. Image generated during 3D scan of wheel 05544 showing the overall variation in the shape of the wheel bore compared to a 3D model of a nominal wheel. A large amount of distortion on the outboard side is evident. View from inboard side of wheel..... 12



Approved: March 20, 2023

Preliminary Report RRD23LR006

This information is preliminary and subject to change.

Safety Performance of Wheelsets

Springfield, Ohio

March 4, 2023

On March 4, 2023, about 4:54 p.m. local time, westbound Norfolk Southern Railway (NS) mixed freight train 179LC04 derailed 28 railcars at milepost 178.85 on the Dayton District near Springfield, Ohio.¹ (See figure.) Twenty-one of the derailed railcars were loaded and 7 were empty; none were carrying hazardous materials. The derailment downed a powerline, which caused about 47 homes to lose power. Local first responders initially ordered residents within a 1,000-foot radius to shelter in place. This order was lifted about 1:00 a.m. on March 5. No injuries were reported. NS estimated damages to equipment, track, and signal infrastructure to be about \$2.6 million. Visibility conditions at the time of the derailment were daylight and clear; the weather was 51°F with no precipitation.

¹ (a) All times in this report are local time. (b) Train 179LC04 was traveling from Bellevue, Ohio, to Birmingham, Alabama.



Figure. Aerial view of derailment. (Courtesy of Clark County Emergency Management Agency.)

The crew of train 179LC04 consisted of an engineer and a conductor in the lead locomotive. The train was composed of 3 head-end locomotives, 2 mid-train distributed power units, and 212 railcars. The train was 13,470 feet long and weighed about 17,966 tons.²

After this derailment, on March 8, 2023, NS began removing 517 National Steel Car railcars from service until their wheelsets can be replaced.

Additionally, the Association of American Railroads issued an equipment inspection order on March 9, 2023, advising railroads to inspect and remove from service wheelsets that were mounted by National Steel Car between August 2022 and March 2023.³

The National Transportation Safety Board (NTSB) has initiated an investigation focusing on the performance of wheelsets. The NTSB requested that NS recover eight wheelsets from two of the derailed railcars; photographs taken on scene after the derailment show that three wheels from these wheelsets exhibited movement on their axles. The NTSB subsequently placed an investigative hold on these wheelsets, additional wheelsets and other truck components from the accident train, and

² Train 179LC04 included 28 loaded hazardous materials tank cars; none of the hazardous materials tank cars derailed.

³ The complete advisory is accessible at: <https://www.railwayage.com/wp-content/uploads/2023/03/AAR-NSC-Advisory.pdf>.

wheelsets from elsewhere in the NS fleet for examination. The wheelsets and other components were delivered to an NS facility in Altoona, Pennsylvania, for an examination performed before all parties that began on March 15, 2023.

The NTSB's investigation is ongoing. Future investigative activity will focus on failure analysis of the subject wheelsets and on industry-wide standards and practices for railcar wheel and axle assembly processes, specifications, and quality control.

Parties to the investigation include the Federal Railroad Administration, the Public Utilities Commission of Ohio, NS, and National Steel Car.

**ASSOCIATION OF
AMERICAN RAILROADS****Equipment Instructions**

March 09, 2023

EI-0033

File Number: TWBL-18A.6**Subject: NSC Loose Wheels****To: All Subscribers**

A member railroad has experienced three loose wheels in the subject car series. These cars are new builds. This advisory is issued to inspect and remove from service wheel sets that were mounted by National Steel Car (NSC-T) in the date range between 08-22 and 03-23 inclusive. These wheel sets are at an increased risk of an out of gage derailment.

All cars included in this advisory must be inspected for the wheel sets in question and reported as outlined below. Any cars, loaded or empty, found so equipped must have the NSC-T mounted wheel sets removed immediately as directed below. If available, replace suspect wheel sets with new wheel sets. Handle in accordance with the instructions for identification, inspection and counter billing outlined below.

Suspect Wheel Set Determination:

1. Car Series:
 - NS 162390 – 162749
 - NKLX 400000 – 400314
2. H-36 Wheel
3. Wheel Shop Mark: NSC T
4. Wheel Mounting Dates: 08-22 to 03-23 inclusive. (on one field side hub face)

Inspection Procedure and Determination

1. Inspect all wheel sets of each suspect car for wheel shop mark and wheel mounting date stamp. Both are located on the field side hub face of only one wheel per wheel set. The mate wheel will not have a mounting stamp. Refer to AAR Field Manual, Rule 41, Figure 41.44.
2. If the mark is NSC T, remove the wheel set. The T may be several inches to the right from NSC and may look like the number "1".
3. If wheel mounting information is illegible remove the wheel set.

Instructions

- 1) Cars inspected and not equipped with suspect wheel sets

- a. Any car inspected and found to not be equipped with a suspect wheel set is to be removed from this Maintenance Advisory by reporting Activity Code MR.
 - i. Report to car owner using normal AAR Billing

Inspection

Job Code 4454

Why Made Code 13, "Attention Required as Directed by EA"

Responsibility Code 1, "Owner's Responsibility"

- 2) Cars found with suspect wheel sets
 - a. Replace all suspect wheel sets with new wheel sets if available. Bill with all normally required AAR CRB details.
 - i. Report to car owner using normal AAR billing

Wheel set replacement

Applicable Rule 44 Job Code

Why Made Code 13, "Attention Required as Directed by EA"

Responsibility Code 1, "Owner's Responsibility"

Wheels Replaced

Applicable Rule 41 Job Code

Why Made Code 13, "Attention Required as Directed by EA"

Responsibility Code 1, "Owner's Responsibility"

Roller Bearings replaced

Applicable Rule 36 Job Code

Why Made Code 13, "Attention Required as Directed by EA"

Responsibility Code 1, "Owner's Responsibility"

Axle replacement

Applicable Rule 43 Job Code

Why Made Code 13, "Attention Required as Directed by EA"

Responsibility Code 1, "Owner's Responsibility"

Jacking Charge

Job Code 4458

Why Made Code 09, "Account Repairs"

Responsibility Code 1, "Owner's Responsibility"

- b. Remove car from this Equipment Advisory by reporting Activity Code MH
- c. Mark axles of captured wheel sets with orange tape and mark "EI-33" on the wheel plates to ensure proper handling by the receiving wheel shop.

- d. Mark the wheel plates and axle with the car number, the Why Made Code and location removed.
 - e. Send wheel sets matching the suspect wheel set information to wheel shop for quarantine.
- 3) Wheel Shops
- a. Quarantine any wheel sets matching the suspect wheel set information.
 - b. Send notification to wabl@aar.com with EI-33 as the subject, include equipment name and number, and how many wheel sets removed. (Example email subject header: EI-33, NS XXXXXX, # wheel sets)
- 4) Car Owner Counter Billing Procedures
- a. Car owners should request counter billing authority per AAR Office Manual Rule 112.

AAR and the WABL Committee will continue to monitor the situation and issue supplement(s) to this Advisory as warranted.

Questions regarding this Equipment Instruction Advisory should be directed to the WABL Committee Manager at wabl@aar.com.

Sincerely,
Ron Hynes
Assistant Vice President – Technical Services



Safety and Operations
Association of American Railroads
425 Third Street, SW, Suite 1000
Washington, DC, 20024

In accordance with AAR Interchange Rule 125, this Equipment Instructions is assigned SEVERITY CODE(S) and ESCALATION INTERVAL(S):

XX - Restricted at Interchange

Assignment Marks Associated with this Advisory:

AAR Only

Periodic Inspections:

There are no periodic inspection codes for this advisory.

Inspection Marks Associated with this Advisory:

Open

Allowable Final Inspection Codes Associated with this Advisory:

MH - Car inspected, defect found, repaired and returned to service.

MR - Car inspected, no defect found, and returned to service.

Equipment Locations Associated for Inspection Reporting:

Mechanical Designations Associated with this Advisory:

Component Registry:

This Equipment Instructions Advisory is NOT designated a Component Registry Advisory.

Cars Remaining on EI-0033 List

Total Assigned: 0

Total Remaining: 0

Severity XX: 0

**ASSOCIATION OF
AMERICAN RAILROADS****Equipment Instructions - Supplement****March 09, 2023****EI-0033 Supplement 01****File Number: TWBL-18A.6****Subject: NSC Loose Wheels****To: All Subscribers**

After further investigation, the WABL Committee has voted to cancel EI-0033 and has removed all remaining cars from the advisory. Wheel sets that were quarantined under this advisory can now be processed per MSRP G-II, 1.5.1 and 1.5.5. Car owners may request to have their quarantined wheel sets placed back under their own cars, per Field Manual Rule 36.E.20.

Original EI Provided Below for Information:

A member railroad has experienced three loose wheels in the subject car series. These cars are new builds. This advisory is issued to inspect and remove from service wheel sets that were mounted by National Steel Car (NSC-T) in the date range between 08-22 and 03-23 inclusive. These wheel sets are at an increased risk of an out of gage derailment.

All cars included in this advisory must be inspected for the wheel sets in question and reported as outlined below. Any cars, loaded or empty, found so equipped must have the NSC-T mounted wheel sets removed immediately as directed below. If available, replace suspect wheel sets with new wheel sets. Handle in accordance with the instructions for identification, inspection and counter billing outlined below.

Suspect Wheel Set Determination:

1. Car Series:
 - NS 162390 – 162749
 - NKLX 400000 – 400314
2. H-36 Wheel
3. Wheel Shop Mark: NSC T
4. Wheel Mounting Dates: 08-22 to 03-23 inclusive. (on one field side hub face)

Inspection Procedure and Determination

1. Inspect all wheel sets of each suspect car for wheel shop mark and wheel mounting date stamp. Both are located on the field side hub face of only one wheel per wheel set. The mate wheel will not have a mounting stamp. Refer to AAR Field Manual, Rule 41, Figure 41.44.
2. If the mark is NSC T, remove the wheel set. The T may be several inches to the right from NSC and may look like the number “1”.

3. If wheel mounting information is illegible remove the wheel set.

Instructions

- 1) Cars inspected and not equipped with suspect wheel sets
 - a. Any car inspected and found to not be equipped with a suspect wheel set is to be removed from this Maintenance Advisory by reporting Activity Code MR.
 - i. Report to car owner using normal AAR Billing

Inspection

Job Code 4454

Why Made Code 13, "Attention Required as Directed by EA"

Responsibility Code 1, "Owner's Responsibility"

- 2) Cars found with suspect wheel sets
 - a. Replace all suspect wheel sets with new wheel sets if available. Bill with all normally required AAR CRB details.
 - i. Report to car owner using normal AAR billing

Wheel set replacement

Applicable Rule 44 Job Code

Why Made Code 13, "Attention Required as Directed by EA"

Responsibility Code 1, "Owner's Responsibility"

Wheels Replaced

Applicable Rule 41 Job Code

Why Made Code 13, "Attention Required as Directed by EA"

Responsibility Code 1, "Owner's Responsibility"

Roller Bearings replaced

Applicable Rule 36 Job Code

Why Made Code 13, "Attention Required as Directed by EA"

Responsibility Code 1, "Owner's Responsibility"

Axle replacement

Applicable Rule 43 Job Code

Why Made Code 13, "Attention Required as Directed by EA"

Responsibility Code 1, "Owner's Responsibility"

Jacking Charge

Job Code 4458

Why Made Code 09, "Account Repairs"

Responsibility Code 1, "Owner's Responsibility"

- b. Remove car from this Equipment Advisory by reporting Activity Code MH
 - c. Mark axles of captured wheel sets with orange tape and mark "EI-33" on the wheel plates to ensure proper handling by the receiving wheel shop.
 - d. Mark the wheel plates and axle with the car number, the Why Made Code and location removed.
 - e. Send wheel sets matching the suspect wheel set information to wheel shop for quarantine.
- 3) Wheel Shops
- a. Quarantine any wheel sets matching the suspect wheel set information.
 - b. Send notification to wabl@aar.com with EI-33 as the subject, include equipment name and number, and how many wheel sets removed. (Example email subject header: EI-33, NS XXXXXX, # wheel sets)
- 4) Car Owner Counter Billing Procedures
- a. Car owners should request counter billing authority per AAR Office Manual Rule 112.

AAR and the WABL Committee will continue to monitor the situation and issue supplement(s) to this Advisory as warranted.

Questions regarding this Equipment Instruction Advisory should be directed to the WABL Committee Manager at wabl@aar.com.

Sincerely,
Ron Hynes
Assistant Vice President – Technical Services



Safety and Operations
Association of American Railroads
425 Third Street, SW, Suite 1000
Washington, DC, 20024

Information needed to create the advisory

- 1) Advisory Title (80 characters) – NSC Loose Wheels
- 2) Advisory Category (EI, IN, SH) – EI
- 3) Severity Levels (A9, A3, A2, A1, XX) – XX
- 4) Component Registry (Y/N) – N
- 5) File Number (12 characters) – TWBL-18A.6
- 6) Effective Date – 3/9/2023
- 7) Escalation? Yes, see 8-11. No, go to 12. – No
- 8) Escalation from A3 to A2
 - a. Duration
 - i. Time Period -
 - ii. Units (Days, Months, Years) -
- 9) Escalation from A2 to A1
 - a. Duration
 - i. Time Period -
 - ii. Units (Days, Months, Years) -
 - b. Interval
 - i. Quota Amount -
 - ii. Time Period –
 - iii. Units (Days, Months, Years) -
 - c. Replenish
 - i. Quota Amount -
 - ii. Time Period –
 - iii. Units (Days, Months, Years) –
- 10) Escalation from A1 to XX
 - a. Duration
 - i. Time Period -
 - ii. Units (Days, Months, Years) –
- 11) Scoring (Y/N) –
- 12) Assign Reporter Marks (AAR Only, Equip Owner, Internal, Specify) – AAR Only
 - a. Marks if applicable
- 13) Final Inspection Marks (Open, Internal, Specify) – Open
 - a. Marks if applicable
- 14) Final Inspection Codes (MH, MR, MO) – MH, MR
- 15) Periodic Inspections (Y/N) – N
 - a. Inspection Interval –
 - b. Time Unit (Days, Months, Years) –
- 16) Mechanical Designations –
- 17) Equipment Locations –

In accordance with AAR Interchange Rule 125, this Equipment Instructions is assigned SEVERITY CODE(S) and ESCALATION INTERVAL(S):

XX - Restricted at Interchange

Assignment Marks Associated with this Advisory:

AAR Only

Periodic Inspections:

There are no periodic inspection codes for this advisory.

Inspection Marks Associated with this Advisory:

Open

Allowable Final Inspection Codes Associated with this Advisory:

MR - Car inspected, no defect found, and returned to service.

MH - Car inspected, defect found, repaired and returned to service.

Equipment Locations Associated for Inspection Reporting:

Mechanical Designations Associated with this Advisory:

Component Registry:

This Equipment Instructions Advisory is NOT designated a Component Registry Advisory.

Cars Remaining on EI-0033 Supplement 01 List

Total Assigned: 692

Total Remaining: 0

Severity XX: 0

WSA

ORX
NTSB Investigation
NS Springfield Derailment
ORX TIPTON

REF		CAR	WSA	WHL SN	AXLE SN	National Transportation Safety Board										The World's Highest Standards In Railroad Wheel Sets	
A1	162581-1	2	05523	W0304	S	B-B	52.935	-0.066	127	152	132	120%	104%	11.1	NOTE whl dislodged outboard; galling (cold weld) on WS normal looking whl position normal looking whl position whl dislodged inboard		
A2	162581-1	2	05987	W0304	T	B-B	52.935	-0.065	129	163	142	126%	116%	11.7			
B1	162582-1	3	07084	W0218	S	dB-B	51.477	-1.523	116	106	80	83%	62%	9.0			
B2	162582-1	3	07340	W0218	T	B-B	54.392	1.392	135	174	162	144%	120%	12.3			
					d	dB-B	2.915	2.915	20	68	82	61%	57%	3.3			
REF	CAR	WSA	WHL SN	AXLE SN	SIDE	B-B	B-B	dB-B	OEM	BREAK	SLIDE	BREAK%	SLIDE%	SOUND	NOTE		
A1	162581-1	2	05523	W0304	S	54.392	54.392	1.392	116	166	136	144%	118%	medium	whl dislodged outboard; galling (cold weld) on WS		
A2	162581-1	2	05987	W0304	T	54.392	54.392	1.392	129	160	148	124%	115%	none	normal looking whl position		
B1	162582-1	3	07084	W0218	S	51.477	51.477	-1.523	135	174	162	129%	120%	none	normal looking whl position		
B2	162582-1	3	07340	W0218	T	51.477	51.477	-1.523	128	106	80	83%	62%	none	whl dislodged inboard		

WHEEL


ORX
NTSB Investigation
NS Springfield Derailment
ORX TIPTON

REF	WSA	WHL SN	YEAR	MO	MFG	TYPE	CLASS	SIDE	BOREavg	BOREback	BOREmid	BOREfront	TAPER	OOB	BOREback0	BOREback90	BOREmid0	BOREmid90	BOREfront0	BOREfront90	d
A1	2	05523	22	12	SW	H36	C	S	8.7449	8.7458	8.7453	8.7438	2.0	0.3	8.7459	8.7456	8.7453	gall	8.7439	8.7436	2.3
A2	2	05987	22	12	SW	H36	C	T	8.7476	8.7481	8.7477	8.7470	1.2	0.3	8.7482	8.7480	8.7477	8.7476	8.7468	8.7471	1.4
B1	3	07084	22	12	SW	H36	C	S	8.7463	8.7470	8.7463	8.7457	1.4	0.1	8.7471	8.7469	8.7463	8.7462	8.7457	8.7456	1.5
B2	3	07340	22	12	SW	H36	C	T	8.7484	8.7473	8.7475	8.7502	-2.9	1.1	8.7468	8.7478	8.7475	8.7476	8.7508	8.7496	4.0

AXLE

ORX
NTSB Investigation
NS Springfield Derailment
ORX TIPTON

REF	WSA	WHL SN	AXLE HEAT	AXLE SN	YEAR	MO	FORGE	SIDE	SEATavg	SEATback	SEATmid	SEATfront	TAPER	OOB	SEATback0	SEATback90	SEATmid0	SEATmid90	SEATfrnt0	d
A1	2	05523	4C1	W0304	22	12	SSD	S	8.7567	8.7576	8.7566	8.7560	1.5	0.2	8.7577	8.7574	8.7566	8.7565	8.7561	1.8
A2	2	05987	4C1	W0304	22	12	SSD	T	8.7591	8.7597	8.7591	8.7584	1.3	0.1	8.7597	8.7597	8.7591	8.7590	8.7585	1.4
B1	3	07084	4C1	W0218	22	12	SSD	S	8.7586	8.7593	8.7586	8.7579	1.4	0.1	8.7593	8.7592	8.7586	8.7586	8.7578	1.5
B2	3	07340	4C1	W0218	22	12	SSD	T	8.7573	8.7581	8.7571	8.7569	1.2	0.3	8.7583	8.7578	8.7570	8.7572	8.7569	1.5

 The World's Highest Standards In Railroad Wheel Sets												
REF	CAR	AXLE SN	WHL SN	SIDE	SEAT	LOC	Ra μ m	Ra μ -in	Rsk	Rku	Rmr50%	Rmr5
1	162581-1	W0304	05523	S	I	outboard	0.260	10.2	-2.545	14.642	1.10	100.0
2	162581-1	W0304	05523	S	I	inboard	0.671	26.4	-5.022	44.722	2.13	98.1
3	162581-1	W0304	05523	S	I	OEM	2.263	89.1	0.131	4.261	13.06	1.4
4	162581-1	W0304	05987	T	I	outboard	0.156	6.1	0.545	2.681	0.72	100.0
5	162581-1	W0304	05987	T	I	inboard	0.276	10.9	-0.252	2.894	0.92	100.0
6	162581-1	W0304	05987	T	I	OEM	2.365	93.1	0.668	2.966	9.00	11.4
7	162582-1	W0218	07084	S	I	outboard	0.093	3.7	-0.225	3.085	0.29	100.0
8	162582-1	W0218	07084	S	I	inboard	0.475	18.7	-0.075	4.384	2.10	100.0
9	162582-1	W0218	07084	S	I	OEM	2.689	105.9	0.755	2.531	9.82	14.8
10	162582-1	W0218	07340	T	I	outboard	0.386	15.2	-0.243	4.191	1.43	100.0
11	162582-1	W0218	07340	T	I	inboard	0.232	9.1	-0.054	3.599	1.03	100.0
12	162582-1	W0218	07340	T	I	OEM	1.445	56.9	0.099	3.088	5.16	45.7
	AVG						0.943	37.1	-0.518	7.754	3.90	72.6
	MED						0.431	16.9	-0.065	3.344	1.77	100.0
	MIN						0.093	3.7	-5.022	2.531	0.29	1.4
	MAX						2.689	105.9	0.755	44.722	13.06	100.0
	d						2.596	102.2	5.777	42.191	12.77	98.6

From: [Gordon Robert \(Joe\)](#)
To: [Hall Robert](#); [Hiller Michael](#); [Bachmeyer Michael](#); [Friso Ryan](#)
Subject: Fwd: National Steel Intercept Definition 8101
Date: Wednesday, March 8, 2023 9:06:05 PM
Attachments: [image003.png](#)
[image004.png](#)
[image005.png](#)

See below the NS intercept:

Stop car loaded or empty. All wheel sets must be replaced with new wheel sets.

These are the National Steel Car company cars like those from Springfield, OH.

Joe Gordon WSO-CSM
Railroad Branch Chief
(202) 841-5537

From: Rhine Don (Joey) <don.rhine@ntsb.gov>
Sent: Wednesday, March 8, 2023 8:34 PM
To: Gordon Robert (Joe) <robert.gordon@ntsb.gov>
Subject: FW: National Steel Intercept Definition 8101

From: [REDACTED]
Sent: Wednesday, March 8, 2023 11:18 AM
To: Rhine Don (Joey) <don.rhine@ntsb.gov>
Subject: FW: National Steel Intercept Definition 8101

[CAUTION] This email originated from outside of the organization. Do not click any links or open attachments unless you recognize the sender and know the content is safe.

Joey,

Below is the intercept issued:

Jason

From: Pennington, Randall E. <Randy.Pennington@nscorn.com>
Sent: Wednesday, March 8, 2023 2:07 PM
Subject: FW: National Steel Intercept Definition

Here's what the National Steel Intercept 8101 now says. Email below shows the original version.

 **Create Repair Work Order** ▾
Intercept Help Messages
Car Mark: NS162390


Intercept NS-8101 Help Message

STOP CAR LOADED OR EMPTY. ALL WHEEL SETS MUST BE REPLACED WITH NEW WHEEL SETS.

From: Pennington, Randall E.
Sent: Tuesday, March 7, 2023 10:12 PM
Subject: RE: National Steel Intercept Definition

Intercept 8101 has been added to 517 cars out of 675 within the target range of cars. The margin consists of cars that do not exist or they are in pre-registered status in Umler. The system will not allow me to apply an Intercept to pre-registered cars.

Here's what the Intercept looks like in EAM.

 Car List ▾

NS162390
 Current Track: 723
 Arrival Train: D402nd07
 Next Train:

INTERCEPT(S) BO REASON(S) CAR LOCATION WAYBILL CAR DETAILS CAR MOVE RESTRICTIONS SCABT

Intercepts	Priority	Description
NS-8101	09	NATIONAL STEEL NEW CAR WHEEL INSPECTION

 Create Repair Work Order ▾

Intercept Help Messages

Car Mark: NS162390

Intercept NS-8101 Help Message

STOP CAR LOADED OR EMPTY. INSPECT EACH WHEEL LOCATION AT THE AXLE AND WHEEL HUB INTERFACE. IF ANY LATERAL MOVEMENT OF THE WHEEL PLATE IS IDENTIFIED, WHEEL SET MUST BE REPLACED AND QUARANTINED. NOTIFY MANAGER CAR MAINTENANCE.

Randy