



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	B
EXHIBIT	
12	

Agency / Organization

NTSB

Title

Materials Laboratory Factual Report 23-039

National Transportation Safety Board
Office of Research and Engineering
Washington, DC 20594



RRD23MR005

MATERIALS LABORATORY

Factual Report 23-039

May 4, 2023

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A. ACCIDENT INFORMATION

Location: East Palestine, Ohio
Date: February 3, 2023
Vehicle: Norfolk Southern Railway freight train 32N
Investigator: Paul Stancil (RPH-20)

B. COMPONENTS EXAMINED

Debris collected from PRDs.

C. EXAMINATION PARTICIPANTS

Specialist Adrienne Lamm
National Transportation Safety Board
Washington, D.C.

D. DETAILS OF THE EXAMINATION

On February 3, 2023, about 8:54 pm, local time, eastbound Norfolk Southern Railway, general merchandise freight train 32N of the 1st (Train 32N), derailed on main track 1 of the NS Fort Wayne Line of the Keystone Division in East Palestine, Ohio. As a result of the derailment, 38 rail cars derailed and a fire ensued which damaged an additional 12 cars.

After the fires were extinguished, on-scene investigators observed accumulated debris in the pressure relief devices (PRDs) of several cars that were transporting the hazardous material. Samples were collected from the PRDs of three of the cars and sent to the NTSB Materials Laboratory in Washington, D.C. for analysis.

The PRDs were collected from the accident scene and subsequently bench tested at Trinity Rail Maintenance Services in Sagninaw, Texas on March 15, 2023. During testing, two additional samples were collected from two of the PRDs and sent to the NTSB Materials Laboratory for analysis.

Identifying information for the collected samples is listed in Table 1.

Table 1. PRD railcar IDs and sample location information

Railcar ID	Location of PRD During Sample Collection	Location of Sample on PRD
OCPX 80235	On-scene in East Palestine, OH	Taken from PRD top guide inside top fittings protective housing
OCPX 80179	On-scene in East Palestine, OH	Taken from top fittings protective housing
GATX 95098	On-scene in East Palestine, OH	Taken from top fittings protective housing
OCPX 80235	Bench-testing in Saginaw, TX	Taken from PRD top guide inside top fittings protective housing
GATX 95098	Bench-testing in Saginaw, TX	Taken from top fittings protective housing next to PRD

Photos of the collected samples are shown in Figures 1-5. The largest and most substantive piece of debris from each collected sample was chosen for analysis and are indicated by the red arrows in the photos. The identified pieces were analyzed using an Olympus Vanta x-ray fluorescence (XRF) alloy analyzer.

All the analyzed specimens had more than half their weight percent measured as aluminum. Along with the major element of aluminum, two specimens had a minor element of iron – the GATX 95098 specimen collected on-scene and the OCPX 80235 specimen collected during testing. Trace amounts of numerous additional elements made up the balance of each specimen.

Submitted by:

Adrienne V. Lamm
Materials Engineer



Figure 1. Macro photo showing the sample collected from rail car OCPX 80235 while on-scene. The red arrow points to the approximate location XRF measurements were taken on the piece of debris chosen for analysis.



Figure 2. Macro photo showing the sample collected from rail car OCPX 80179 while on-scene. The red arrow points to the approximate location XRF measurements were taken on the piece of debris chosen for analysis.



Figure 3. Macro photo showing the sample collected from rail car GATX 95098 while on-scene. The red arrow points to the approximate location XRF measurements were taken on the piece of debris chosen for analysis.



Figure 4. Macro photo showing the sample collected from rail car OCPX 80235 during PRD testing. The red arrow points to the approximate location XRF measurements were taken on the piece of debris chosen for analysis.



Figure 5. Macro photo showing the sample collected from rail car GATX 95098 during PRD testing. The red arrow points to the approximate location XRF measurements were taken on the piece of debris chosen for analysis.