NATIONAL TRANSPORTATION SAFETY BOARD
Meeting of June 25, 2024
(Information subject to editing)

Norfolk Southern Railway
Derailment and Hazardous Materials Release
East Palestine, Ohio
February 3, 2023
RRD23MR005

This is a synopsis from the NTSB's report and does not include the Board's rationale for the findings, probable cause, and safety recommendations. NTSB staff is currently making final revisions to the report from which the attached findings and safety recommendations have been extracted. The final report and pertinent safety recommendation letters will be distributed to recommendation recipients as soon as possible. The attached information is subject to further review and editing to reflect changes adopted during the Board meeting.

Executive Summary

What Happened

On February 3, 2023, about 8:54 p.m., eastbound Norfolk Southern Railway (NS) train 32N derailed 38 mixed freight railcars at milepost 49.5 on the NS Fort Wayne Line of the Keystone Division in East Palestine, Ohio. Three tank cars carrying flammable and combustible hazardous materials were mechanically breached during the derailment. A fire ignited during the derailment and grew to involve lading released from these three mechanically breached tank cars, additional derailed tank cars carrying both hazardous and non-hazardous materials, and freight cars. Emergency responders established a 1-mile evacuation zone that affected about 2,000 residents. The derailed equipment included five hazardous materials tank cars carrying vinyl chloride monomer (VCM), a compressed liquified flammable gas offered for shipment as "UN1086 vinyl chloride, stabilized, 2.1." The five VCM tank cars were not mechanically breached during the derailment, but over the next day, four of these tank cars were exposed to fires and released material from pressure relief devices. These releases ceased on the afternoon of February 4. Acting on information provided by NS and its contractors that a dangerous chemical reaction was occurring within a VCM tank car, the incident commander managing the response chose to expand the evacuation zone and perform a vent and burn (a deliberate breach of a tank car) on all five derailed VCM tank cars. The incident commander was not aware of dissenting opinions the VCM shipper had provided to NS and its contractors. A contractor hired by NS breached the VCM tank cars at 4:37 p.m. on February 6, releasing and igniting their lading. No injuries were reported during the derailment or emergency response.

What We Found

The derailment occurred because a bearing on a hopper car overheated and an caused an axle to separate. There was not enough evidence to determine whether a mechanical inspection conducted before the derailment failed to identify signs of bearing failure; the bearing may not have been showing visible problems at the time of the inspection.

A hot bearing detector traversed by train 32N detected an elevated temperature on the overheating bearing, but the low priority alert it transmitted to railroad personnel did not reflect the true condition of the failing bearing. Because of design constraints, hot bearing detectors are likely to indicate misleadingly low bearing temperatures. This limit on detector performance, combined with NS's standard operating procedures and the spacing between detectors, meant that the train's crew did not have adequate warning to stop the train before the derailment.

Research will be necessary to determine whether changes to wayside bearing defect detection systems—such as lower alert and alarm thresholds—would produce a significant safety improvement. Research is also necessary to determine what operational responses to bearing alerts and alarms are sufficient to prevent derailments.

The state of Ohio's laws regarding volunteer firefighter training were not sufficient to support a safe emergency response to the derailment. Further, the emergency response lacked efficient coordination because the responding agencies did not have common radio channels. Also hampering efforts was the illegible railcar placards after fire exposure. Delays in NS transmitting train consist information to emergency responders also increased responders' and the public's exposure to postderailment hazards.

The postderailment fires likely began because of hazardous materials released from a punctured DOT-111 tank car. The subsequent release of VCM from mechanically intact DOT 105 tank cars likely would not have occurred if the DOT-111 tank cars in the consist had survived the derailment. The presence of hazardous materials DOT-111 tank cars in a train can increase the risk of more resilient tank cars releasing hazardous materials following a derailment; the definition of key train does not account for this. Voluntary phase out of the remaining DOT-111 tank cars in hazardous materials service is technically possible but unlikely because of economic and business disincentives.

The VCM in the derailed DOT 105 tank cars remained in a stabilized environment (that is, was unable to undergo polymerization, a potentially dangerous chemical reaction) until those tank cars were deliberately breached with explosives (the vent and burn procedure). On-scene temperature trends did not indicate that a polymerization reaction was occurring and postaccident examinations confirmed this. The vent and burn procedure was not necessary to prevent a polymerization induced explosion. One source of information about polymerization consulted by NS and its contractors, The Chlorine Institute's Pamphlet 171, included misleading information about signs of polymerization. NS and its contractors continued to describe polymerization as an imminent threat when expert opinions and available evidence should have led them to reconsider their course of action. NS compromised the integrity of the decision to vent and burn the tank cars by not communicating expertise and dissenting opinions to the incident commander making the final decision. This failure to communicate completely and accurately with the incident commander was unjustified. The high local and environmental impacts of a vent and burn decision demonstrate the need for federal guidance about when to conduct a vent and burn.

Lastly, inward- and outward-facing recorders can provide the opportunity for railroads to verify train crew actions and for investigators to improve the quality of investigations and without a requirement we have missed an opportunity to record important safety data.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the derailment involving Norfolk Southern Railway train 32N was the failure of the L1 bearing on the 23rd railcar in the consist that overheated and caused the axle to separate, derailing the train and leading to a postderailment fire that likely began with the release of a Class 3 flammable liquid from a DOT-111 tank car that was punctured during the derailment. Contributing to the postderailment fire and the severity of the hazardous materials release was the continued use of DOT-111 tank cars in hazardous materials service. Also contributing to the severity of the hazardous materials release were (1) the failure of Norfolk Southern Railway and its contractors to communicate relevant expertise and dissenting opinions to the incident commander and (2) the inaccurate representation by Norfolk Southern Railway and its contractors that the tank cars were at risk of catastrophic failure from a polymerization reaction, which created unwarranted urgency and led to the unnecessary decision to vent and burn five derailed vinyl chloride monomer tank cars to prevent a polymerization-induced tank car rupture. Contributing to the exposure of emergency responders and the public to postderailment hazards were (1) Norfolk Southern Railway's delay in transmitting the train consist information to emergency responders and (2) the state of Ohio's insufficient training requirements for volunteer firefighters.

What We Recommended

As a result of this investigation, we issued 31 new recommendations and reiterated 1 previously issued recommendation. We also classified 4 previously issued recommendations.

We asked the Federal Railroad Administration (FRA) to conduct research on bearing defect detection systems, and recommended that the FRA use the results to establish regulations on related subjects:

- Railroads' use of bearing defect detection systems, including thresholds for alerts and alarms and distances between wayside detectors;
- Railroads' operational responses to bearing alerts and alarms; and
- Installation, inspection, and maintenance of wayside bearing defect detection systems.

We recommended that the Association of American Railroads develop a database of bearing failure and replacement data to help railroads, regulators, and investigators identify and address bearing failure risk factors.

We issued a recommendation to the state of Ohio to amend its statute limiting volunteer firefighter training and bring its training requirements in line with a widely accepted standard. To expand the reach of lessons learned at East Palestine, we recommended that the International Association of Fire Chiefs, the International Association of Fire Fighters, and National Volunteer Fire Council inform their members of the derailment and fire and encourage them to adopt training that meets a widely accepted standard. We also recommended that the National Volunteer Fire Council identify barriers to volunteer firefighter training and actions to address them.

To improve local preparedness, we recommended that the Columbiana County Emergency Management Agency develop a policy to immediately provide train consists to emergency responders and update its emergency plans to incorporate lessons learned from the East Palestine derailment.

We classified Closed—Acceptable Action a recommendation to the Pipeline and Hazardous Materials Administration (PHMSA) that it require railroads to immediately provide emergency responders with train consist information (R-07-4, Open—Unacceptable Response). We also recommended that NS review and revise its practices to ensure immediate communication of the consist to first responders. We made a new recommendation that PHMSA require that placards used to identify hazardous materials be able to survive accidents and fires.

We issued additional new recommendations to PHMSA expanding and accelerating the current phase out of DOT-111 tank cars from hazardous materials service and expanding the definition of high-hazard flammable trains to include a wider variety of hazardous materials and account for variations in how well different tank car specifications survive derailments. We made a related recommendation to the Association of American Railroads to account for the risk posed by certain tank cars in its definition of key train. We also recommended that the Association of American Railroads take steps to require manufacturers of tank car service equipment to demonstrate that their products are compatible with a tank car's intended lading and that the FRA monitor the Association of American Railroads' progress to ensure they address weaknesses in their approval process.

Regarding the vent and burn decision, we recommended that The Chlorine Institute review and revise its pamphlet on VCM to ensure that it is accurate and suited to supporting emergency responses, and that it change its CHLOREP program to make sure specialized emergency response contractors can appropriately respond to chemical hazards during a VCM incident; that Oxy Vinyls update its safety data sheet for VCM to ensure that it is accurate and also develop a policy to ensure that its expertise is communicated to the full incident command; that the American Chemistry Council and The Chlorine Institute make their members aware of the events at East Palestine and emphasize the importance of shippers communicating their expertise to the full incident command; that NS establish a policy of communicating all expert opinions to the full incident command and share information collected by its emergency response contractors with entities that provide hazardous materials guidance; that the FRA disseminate current and updated versions of its existing study on the vent and burn method to help guide incident commands in the future; and that PHMSA spread awareness of the FRA's most current guidance by referencing it in the next edition of the Emergency Response Guidebook. We made an additional recommendation to the International Association of Fire Chiefs, the International Association of Fire Fighters, and National Volunteer Fire Council to encourage the distribution of federal guidance about the vent and burn method.

We also classified Closed—Superseded recommendations to the Secretary of Transportation and the FRA regarding the installation and use of inward- and outward-facing audio and image recorders on locomotives (R-10-1, and R-10-2 to the FRA were Open—Unacceptable Response; R-19-7 to the Secretary of Transportation was Open—Await Response). We recommended that the FRA and

Secretary of Transportation take the actions described in the closed recommendations, obtaining legislative authority to act if necessary.

We reiterated one recommendation to the Class I railroads regarding installation and use of audio and image recorders (R-13-26, Open—Acceptable Response).

Conclusions

Findings

1. None of these issues contributed to the derailment of train 32N and subsequent hazardous materials release: (1) defects in railroad track or infrastructure; (2) the signals or train control system; (3) the train crew's proper train handling and appropriate response to the bearing alarm and derailment; (4) the marking, placarding, and method of loading for the derailed vinyl chloride monomer tank cars; (5) the weight and lading volume of the derailed hazardous materials tank cars; and (6) the mechanical crashworthiness of the derailed DOT-105 tank cars.

2. Train 32N derailed because the L1 bearing on railcar GPLX75465 overheated and caused the axle to separate, causing the railcar's lead truck to derail.

3. There is insufficient evidence to determine if the Terminal Railroad Association of St. Louis mechanical inspection of train 32N on February 1, 2023, failed to identify signs of failure on hopper car GPLX75465's L1 wheel bearing.

4. The non-critical alert transmitted by the Salem, Ohio, hot bearing detector did not reflect the true temperature and failing condition of the L1 wheel bearing.

5. A failing wheel bearing's actual internal temperatures will likely exceed external temperatures measured and reported by a hot bearing detector (HBD), and this limit on HBD accuracy is inherent in how current HBDs and railcar trucks are designed.

6. The combination of Norfolk Southern Railway standard operating procedures that required only continued monitoring for non-critical bearing alerts, the limited ability of hot bearing detectors to measure a bearing's actual internal temperature, and the distance between detectors did not give the train's crew adequate warning to stop the train before the suspect bearing failed and caused the derailment.

7. Without research into how differences in alert and alarm thresholds and varied distances between detectors affect the performance of wayside bearing defect detection systems, railroads and regulators lack the information to determine what changes would produce significant safety improvements.

8. Regulatory requirements for the installation, inspection, and maintenance of wayside bearing defect detectors would protect the reliability of these devices and improve the safety of railroad operations.

9. Because the effectiveness of wayside bearing defect detection systems depends on appropriate operational responses, and because the rail industry has yet to arrive at a consensus standard for these responses, research is necessary to determine what

operational responses to bearing alerts and alarms are sufficient to prevent bearing-related accidents.

10. A database capturing bearing failure and replacement information could help identify what factors pose an increased risk of burn-off so that railroads, regulators, and investigators can better address bearing-related safety issues.

11. While the East Palestine Fire Department deputy fire chief and other volunteer firefighters acted in good faith to protect their community, the initial emergency response did not conform to Emergency Response Guidebook guidance for fires involving tank cars and unknown materials; both the proximity of the first command post to the fire and the use of manned hoses near a fire involving unknown materials placed these firefighters at unnecessary risk.

12. The state of Ohio's statutory requirements for volunteer firefighter training were insufficient to support a safe emergency response to the East Palestine derailment led by a volunteer fire department.

13. Because there were not common radio channels between all responding agencies, the emergency response lacked efficient coordination.

14. The delayed transmittal of consist information by Norfolk Southern Railway to emergency responders needlessly increased the time emergency responders spent near the derailment pileup and delayed the evacuation order, resulting in unnecessary and increased exposure of emergency responders and the public to postderailment hazards.

15. The Pipeline and Hazardous Materials Safety Administration's Hazardous Materials: FAST Act Requirements for Real-Time Train Consist Information addresses the safety concerns of Safety Recommendation R-07-4.

16. The vulnerability of tank car placards to fire exposure resulted in illegible placards and hampered emergency responders' efforts to identify hazards.

17. The postderailment fire likely began with hazardous material released from a mechanically breached DOT-111 tank car, most probably the butyl acrylates released from tank car UTLX205907.

18. If DOT-111 tank cars transporting combustible and flammable liquids had not sustained mechanical breaches during the derailment, the DOT-105 tank cars transporting vinyl chloride monomer likely would not have been exposed to the fire conditions that led to concerns about polymerization and ultimately the vent and burn actions that released additional lading from those five DOT-105 tank cars.

19. Voluntary industry action to improve the safety of the tank car fleet by completing the phase out of remaining DOT-111 tank cars in flammable liquids service ahead of the Fixing America's Surface Transportation Act mandate is feasible, but such action is unlikely because of economic and business disincentives.

20. The presence of DOT-111 tank cars carrying hazardous materials in a mixed freight train increases the risk of lading releases from other, more resilient tank cars during a derailment.

21. The current Association of American Railroads tank car certificate of construction approval process lacks a means of verifying manufacturers' claims and is therefore insufficient to ensure that tank cars and their fittings are appropriate for their specified lading.

22. While the use of aluminum in the vinyl chloride monomer tank cars and pressure relief devices rendered them susceptible to thermal damage, there is insufficient evidence to determine whether this greater susceptibility created a safety hazard or contributed to the release of hazardous materials following the East Palestine derailment.

23. Cascading hazardous materials releases are not unique to high-hazard flammable trains, and the probability of a cascading hazardous materials release depends in part on variations in tank car survivability and on the presence of hazardous materials other than Class 3 flammable liquids, such as combustible liquids and Division 2.1 flammable gases.

24. The definition of key train in Association of American Railroads Circular OT-55 does not account for differences in survivability between different tank car specifications, and the DOT-111 and AAR-211 specifications can pose an elevated risk of a hazardous materials release compared to other specifications, such as the DOT-117.

25. Postaccident examinations, which found no solidified chemical matter blocking pressure relief devices and other tank car service equipment openings, do not indicate that a polymerization reaction occurred within any of the five vinyl chloride monomer tank cars.

26. The observed downward temperature trend in tank car OCPX80370 indicates that polymerization was not occurring within the tank car, contrary to the representation by Norfolk Southern Railway and its contractors.

27. The vinyl chloride monomer within the derailed DOT-105 tank cars remained in a stabilized environment until the vent and burn and did not undergo polymerization; the vent and burn procedure was not necessary to prevent a polymerization-induced tank rupture.

28. Language in The Chlorine Institute's Pamphlet 171 overstates the probability of vinyl chloride monomer polymerization in scenarios where tank cars remain intact, likely leading those using the pamphlet during an emergency response effort to overestimate the likelihood of polymerization.

29. Because Level 3 CHLOREP contractors are expected to provide advanced emergency response capabilities, including communicating expertise to other on-scene personnel and the transloading of vinyl chloride monomer (VCM), these contractors should possess or know how to obtain enough technical knowledge to accurately assess how chemical hazards, such as polymerization, affect a safe response to a VCM incident.

30. Information collected during real-world accidents is a vital resource in ensuring that hazardous materials guidance is suitable for supporting responses to transportation emergencies.

31. Norfolk Southern Railway and its contractors continued to assert the necessity of a vent and burn after expert opinion and available evidence should have led them to re-evaluate their initial conclusions regarding polymerization.

32. Norfolk Southern Railway and its contractors compromised the integrity of the vent and burn decision by creating unwarranted urgency and not communicating expert opinions and information completely and accurately to the incident commander.

33. The absence of Oxy Vinyls' expertise from the formal incident command denied the incident commander relevant information necessary to make a fully informed decision about the vent and burn.

34. No explanation or argument for Norfolk Southern Railway and its contractors' continued advocacy for the vent and burn procedure justifies failing to communicate relevant expertise and dissenting opinions to the incident commander.

35. The significant local and environmental impacts of a vent and burn decision demonstrate the need for federal guidance about what products and circumstances are candidates for the vent and burn method.

36. Inward- and outward-facing recorders can improve the quality of accident and incident investigations and provide the opportunity for proactive steps by railroad management to verify that train crew actions are in accordance with safety rules and procedures.

37. The Federal Railroad Administration's final rule in response to the Fixing America's Surface Transportation Act did not require audio recording in passenger locomotives and did not require inward- and outward-facing image and audio recording in freight rail locomotives, resulting in a missed opportunity to record important safety data.

Safety Recommendations

New Recommendations

As a result of this investigation, the National Transportation Safety Board makes the following new safety recommendations.

To the Secretary of Transportation:

1. Require the Federal Railroad Administration to issue regulations for inward facing recorders that include image and audio recordings as recommended by the National Transportation Safety Board in [RECOMMENDATION 10] and [RECOMMENDATION 11]. If necessary, obtain legislative authority to act on this recommendation.

To the Federal Railroad Administration:

2. Research the effectiveness of current bearing defect detection systems, identify minimum standards to protect railroad personnel and the public, and make public the results of this research.

3. Use the results of the research described in [RECOMMENDATION 1] to develop and establish minimum requirements for bearing defect detection systems, including criteria for bearing alert and alarm thresholds and maximum distances between wayside detectors.
4. Establish requirements for the installation, inspection, and maintenance of wayside bearing defect detectors to protect the reliability of these devices and improve the safety of railroad operations.
5. Use the results of the research described in [RECOMMENDATION 1] to develop and establish rules governing railroads' operational responses to bearing alerts and alarms.
6. Monitor the progress of the Association of American Railroads' (AAR) action on [RECOMMENDATION 16] and use your regulatory authority to ensure that the AAR addresses weaknesses in its tank car service equipment approval process.
7. Distribute the public versions of your 2007 vent and burn reports to emergency responder associations, including the International Association of Fire Chiefs, the International Association of Fire Fighters, and the National Volunteer Fire Council.
8. Update and re-publish your 2007 vent and burn reports to include clear instructions to consult the shipper when considering a vent and burn, more comprehensive guidance on what products are candidates for a vent and burn along with what chemical and other hazards may result, and an updated process flow chart incorporating lessons from the East Palestine vent and burn; the re-published reports should identify the questions an incident commander should ask when considering a vent and burn, distinguish the meaning of the answers, and identify the resources necessary to make an informed decision.
9. Make the updated versions of the 2007 vent and burn reports described in [RECOMMENDATION 7] available to emergency responder associations, including the International Association of Fire Chiefs, the International Association of Fire Fighters, and the National Volunteer Fire Council.
10. Require the installation, in all controlling locomotive cabs and cab car operating compartments, of crash and fire protected inward- and outward-facing audio and image recorders capable of providing recordings to verify that train crew actions are in accordance with rules and procedures that are essential to safety as well as train conditions. The devices should have a minimum 12-hour continuous recording capability with recordings that are easily accessible for review, with appropriate limitations on public release, for the investigation of accidents or for use by management in carrying out efficiency testing and systemwide performance monitoring programs. If necessary, obtain legislative authority to act on this recommendation.
11. Require that railroads regularly review and use in cab audio and image recordings (with appropriate limitations on public release), in conjunction with other performance data, to verify that train crew actions are in accordance with rules and procedures that are essential to safety. If necessary, obtain legislative authority to act on this recommendation.

To the Pipeline and Hazardous Materials Safety Administration:

12. Require that placards be able to survive fires and accidents and remain legible during such emergencies long enough to fulfill their functions as described in the Emergency Response Guidebook.

13. Obtain the necessary legislative authority and accelerate the deadline for removing specification DOT-111 tank cars from flammable liquids service.
14. Establish a tank car replacement schedule whereby non-pressure tank cars in any hazardous materials service must meet or exceed the safety standards of the DOT-117 specification; if necessary, obtain legislative authority to act on this recommendation.
15. Revise the definition of high-hazard flammable train to account for differences in survivability between tank car specifications and to include hazardous materials other than flammable liquids, such as combustible liquids and Division 2.1 flammable gases, that can contribute to cascading hazardous materials releases; if necessary, obtain legislative authority to act on this recommendation.
16. Distribute the Federal Railroad Administration's most current guidance on the vent and burn method to emergency response agencies by referencing it in the next edition of the Emergency Response Guidebook.

To the state of Ohio:

17. Amend your firefighter training statute and revise your volunteer firefighter certification standards to meet the NFPA 1010 standard for professional firefighters.

To the Columbiana County Emergency Management Agency:

15. Adopt a policy to, upon receipt of a train consist, immediately provide it to the incident commander and all appropriate response agencies and departments.
16. Update your Emergency Operations Plan, Hazardous Materials Response Plan, and Hazard Mitigation Plan, as appropriate, with lessons learned from the East Palestine derailment and fire, including, at a minimum, coordination among response agencies, communications, requests for and distribution of the train consist, staging and availability of equipment and other resources, and training for emergency responders.

To the Association of American Railroads:

17. Develop a database of bearing failures and replacements and make it available to railroads, regulators, and investigators to help determine and address failure risk factors.
18. Revise the Manual of Standards and Recommended Practices, M-1002, Specifications for Tank Cars, to establish criteria and procedures for manufacturers of tank car service equipment to demonstrate compatibility of pressure relief devices and other Association of American Railroads-approved service equipment with intended ladings.
19. Revise the definition of key train in Circular OT-55 to designate as a key train any train containing tank cars transporting hazardous materials that do not meet the DOT117 standard.

To the National Volunteer Fire Council:

20. Identify barriers to adequate fire and emergency response training for volunteer firefighters, particularly for situations where hazardous materials are present, and publish actions states, municipalities, and the private sector can take to provide the flexibility necessary for volunteer firefighters to obtain training.

To the International Association of Fire Chiefs, the International Association of Fire Fighters, and the National Volunteer Fire Council:

21. Advise your members of the circumstances of the East Palestine derailment and fire, identify fire departments whose personnel are not trained to the NFPA 1010 standard for professional firefighters, recommend that these departments adopt training that meets this standard, and inform them of funded training opportunities available through private, state, and federal programs.
22. Advise your members of the circumstances surrounding the vent and burn at East Palestine, the importance of obtaining information from the shipper when considering a vent and burn, and the availability of federal guidance on when the vent and burn method may be appropriate.

To The Chlorine Institute:

23. Review and revise Pamphlet 171 to ensure that its safety messages about vinyl chloride monomer polymerization in tank cars are accurate and adequately support determining whether a rail accident poses a risk of polymerization.
24. Review and revise your Chlorine Emergency Plan training and verification programs to ensure that Level 3 contractors possess or can obtain enough technical knowledge of vinyl chloride monomer (VCM) to accurately assess and respond to chemical hazards like polymerization during a VCM incident.

To the American Chemistry Council and The Chlorine Institute:

25. Advise your members of the circumstances of the East Palestine derailment and fire and the need for shippers to ensure their expertise is communicated to and shared with the full incident command.

To Norfolk Southern Railway:

26. Review and revise your procedures to immediately provide emergency responders with an accurate copy of the train consist upon becoming aware of an accident.
27. Update your submissions to the Pipeline and Hazardous Materials Safety Administration's Incident Database to accurately reflect the cause of package failures following the East Palestine derailment.
28. Adopt policies to ensure that your emergency response contractors keep detailed records of information used to make decisions involving hazardous materials, and share this information with shippers, relevant chemical associations, and other entities that provide hazardous materials guidance.
29. Develop a policy to ensure that the expertise of manufacturers and shippers of hazardous materials involved in transportation accidents or incidents is communicated to your on scene representatives and contractors and shared with the full incident command.

To Oxy Vinyls, LP:

30. Update the safety data sheet for vinyl chloride monomer (VCM) to accurately reflect the potential risks of VCM and the hazards that increase such risks.

31. Develop a policy to ensure that expertise on chemicals manufactured and offered for transportation by Oxy Vinyls is communicated to and shared with the full incident command during transportation accidents or incidents.

Previously Issued Recommendations Reiterated in this Report

To the Class I railroads:

Install in all controlling locomotive cabs and cab car operating compartments crash- and fire-protected inward- and outward-facing audio and image recorders. The devices should have a minimum 12-hour continuous recording capability. (R-13-26)

Previously Issued Recommendations Classified in this Report

To the Secretary of Transportation:

Require the Federal Railroad Administration to issue regulations for inward-facing recorders that include image and audio recordings as recommended by the National Transportation Safety Board in R-10-1 and R-10-2. (R-19-7)

Safety Recommendation R-19-7 is classified Closed—Superseded in section 2.6 of this report.

To the Pipeline and Hazardous Materials Safety Administration:

With the assistance of the Federal Railroad Administration, require that railroads immediately provide to emergency responders accurate, real-time information regarding the identity and location of all hazardous materials on a train. (R-07-4)

Safety Recommendation R-07-4 is classified Closed—Superseded in section 2.3.2 of this report.

To the Federal Railroad Administration:

Require the installation, in all controlling locomotive cabs and cab car operating compartments, of crash- and fire-protected inward- and outward-facing audio and image recorders capable of providing recordings to verify that train crew actions are in accordance with rules and procedures that are essential to safety as well as train conditions. The devices should have a minimum 12-hour continuous recording capability with recordings that are easily accessible for review, with appropriate limitations on public release, for the investigation of accidents or for use by management in carrying out efficiency testing and systemwide performance monitoring programs. (R-10-1)

Safety Recommendation R-10-1 is classified Closed—Superseded in section 2.6 of this report.

Require that railroads regularly review and use in-cab audio and image recordings (with appropriate limitations on public release), in conjunction with other

performance data, to verify that train crew actions are in accordance with rules and procedures that are essential to safety. (R-10-2)

Safety Recommendation R-10-2 is classified Closed—Superseded in section 2.6 of this report.