



NATIONAL TRANSPORTATION SAFETY BOARD
Investigative Hearing

Norfolk Southern Railway general merchandise freight train 32N
derailment with subsequent hazardous material release and fires,
in East Palestine, Ohio, on February 3, 2023

GROUP	H
EXHIBIT	
4	

Agency / Organization

Brotherhood of Railroad Signalmen

Title

**NS Operating Rules –
Defective Equipment Detectors**

DEFECTIVE EQUIPMENT DETECTORS

145. Defective Equipment Detectors

Locations, functions, and associated instructions of defective equipment detectors are listed by Timetable.

146. Train Inspection – “No Defect” Message For All Detectors

- (a) When no defects have been detected, the exit radio message will be:

“NS detector, milepost location, identification of track to which message is applicable (in multiple track territory),” and followed by “NO DEFECTS.”

- (b) If a “NO DEFECTS” message is received before the rear of train has cleared the detector, the train may proceed in accordance with **Rule 149 “Failure Messages.”**

147. Defect Message For All Detectors (Except Stress State Detectors)

- (a) When a train is occupying a detector and a defect has been detected, an automatic radio transmission as described below will occur:

- A defect warning alarm and/or a “TONE” will indicate that a defect has been detected.
- A defect warning message stating “CRITICAL ALARM” will indicate that an excessively hot journal or dragging equipment defect has been detected. The train must be immediately stopped for inspection, consistent with safe train handling procedures anytime a “CRITICAL ALARM” is received for detection of a hot bearing (hot box) or any dragging equipment defect.

- (b) When a non-critical defect message is received, the train must immediately reduce speed to not less than 8 MPH until the rear of the train clears the detector at which point the train must be stopped for inspection.

- (c) When the rear clears the detector, or a detector times out due to lack of movement, a radio message is transmitted to indicate nature of any defects and its location in the train by axle count, starting at the first axle in the locomotive consist.

148. Train Inspection – Defect Message For All Detectors (Except Stress State Detectors)

- (a) If train speed drops below 8 MPH while passing over the detector, and a “DEFECT” message is received, the train must be stopped and all cars must be inspected.
- (b) When an inspection is required, the crew must contact the Wayside Detector Help Desk. After briefing with the Help Desk:
 1. A thorough inspection must be made of the car(s) indicated as being defective. Except when relieved by the Help Desk, both sides of the cars must be inspected.
 2. The crewmember must take the necessary tools and supplies. Crews in road service must have a Temperature indicator and a hand-held counter accessible while on duty. The hand-held counter must be used to ensure the proper axle is inspected.

Exception (Not Applicable to Key Trains or Passenger Trains):

The Help Desk may relieve a crew from inspecting their train for defect alarms when information is available confirming it is safe to proceed. Trains relieved of inspection may proceed, in accordance with existing authority, at a speed not to exceed 30 MPH to the next detector or to the location where the car is to be set out, if applicable. Trains relieved of inspection at the last detector prior to entering a yard must notify the Yardmaster, or other designated authority to ensure a proper inspection is made.

- (c) The Inspection results must be provided to the Help Desk prior to the crewmember departing the car location.

149. Failure Messages

- (a) A train receiving no message or a failure message as listed:

“Analyzer Failure”,
“System Failure”,
“Detector Malfunction”,
“System Not Working”, or
“Train Too Slow”,

must contact the Help Desk and may proceed, in accordance with existing authority, at a speed not to exceed 30 MPH to the next detector provided:

1. Train is not a Key Train or Passenger Train.
 2. No erratic operation of the train is detected by the train crew.
 3. The previous detector over which the train passed detected “NO DEFECTS”.
- (b) A train receiving a failure message at the first detector after departing a yard, or on 2 consecutive detectors, must be stopped and a roll-by inspection of one (1) side of the train must be performed.
- (c) A train receiving a failure message at the last detector prior to entering a yard must notify the Yardmaster, or other designated authority, to ensure a proper inspection can be made.

150. Hotbox Detectors

- (a) When authorized by the Help Desk, after stopping, a roll by inspection may be performed on the side of the train indicated as having defects. The person making the inspection must visually monitor the train during the roll-by inspection for any defects, and must stop the train and inspect the cars identified as being defective.
- (b) Inspections must be made using a temperature indicator to determine if a bearing is overheated and car cannot continue in service. Results must be provided to the Help Desk.
- (c) If no apparent defects are found, 20-axles ahead and behind of the designated defect must be inspected for the noted defect.

151. Hot Wheel Detectors

- (a) When operating in single track territory, a train receiving a Hot Wheel defect alarm may proceed at a speed not to exceed 30 MPH to the next siding, multiple track, or yard location where the train must be stopped and inspected, provided:
1. Train is not a Key Train or Passenger Train.
 2. No erratic operation of the train is detected by the train crew.
 3. The Train Dispatcher is immediately notified of the Hot Wheel defect alarm and a job briefing held to determine the location where the train is to be stopped.
- (b) After stopping the train, a roll-by inspection may be performed. Prior to making the roll-by inspection, the Engineer must make a full service application of the air brakes, allowing sufficient time for a complete set and equalization of the brake system before initiating a release.

152. High Car and Clearance Detectors

- (a) If there is no transmission received after passing over a high car or clearance detector location or after a "DETECTOR NOT WORKING" or "SYSTEM FAILURE" message is received, the train must not pass through obstructions such as height restricted bridges, tunnels, etc., until inspection is made.
- (b) If a defect is detected at a radio alarm High Car Detector or Clearance Detector, in addition to checking the location specified, 2 cars (or 2 platforms on articulated equipment) ahead and behind the reported location must also be inspected, even if a defect is found at the reported location.

153. Stress State Detectors

Stress State Detectors (SSD) measure various stress levels that occur at the rail to wheel interface point as a train passes over the detector. These measurements include:

- Impact a rail wheel has on the track structure
- Imbalance loads resulting from improper loading and/or shifted loads

(a) Radio Messages:

1. Stress State Detectors are equipped to transmit via radio on the designated road channel either a “Non-Critical” or “Critical” alarm message when a defect is detected.
 - **Non-Critical** — NS SSD MP (milepost location) Track (designation). (Number of alarms detected) alarms detected. Contact Train Dispatcher.
 - **Critical** — Critical Alarm, Critical Alarm, Critical Alarm. NS SSD MP (milepost location) Track (designation). (Number of alarms detected) alarms detected. Contact Train Dispatcher.
2. “NO DEFECT” Message

If the SSD does not detect any alarm conditions, the detector will announce twice via radio on the designated road channel the following automatic message:

NS SSD MP (milepost location) Track (designation)— NO DEFECT

(b) Detector Alarms

When a Stress State Detector transmits via radio an alarm message (“Non-Critical” or “Critical”), the train:

- **Non-Critical**

May continue without stopping, not exceeding 30 MPH to the next forward mechanical repair location or other location designated by Division Timetable instructions, as determined by the Train Dispatcher where equipment must be set out.
- **Critical**

Must be stopped for inspection as soon as possible consistent with safe train handling procedures. If no defect(s) is found upon inspection, the train may proceed, not exceeding 30 MPH, to a location designated by Division Timetable instructions where equipment must be set-out. If a defect(s) is found upon inspection, coordinate with Mechanical Department to make the determination if the equipment is safe to move, including any additional handling restrictions.

(c) General Instructions

Trains that stop on a SSD or do not maintain a minimum of 15 MPH while passing over the SSD may receive multiple messages. When possible, stopping or reducing speed below 15 MPH should be avoided while passing a SSD. If speed drops below 15 MPH, proceed as though a train too slow message is received.