[Federal Register: August 10, 2004 (Volume 69, Number 153)]
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[DOCID:fr10au04-158]

DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

Notice of Safety Advisory 2004-02

AGENCY: Federal Railroad Administration (FRA), DOT.

ACTION: Notice of safety advisory.

SUMMARY: The Federal Railroad Administration (FRA) is issuing Safety Advisory 2004-02 to address the importance of having clear safety and response procedures for use in the event of reports of railroad signal system problems.

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SUPPLEMENTARY INFORMATION:

Background: The National Transportation Safety Board (NTSB) and FRA conducted an investigation following a major train derailment. The conclusions of this investigation and the report issued by the NTSB, RAR-03/05, provide the underlying basis for the recommendations issued in this Safety Advisory. The derailment occurred on September 15, 2002, at Farragut, Tennessee, when a westbound

Norfolk Southern train consisting of 3 locomotives, and 142 cars, traversed a defective switch and derailed two locomotives and the first 25 cars. This derailment caused a tank car containing sulfuric acid to puncture. The resultant spill produced a cloud of toxic fumes, prompting the evacuation of approximately 2,600 residents, from a 4.4 square mile area around the derailment site. While there were no fatalities, a number of the local residents required treatment for minor respiratory difficulties. Damages were estimated to be in excess of $1 million.

The post-accident investigation revealed that an eastbound freight train traversing the territory approximately two hours prior to the derailment received an approach and then a restricting signal indication at the west end of a siding in approach to a spring switch. In accordance with railroad operating instructions, the train speed was reduced from the normal track speed of 50 m.p.h. to 30 m.p.h. and the train crew was prepared to stop at the next signal, which was indicating ``Restricting''. The train dispatcher was notified of the signal aspects that were displayed. Upon reaching the spring switch the train stopped and the train's conductor checked the switch. The normally closed point of the switch was found to be gapped approximately \1/4\-inch. The conductor manually operated the switch back and forth several times between the normal to reverse position, attempting to properly seat the point snugly against the stock rail. However, the point remained gapped approximately \1/8\-inch from the normal closed position. The train crew then notified the dispatcher that the point was not properly seated. The dispatcher informed the train crew that signal personnel would be notified and permitted the train to continue its eastbound trailing movement over the switch.

A signal maintainer was called to the site. Upon his arrival at the switch, he conducted a visual inspection from the leading edge of the switch points to the heel blocks, noting that the point rail was snugly seated against the stock rail. He also noted that the westward governing signal over the switch (facing direction) was displaying a clear indication. The signal maintainer then called to inform the dispatcher that the switch point appeared to be properly aligned and requested a track warrant to occupy the track so that tests could be made on the spring switch and switch circuit controller to determine why the point had gapped. The dispatcher informed the signal maintainer that two westbound trains were en-route toward the switch. The signal maintainer replied that he would wait until the two trains passed over the switch before continuing his inspection.

While waiting to receive a track warrant to occupy the track, the signal maintainer overheard the crew of the first train, as they were approaching the leading edge of

the switch points, call out a clear signal over his radio. As the freight train traversed the switch point at 38 m.p.h., the train derailed.

Post-accident investigations conducted by the NTSB and the FRA indicated that the probable cause of the derailment could be attributed to the point of a spring switch being obstructed by a clip bolt. The clip bolt had apparently broken from the fourth switch-rod located approximately 80 inches from the leading edge of the switch point and lodged between the base of the stock rail and point rail. Inspection and operational tests of the spring switch immediately after the derailment revealed that the switch and the switch circuit controller were adjusted within specification and functioned as intended. However, there was a groove worn into the base of the stock rail along with a flare imprinted onto the base of the point rail, indicating that the points had been obstructed by the broken switch rod bolt, preventing the point rail from seating snugly against the stock rail. It was determined that when the first train traversed the switch, the tip of the point rail was shoved over into a snug position against the stock rail and was in this position when the maintainer observed it. However, when the ensuing train movement was made in the facing direction, the tip of the point rail was forced slightly open (gapped) because of a ``fulcrum'' effect introduced by the broken switch clip bolt lodged between the stock rail and the point rail in the mid-portion of the switch. This condition resulted in the switch point being split by a wheel flange and caused the ensuing derailment.

In assessing the chain of events leading up to this derailment, the NTSB concluded that the root causes of this derailment were: ``(1) The decision by the train dispatcher and the signal maintainer to allow the train to proceed in a facing point direction over the spring switch at maximum authorized speed before the switch had been adequately inspected or clamped closed; and (2) the lack of company procedures requiring that train dispatchers, after receiving a report of a problem involving a main track switch, to immediately stop trains or implement an appropriate speed restriction in the affected area.'' The FRA fully agrees with the NTSB's assessment of the probable cause of the derailment. Federal regulations addressing this issue are found in 49 CFR 236.11 which states:

When any component of a signal system, the proper functioning of which is essential to the safety of train operation, fails to perform its intended signaling function or is not in correspondence with known operating conditions, the cause shall be determined and the faulty component adjusted, repaired, or replaced without undue delay.

This rule requires a railroad to take action to determine the cause of each unexpected ``stop'' or ``stop and proceed'' signal indication and to determine if there is any failed or defective component in the system. This requirement is used to ascertain any effect on train movement safety and when necessary requires adjustment, repair, or replacement of the defective component. Both aspects of the requirement must occur without undue delay.

Signal systems are required to be installed and maintained on the ``fail-safe'' principle and to detect a number of specific conditions that affect the safety of train operations. Many factors can be involved in situations where the signal aspect is not in correspondence with known operating conditions or a component is not functioning as intended. FRA believes that adherence to the requirements of section 236.11, along with the protective measures provided by crew adherence to the corresponding operating rules, provide the needed measure of safety, until a qualified person can determine a cause of the problem and its effect on train operations. The rule requires that this determination and repairs be made ``without undue delay'' i.e., they should be made in as timely a manner as possible. In those cases, railroads may need to institute temporary safety measures, until the problem can be resolved. However, FRA expects railroads to determine the cause and restore signal systems to proper functioning without undue delay, taking into consideration factors such as rail traffic, whether highway/rail grade-crossings are involved, and other related factors.

Furthermore, additional factors are involved in instances of intermittent signal problems (e.g., signal aspects not in correspondence with known operating conditions, track occupancy lights (TOLs), or points of a switch not closed in proper position), which subsequently ``clear up'' on their own. There are nearly an infinite number of conditions that could cause intermittent signal problems, many of which could remain a safety concern, even when seemingly resolving themselves (e.g., a broken rail or pull-apart where the track circuit is intermittently affected, or a switch problem similar to that of the described accident). Signal systems are not capable of indicating differences between the most obvious safety concerns, such as track occupancy by a train or an improperly positioned switch and relatively minor nuisance-type occurrences such as a momentary external short on a track circuit, or a broken wire. In these instances, prudent safety precautions should be followed.

FRA recognizes the circumstances under which the events unfolded causing the subject accident, since conditions appeared to be safe and proper to the signal maintainer upon his arrival. The decision to immediately conduct proper inspection and testing of the switch (in this instance) or other signal component should not be left up to the individuals involved. That decision should instead be clearly addressed in railroad prescribed procedures which should provide priority for such inspection and testing.

FRA has reviewed the procedures used by major railroads to determine if they adequately address signal issues or conditions (i.e., switch problems, track occupancy lights, track defects, etc.) that may interfere with the safe passage of a train or locomotive. In reviewing these procedures, FRA has determined that although each of the railroads have procedures in place, there are specific actions that can be taken to improve these procedures. Therefore, FRA is recommending that when responding to a trouble call, a railroad signal maintainer, technician, or maintenance of way employee should receive priority in occupying track so that inspections and operational tests can be conducted to ensure that no unsafe conditions exist. For example, consider the events of the aforementioned derailment. Although the conductor reported the gapped points to the dispatcher, as required by railroad instructions, the signal maintainer was not given priority for track occupancy so that sufficient inspection and operational tests could be conducted on the switch to determine the cause. Had the maintainer tested the switch prior to the train's arrival, the derailment may have been prevented.

It is important to note that 49 CFR 213.135(b) of the Track Safety Standards states in part ``Each switch point shall fit its stock rail properly, with the switch stand in either of its closed positions to allow wheels to pass the switch point. Lateral and vertical movement of a stock rail in the switch plates or of a switch plate on a tie shall not adversely affect the fit of the switch point to the stock rail." Railroads are encouraged to have both signal and track employees trained to comprehensively understand the interface between the point and stock rails (tip to heel) and associated hardware.

Recommendations

Based on the above, FRA strongly recommends that:

1. Any railroad employee encountering a condition that could interfere with the safe passage of a train should promptly report the condition or defect to the train dispatcher. Train dispatchers, upon receiving reports of potentially

hazardous conditions involving a signal system or component, including any track segment or switch should immediately issue instructions to stop train movements or immediately implement an appropriate speed restriction, not to exceed 20 mph, for the affected area. These restrictions should remain in effect until the component or trackage in the affected area is properly inspected and/or tested by a qualified employee to determine the cause and make any necessary repairs, replacements or adjustments.

2. Each railroad should ensure that it has procedures for responding to trouble calls that include providing priority in occupying track to a signal maintainer, technician or maintenance of way employee investigating a report of a signal system or component failure so that proper and sufficient inspections and tests may be conducted to determine the cause of the failure.

3. Each railroad should ensure that it has inspection and test procedures that will assure sufficient and proper inspection and testing to determine the cause of signal system or component failures.

   For example, in the event of a found or reported switch problem, switch inspection and tests sufficient to determine the cause of the problem and detect any unsafe condition should be conducted. In this case, a minimum inspection and test would include the elements of inspecting not only the switch point rails (point to heel), but also all of the switch rods, operation of the switch through its full range of motion and testing the switch circuit controller or point detector for proper adjustment

4. Each railroad should ensure that when a signal problem is suspected, detected, or reported, applicable signal personnel should be notified of the occurrence and provided with any applicable information about the circumstances. This will aid the signal department in attempting to determine the cause of recurring signal trouble.

Issued in Washington, DC, on August 3, 2004.
Grady C. Cothen, Jr.,
Acting Associate Administrator for Safety.
[FR Doc. 04-18193 Filed 8-9-04; 8:45 am]

BILLING CODE 4910-06-M