

# On Guard



US Department of Transportation

## THE HAZARDS OF OPERATING MULTIPLE TRAILERS

5 axle tractor-semitrailer with 45 ft trailer



3 axle tractor-semitrailer with 27 ft trailer



turnpike double 45 ft trailers



B-train double 27 ft trailers



Rocky mountain double—45 ft & 27 ft trailers



California truck full trailer



65 ft conventional double—27 ft trailers



triple 27 ft trailers



### TRUCKERS AND CARRIERS!

According to accident reports cited by the National Transportation Safety Board (NTSB) from a study on heavy trucks: accidents involving combination tractors with multiple trailers indicate that many truck drivers are making the transition from driving single trailer units to combination tractors with multiple trailers (doubles and triples) with little or no training on the hazards of operating these units . . . and without any behind-the-wheel training. (1)

Do not assume that a driver of a semi-trailer combination unit can easily make the switch to a multiple trailer unit with little or no special training. The controllability and maneuverability of these multiple trailer units can vary greatly between straight truck and even single-unit trailer configurations.

For example:

- The small tractor steering movements or braking applications, particularly in a lane change, are magnified by a second trailer and can reach uncontrollable levels, producing considerable yawing and subsequent rollover.
- The chances of the rear trailer unit rolling over during a sharp turn vary with the combination trailer unit configuration. The last trailer of a triple with 27-foot trailers is 3½ times more apt to roll over in a sharp turn than a 5-axle tractor semi-trailer with a 45-foot trailer. (2)
- The height and positioning of cargo in a combination vehicle are even more important than in straight trucks in determining the likelihood of a rollover.
- The type of cargo also contributes to the likelihood of a rollover. With bulk liquids, for instance, sudden steering movements or braking applications can cause product surge in a tank vehicle and shifting of the vehicle's center of gravity.

The following accident summaries from the NTSB study on heavy trucks illustrate the controllability and maneuverability hazards in operating combination tractors with multiple trailers:

- The driver of a twin trailer combination unit lost control when he steered sharply left to pass an automobile on an interstate highway. Both trailers began swinging from side to side. The first trailer then struck the automobile, and the rear trailer broke away and rolled over.

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- The driver of a twin trailer combination unit was taking a right curve on a downward mountain grade, when he felt the rear trailer begin a violent counter-clockwise rotation. The rear trailer broke away, rolled over onto its left side, slid through a guardrail and down a mountain slope before it came to rest.
- The driver of a twin trailer combination unit ran off the right side of an interstate highway and struck a concrete drainage cover at the outer edge of the shoulder. When he steered left to return the unit to the roadway, the rear trailer broke away and rolled over.
- A driver of a twin trailer unit on a two-lane highway made a sharp right steering maneuver onto the grassed shoulder to avoid an oncoming automobile. When the driver steered back onto the roadway, the rear trailer began weaving laterally; it broke away from its coupling pin and rolled over.
- The driver of a twin trailer unit was taking a right curve on a downgrade when the rear trailer began weaving on the roadway. The weaving became rapid; the trailer broke away from its coupling pin and rolled over on the roadway.
- The driver of a twin cargo tank trailer combination unit was taking a left curve on a downward mountain grade when the rear trailer began swinging laterally. As the unit continued through the curve, the rear trailer broke away and rolled over. The driver had 10 years' experience driving combination units but only 2 weeks driving twin trailer units.

*These were experienced single trailer unit drivers in the above examples. Yet, they reported having training ranging from no formal training in the operation of multiple trailers to a maximum of a single trip behind the wheel of a similar vehicle with a senior driver. Most of the drivers only had training on the inspection and hookup of multiple trailers.*

Drivers must have adequate driver training, both on the road and in the classroom, to make them aware of the variables that influence the controllability and maneuverability of the multiple trailer configurations and how these variables compare to and contrast with those that affect operation of the semi-trailer combination.

**DRIVERS SHOULD NOT BE DRIVING THESE MULTIPLE TRAILER COMBINATION UNITS WITHOUT THIS SPECIALIZED TRAINING.**

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(1) "Case Summaries of 189 Heavy Truck Accident Investigations." National Transportation Safety Board, Safety Study, NTSB/SS-88/06.

(2) "Influence of Size and Weight Variables on the Stability and Control Properties of Heavy Trucks." R. D. Ervin, R. L. Nisonger, C.C. MacAdam, and P.S. Fancher. University of Michigan Transportation Research Institute, 1983.