



DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

Safety Advisory 2023-07; Review and Implement New Predictive Weather Modeling and Proactive Safety Processes across the National Rail Network to Prevent Weather-Related Accidents and Incidents

AGENCY: Federal Railroad Administration (FRA), Department of Transportation (DOT).

ACTION: Notice of safety advisory.

SUMMARY: Since the beginning of 2021, 123 rail accidents/incidents have been reported to FRA as having been caused, in whole or in part, by severe weather conditions or weather-related events (e.g., hurricanes, tornadoes, wildfires, flooding, mudslides, and summer heat). These extreme weather conditions and events not only present hazards to railroad workers, operations and infrastructure but can also severely impact the customers and communities relying on the railroads for travel and transportation of critical goods. To reduce weather-related accidents/incidents and improve the efficiency of the national rail network during severe weather events, FRA is issuing this Safety Advisory to recommend that railroads review existing policies, procedures, and operating rules related to predicting, monitoring, communicating, and operating during severe weather conditions or subsequent to extreme weather events. FRA also recommends that railroads collaborate to develop best practices for utilizing weather forecasting technologies, predictive weather models, and weather-related action plans throughout the industry.

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Disclaimer: This Safety Advisory is considered guidance pursuant to DOT Order 2100.6A (June 7, 2021). Except when referencing laws, regulations, policies, or orders, the information in this Safety Advisory does not have the force and effect of law and is not meant to bind the public in any way. This document does not revise or replace any previously issued guidance.

SUPPLEMENTARY INFORMATION:

Background

From January 2021 through the end of July 2023, there have been 123 accidents/incidents reported to FRA where one of the cause codes was related to weather conditions (cause codes M102, M103, M105, M199, and T109 on FRA Form 6180.54). Over half of these accidents/incidents were main-track derailments. A detailed breakdown is provided below:

Accident Cause	Number of Incidents	Number of Mainline Derailments
M102 - Extreme environmental condition - TORNADO	11	4
M103 - Extreme environmental condition - FLOOD	16	10
M105 – Extreme environmental condition – EXTREME WIND VELOCITY	40	12
M199¹ – Other extreme environmental conditions	7	0
T109 - Track alignment irregular (buckled/sun kink)	49	40

FRA has previously issued Safety Advisories concerning weather-related accidents/incidents. On September 4, 1997, FRA issued Safety Advisory 97-1, recommending safety practices to reduce the risk of casualties from train derailments

¹ Includes all other environmental conditions such as falling trees, rockslides, ice or snow, etc.

caused by damage to tracks, roadbeds, and bridges resulting from uncontrolled water flows and similar weather-related phenomena. FRA amended Safety Advisory 97-1 on November 14, 1997, by revising the recommendation concerning the transmission of flash flood warnings to train dispatchers or other employees controlling the movement of trains.

Additionally, FRA issued Safety Advisory 2012–03 on July 16, 2012, to remind track owners, railroads, and their employees of the importance of complying with their continuous welded rail (CWR) plan procedures and reviewing their current internal engineering instructions that address inspecting CWR track to identify conditions that increase the likelihood of buckling of rail. To heighten awareness of the potential consequences of an unexpected track buckle, particularly considering the unusually high and prolonged, record-breaking temperatures that affected much of the United States in the summer of 2012, Safety Advisory 2012-03 highlighted a series of train accidents that were caused by the rail buckling under severe heat conditions (commonly referred to as sun kinks in the rail). The number of mainline derailments caused by track buckles or sun kinks continues to be unacceptable to FRA.

In addition to FRA’s Safety Advisories, MxV Rail Service released a Technology Digest Article earlier this year, addressing some of the challenges the rail industry is experiencing with weather and heat-related track defects.²

Recommendations

In light of the continued occurrence of weather-related rail accidents/incidents, FRA is making the following recommendations to railroads:

- 1. Railroads should evaluate their communication and training programs, rules, policies, and procedures related to severe weather and ensure those**

² MxV Rail Technology Digest TD23-015, *Climatic Impacts on Railroad Infrastructure* (July 2023) (available at <https://www.mxvrail.com/technology-digest/>).

programs are adequate to ensure weather-related action plans can be promptly implemented. In evaluating these rules, policies, and procedures, railroads should ensure preparation and response training curriculums are up to date and include critical information necessary for operating personnel, whether simulated drills are performed to test employee response and recovery from severe weather events, whether employees receive sufficient training on weather monitoring software (including updated new training when software enhancements are introduced); whether policies and procedures for communicating weather events are adequate; whether backup communication and dispatching systems are present and tested regularly; and whether evacuation and safety plans are all-encompassing, to include railroad personnel working in the field and those in transit (e.g., on the rails, in yards, and traveling on roadways).

2. Railroads should evaluate their weather forecasting policies and procedures. In assessing the relevant policies and procedures, railroads should consider integrating weather forecasting policies and procedures (and the outcomes from those policies and procedures) into dispatch operations and whether those policies and procedures should be incorporated into positive train control systems. Railroads should additionally consider whether the National Oceanic and Atmospheric Administration (NOAA) and United States Geological Survey (USGS) predicting, and monitoring capabilities are utilized adequately and consistently within those policies and procedures.

3. Railroads should evaluate their operating infrastructure to identify critical and geographical elements susceptible to severe weather events. Railroads should identify operating infrastructure sensitive to extreme weather events and review plans and policies to monitor the infrastructure proactively and reactively. Railroads should consider issues such as whether technology can be introduced to monitor critical infrastructure in real-time and how weather-related action plans can be revised to establish standardized interfaces with other railroads, agencies, and municipalities (e.g.,

United States Coast Guard and local and State authorities) in the event of a weather-related event. Railroads should review and update these plans and policies periodically and ensure weather-related action plans address specific risks to the identified critical infrastructure.

4. Railroads should evaluate existing weather-related action plans and ensure that those plans detail the necessary proactive planning, maintenance, communication, and other actions necessary to address the risks presented by severe weather conditions. As part of these action plans, railroads should consider developing and implementing an auditing program for severe weather alert systems or other alternative methods to ensure such systems remain in working condition. Railroads should ensure such systems are tested routinely, and their functionality is consistent with all current weather-related action plans.

5. Railroads should establish standard operating thresholds to ensure their weather-related action plans adequately prepare for severe weather events. Railroads should ensure sufficient rules, policies, and procedures are implemented and periodically reviewed and updated to enable effective determinations as to when it is safe to operate in extreme weather conditions and when it is not (considering environmental exposures for railroad personnel and other relevant factors). Rules, policies, and procedures should address weather events such as wind, heat, cold, flooding, flash flooding, tornadoes, hurricanes, fire, visibility, snow, ice, sand drifts, earthquakes, landslides, and environmental factors such as the air quality index.

6. Railroads should work together to develop best practices for utilizing weather forecasting technologies, predictive weather models, and weather-related action plans throughout the industry. In doing so, railroads should consider how much deviation exists between railroads related to operational weather rules, policies, and procedures. Railroads should consider whether those deviations are justified and to what

extent rail safety would benefit from industry-wide standardization of weather-related rules, policies, procedures, and weather-related action plans in general. Railroads should also consider whether individual railroad weather-related rules, policies, and action plans include adequate collaboration with tenant and interchange railroads

Conclusion

FRA encourages all railroad industry members to take actions consistent with the recommendations of this Safety Advisory to prevent weather-related accidents/incidents. FRA may modify this Safety Advisory, issue additional safety advisories, or take other appropriate action necessary to ensure the highest level of safety on the Nation's railroads, including pursuing other corrective measures under its rail safety authority.

Issued in Washington, DC.

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