

# INVESTIGATING TRACTOR-TRAILER WRECKS



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## INTRODUCTION

It was a gorgeous Friday and Dave was looking forward to getting home. It had been a long week. As he saw his driveway approaching, Dave put on his turn signal. He was in the left lane of a rural divided highway and there was a string of traffic coming in the opposite direction. He would have to wait. Dave saw a tractor-trailer behind him and wondered why it wasn't slowing down.

Jerry had been driving his fully-loaded tractor-trailer for ten hours and still had three to go. Jerry hated driving during the day because of heavy traffic. He reached down to pick up his coffee. Jerry had the radio blaring and never realized that Dave's car was stopped ahead of him. When Jerry looked up, he saw Dave's car. He didn't have time to step on the brakes. Jerry watched in terror as his tractor-trailer crushed Dave's car. Dave was killed instantly.

While this story is purely fiction, it illustrates the statistical tractor-trailer accident. The Federal Motor Carrier Safety Administration (FMCSA) and the United States Department of Transportation (USDOT) stated in their last report (2002) that there were over 4,500 tractor-trailers involved in fatal collisions with almost 5,000 total fatalities resulting from these wrecks. The overwhelming majority of tractor-trailer wrecks occurred during daylight hours, during the week (Monday-Friday), in non-inclement weather, on rural highways. Specifically, 70% of fatal tractor-trailer accidents happened during daylight hours and 85% of fatal tractor-trailer accidents occurred between Monday and Friday. Over 80% of fatal tractor-trailer accidents took place on dry roads in normal weather conditions. Almost 70% of fatal tractor-trailer accidents happened on rural highways.

Another startling statistic revealed by the FMCSA and USDOT studies is that **tractor-trailer driver error accounted for almost a third of the fatal accidents in the United States**. Some of these factors included driving too fast for road conditions, running off the road, making improper turns, over-correcting, and driver fatigue. In addition, over 8% of tractor-trailer drivers involved in fatal collisions had no commercial driver's license and another 2% were under the influence of drugs or alcohol at the time of the collision. This is particularly significant

since tractor-trailers make up 8% of all vehicles involved in fatal crashes each year. The number of tractor-trailers on our roads has increased by over 40% in the past twenty years. Almost 8 million tractor-trailers are currently registered in the United States.

These statistics illustrate the significant danger tractor-trailers pose to today's drivers and the special care attorneys for victims must take in pursuing cases arising from these crashes. Some of the factors affecting their involvement in such a substantial number of collisions involving fatalities and/or serious bodily injuries are the size and weight of the vehicle, the stopping distance, and maneuverability. In addition, the tractor-trailer's center of gravity is elevated which naturally creates vehicular instability.

Absent a special permit, federal regulations limit the weight of most fully-loaded tractor-trailers involved in interstate commerce to 80,000 pounds. In comparison, the average automobile weighs between 3,000 and 5,000 pounds. The mass ratio between the tractor-trailer and the standard automobile can exceed 20 to 1.

While tractor-trailer drivers are professionals trained to drive these heavy and complex pieces of machinery, these dangerous vehicles are often poorly maintained and driven by tired truckers.

Tractor-trailer wrecks are not typical motor vehicle collisions and should not be treated the same way by attorneys representing the victims of these collisions. Unlike the typical automobile collision case, commercial motor carriers and their insurance companies frequently have an adjuster and collision reconstruction expert at the scene within twenty-four hours of the collision, especially in cases involving fatalities and/or serious bodily injuries. Time is of the essence in conducting a thorough and accurate investigation of the wreck before key evidence is lost. Counsel for the injured party must be prepared to move quickly if there is to be a level playing field against the trucking industry and their insurers.

## **BEGINNING THE INVESTIGATION**

***In all things, success depends upon previous preparation, and without such preparation, there is sure to be failure.***

*Confucius*

In order to be certain that all of the relevant data to the wreck has been collected, counsel should have his or her own investigator and reconstruction expert conduct a meticulous examination of the scene. The reports of the expert and the police can then be compared. This ensures that no detail is overlooked.

All photographs should be taken with 35mm SLR type camera equipment as opposed to digital equipment due to the ease in editing and manipulating digital images. Standard video recording is also preferable. Any photographs that may be used later to depict the view of the collision scene to the jury should be taken with a normal lens length that approximates the angle of view from the human eye. In all photographs meant to show distance or measurements, use some marker to demonstrate distance or depth. Identify and document the marker.

### **Vehicle**

Most collision scene evidence is "short-lived" since its condition as well as its value diminishes with the passage of time. Counsel must secure control over all vehicles involved in the wreck so no evidence is lost or tampered with.

After securing control over the vehicles involved, an investigator's first priority at the scene of the collision is to locate and record the final point of rest of all vehicles and/or pedestrians involved in the collision. The configuration of the crash must be documented. Documentation consists of photographs, video recordings and diagrams. The expert should take approximately 12 to 14 photographs of each vehicle involved showing all sides of the vehicle – damaged or undamaged – including the top and bottom if possible. These photographs and video are meant to show the comprehensive damage to all vehicles and they also deter any attempts at replacement of vehicles or alteration of evidence.

Counsel should ensure that photographs are taken of the collision, the collision site, and the surrounding roadway. For each image, note the direction the photographer is looking, the location along the roadway, the height of the camera, and the position of all targets in the roadway. The same procedure is recommended for video recording. Counsel should immediately request aerial photographs of the collision scene and surrounding roadway. These photographs are relatively inexpensive and offer a jury perspective that no other picture can provide.

The expert must document and examine the damaged and undamaged portions of all vehicles involved in the collision prior to the vehicles being moved. Dangling components and other potentially fragile evidence could be altered or lost when the vehicles are towed. The investigator must also measure all damage to the vehicles, note the location of impact, and record the depth of impact and crush profile if applicable. At this time, the expert should inspect the connection between the tractor and the trailer.

Counsel should request that the expert methodically and systematically examine and document each individual vehicle involved in the collision. This portion of the investigation includes noting the approximate weight and height for each vehicle, diagramming the general damage to each vehicle, and if applicable, noting any specific deformation of vehicle pillars, the rocker panel, frame, or quarter panels when examining the smaller vehicle. The expert must document the angle of impact, the angle of crush to the roof, the crush area of the roof, and the crush pattern of the roof. If this type of damage is present, counsel should request a damage index matrix. The damage index matrix is a diagram of the roof of the vehicle divided into subdivisions relating to the roof and roof supports of the vehicle. The destruction depicted along this type of matrix yields a more accurate description of the overall damage and provides a useful exhibit if the case goes to trial. The damage index matrix is particularly important in the case of underride collisions.

In an underride collision, the expert should note any interaction of the smaller vehicle with tractor-trailer components such as dollies, rear dual frames, rear dual wheels, sliders, or underbelly cages. If the smaller vehicle exits from underneath the tractor-trailer, the investigator must approximate an exit speed. The expert must also document the entire

examination through photographs and video recording for future analysis. The investigator should follow the same systematic approach used in examining the smaller vehicle when evaluating the damage to the tractor-trailer. He or she should note and document any damage to the tractor or trailer even minor scraping along the trailer frame.

Once the outside of the vehicles involved in the collision have been carefully inspected and documented, the expert should focus on the inside of the vehicles involved. The investigator must record the vehicle identification number and the vehicle manufacture date for all vehicles involved in the wreck. This information provides the link to vehicle specifications which might lead to “black box” data, vehicle computer recordings, or other pertinent information.

Examine the interior of the smaller vehicle first. Note the location of any seats and headrests. Document any intrusion into the interior of the vehicle and all damage inside the vehicle even if it may not be directly related to the wreck. Carefully examine the occupant restraint systems and document all damage. Note and photograph any other physical evidence inside the vehicle.

The examination of the interior of the tractor-trailer is much more complex. Counsel must obtain permission for the investigator to photograph and videotape the contents of the tractor cab and trailer(s) prior to conducting any investigation. This step is usually a technicality but cannot be overlooked. Once permission is obtained, inspect and document the complete contents of the tractor cab. In particular, note the presence of a CB radio, police scanner, or radar detector. In addition, carefully examine for the presence of pill bottles in the truck which might indicate that the driver was using illegal substances at the time of the collision. The investigator must record the condition of the driver’s log book by systematically photographing each page of the log book in order.

Any materials in the windows of the truck, such as stuffed animals, stickers, or other novelty items, should be carefully recorded. The expert must also document the driver’s line of sight over these objects and note any obstructions of the driver’s view. The driver’s line of sight should be recorded with photographs. Counsel should also request the experts to note the location of blind spots and mirror positions.

The driver must know the blind spots – where they exist and whether he or she is moving into one. Mirror position is another critical part of driving a tractor-trailer. Since the driver looks into his or her mirrors approximately every 30 seconds, they should not be overlooked in the investigation.

After inspecting the tractor, counsel should ensure that the expert closely examines the trailer. The expert must photograph and inspect the trailer's entire contents, the type of load, the load resting position, and any materials used to secure it. The investigator should retain the materials used to secure the load as evidence. After thoroughly inspecting the vehicles involved in the collision, the expert should begin his or her examination of the roadway.

## Roadway

Inspect the roadway for raw data in the form of marks or collision debris. All marks and all debris must be photographed, diagrammed, and identified for future analysis. Investigators must document all skid, gouge, scrape, and yaw (lateral) marks on the roadway. Counsel should make sure that each mark is measured for future analysis and/or reconstruction. The investigator should note all marks on trees, signs, and buildings as they might shed some light on the path of travel of the vehicles or some other contributing factor to the collision. He or she should document and describe any other marks on the roadway whether or not they are related to the crash. Counsel should also ensure that all debris in the roadway is documented. This debris includes materials from the collision, as well as any other materials that might have been left in the roadway, such as remnants from prior collisions or pieces of uninvolved vehicles. Debris on the roadway includes any fluid spills or leaks. Having proof of these marks and debris can assist to disprove or discredit the defendant's theory of the case. Proper documentation also ensures that the experts do not rely on evidence unrelated to the crash in their analyses.

The expert must document the physical features of the roadway starting with the type of road surface and the weather conditions. Road composition can significantly affect the friction between the tires and the roadway, which may seriously impact the physics of the collision. Tractor-trailers respond differently

on roads made of asphalt than roads made of concrete, dirt, or gravel; therefore, counsel should note the condition of the road surface – smooth, rough, grooved, potholed, or cracked – since that also affects control of the vehicle. The expert must document and diagram the road layout at the area of the collision and leading up to the collision site including any straight or curved sections. He or she must also diagram and photograph all traffic control devices at and leading up to the collision site such as signs, lane markings, speed limits, or traffic signals. Any other obstructions present should be photographed and diagrammed. All diagrams must include the location of all vehicles and/or pedestrians involved. The investigator should also request state, city or county highway plats as well as state highway department roadway video logs.

## Witnesses

Interview any eyewitnesses at the scene of the wreck. If their statements are reliable, the witnesses should be videotaped giving their statement. Counsel should record the names and addresses of all witnesses to the collision including emergency services personnel. In addition, subpoena copies of any "9-1-1" recordings which might assist in locating other eyewitnesses.

Request or subpoena if necessary any photographs and video recordings taken by television or newspaper crews, fire and rescue personnel, police investigators, and independent photographers present at the scene of the wreck. Counsel should also request any satellite images that may have been recorded or any photographs or video made by traffic control devices or surveillance cameras in the area. Counsel must request copies of all investigative reports made by police, fire, and rescue personnel. These reports usually include basic measurements as well as photographs.

## POST-COLLISION INVESTIGATION

For this aspect of the investigation, it is imperative that counsel hire a reconstruction expert. A good reconstruction expert will commence the post-collision investigation of all vehicles involved in the wreck as soon as possible. Counsel should require that the entirety of this stage be videotaped so there is no question by the court or opposing counsel as to the reconstruction expert's techniques or the authenticity of the evidence. The expert should begin this stage of the investigation with the background of each vehicle. Information that must be recorded includes the year, manufacturer, make and model, and interior and exterior colors of the vehicle. The expert should document whether or not the tractor is a sleeper. This information is useful along with the VIN number and production date in determining vehicle specifications. It also identifies the vehicles involved in the expert's reports so there is no confusion as to authenticity.

The reconstruction expert should carefully inspect and document the condition of the occupant restraint systems in all vehicles involved. This documentation can serve as a useful illustration to the jury of the overall damage to the vehicle. Any harm to these systems should be diagrammed and photographed to depict clearly the extent of the damage and the force of the collision.

Pay particular attention to the vehicle lighting and signaling systems. In the case of sudden, direct collisions, filament analysis of the bulbs in the area involved can yield information as to whether or not the lights were on at the time of the wreck. All other lights should be checked to determine whether they were functional at the time of the wreck. The same is true for all vehicle signals. In the same respect, request that the expert test the horn to determine whether or not it was functioning properly prior to the collision. Generally, note any electrical shorts or abnormalities in either vehicle.

The expert must determine the weight of each vehicle involved. This includes the gross vehicle weight rating (GVWR) – the weight of the vehicle with all of its cargo and passengers – the empty weight, and the weight of each axle. The GVWR is important to understand the force of the collision. It also provides information that may yield a finding that the tractor-

trailer was exceeding the load regulations of the Federal Motor Carrier Safety Regulations (FMCSR) load regulations. The empty weight gives a baseline vehicle weight. The gross axle weights (front and rear) can indicate whether the tractor-trailer was off balance.

When inspecting the vehicles, consider the possibility that a coupling problem may have caused the wreck. The tractor employs a coupling assembly, the fifth wheel, which links to the coupling assembly on the trailer, the kingpin. This is where the tractor and trailer come together to create an articulating hinge. As part of the investigation, the expert should look to see if this assembly is functional and lubricated properly. In many cases, if there is not adequate lubrication, this assembly becomes stiff and makes controlling the tractor-trailer extremely challenging.

In all cases, the expert must carefully consider the condition of the tires on each vehicle. Tire pressure and condition can affect the vehicle maneuverability as well as the way the load is balanced in the trailer. The expert must record the make and model, and DOT or serial number of each tire on the tractor and trailer. This will yield information about the tires in the case of product defects or recalls. In addition, he or she should carefully document the size of the tire as well as the tread depth, width, style, and air pressure. The air pressure can be a key component of a tractor-trailer crash. If one tire has less air pressure than another and the driver takes the truck around a turn, for example, the axle with this tire on it is significantly less capable of supporting the maximum vehicle weight. This increased weight in turn causes more tire surface area to contact the ground, more pressure to be exerted on the tire sidewall, and more pressure to be exerted on the inner wheel. All of these imbalances can lead to accidents. The rolling radius, the front and rear track width, and the general condition and viability of each tire should also be measured and documented.

Inspect vehicle braking systems carefully. This step should be a major priority of counsel since annually over fifty percent of tractor-trailers fail inspection and half of these failures are due to faulty braking systems. Most of these problems can be detected with just a general inspection but often go ignored. A well-trained expert will check the brake condition and balance both fore and aft and from one side to

the other. If the brakes are unbalanced, the expert should make a careful note. Unbalanced means that the tractor and trailer have unequal stopping capabilities. If the braking system is unbalanced from one side to the other, the investigator should consider the possibility that there might be a wheel or axle that is not functioning properly on one side. The expert should carefully examine the brakes on both the tractor and trailer to see if any of these conditions exist (or other conditions) that might have caused an imbalance.

The expert will note the brake condition generally and should photograph all brake components. Counsel should request documentation of the chamber size, brake type (cam or wedge), brake slack (manual or automatic), slack adjuster length, pushrod travel length, and presence of anti-lock brakes. The expert will comment about the general condition of the brakes along with these observations including the brake manufacturer and any other specific product information.

Pay close attention to the steering axle brakes, which provide 12% of the total braking power to the tractor-trailer. The steering axle brakes will lock in the case of sudden or emergency braking if they are left functional. When this happens, the tractor-trailer will continue to move straight ahead regardless of the wheel angle but will decelerate in a controlled and rapid manner. These brakes are often disconnected because truckers feel that they have more control over their rig with only the drive axle or trailer axle brakes engaged. Ironically, the majority of accidents occur when the steering axle brakes are disconnected causing the tractor trailer to jackknife or in the most severe cases, roll-over. The condition and functionality of these brakes must be recorded.

The expert must also consider the condition and functionality of the tractor-trailer's retarder. The retarder, commonly referred to as the "Jake brake", provides the tractor-trailer with additional braking power. This power is often provided by the release of pressurized air into the engine. The increased engine pressure slows the engine rotation. This transfers resistance to the drive train of the tractor which slows the tractor-trailer wheels. The drive train is located to the side of the fifth wheel assembly. It is possible that if a rapid slow-down is attempted, the trailer can cause a jackknife to occur if

too much pressure is exerted on the other side of the hinge. If the retarder is not functional or is in poor condition, it may have some relationship to the wreck; therefore, the expert must document the condition of the retarder.

Suspension type can also play a role in tractor-trailer collisions. Generally, three different suspension types are found in tractor-trailers: air ride tractor, air ride suspension, and elliptical spring suspension. The expert must determine what types of suspension are present on the tractor and the trailer. These different types of suspensions can be combined so do not assume that just because the tractor is an air ride tractor that the suspension on the trailer will also be air ride. For example, the tractor-trailer may be an air ride tractor coupled with an elliptical spring suspension. With different suspension types, the tractor-trailer will handle much differently. If the driver is not aware of the handling characteristics of the suspension, then he or she can easily lose control of the tractor-trailer when making sudden lane changes or turns. The expert should also check the condition of the components of the suspension for defects or maintenance issues.

The expert should document the engine make, model, size, and serial number. This information is crucial in obtaining vehicle specifications which can lead to "black box" data. Specifically, all engines constructed after 1992 are fitted with an engine control module (ECM).

ECMs are essentially engine mounted computers. These computers were installed in response to the demand for increasing fuel efficiency in vehicles and reducing air pollution in the United States and around the world. The ECMs assist in distributing fuel to the engine in a timely and efficient manner. They monitor the status of the engine and document various parameters such as how many hours the engine spends running, what speeds the engine is functioning at, how many hours the engine is idle, and how many hours the engine is off.

In more modern tractors, the ECM can be even more useful. Trucks assembled after 1996 often have advanced modes and software. This type of software will instruct the ECM to record data such as any hard stops or sudden deceleration exceeding seven feet per second. These advanced ECMs can record data for

up to forty seconds prior to the incident of hard braking or sudden deceleration that includes the speed the truck was going and various engine readings. If this type of ECM is present, counsel must ensure that the data is collected and recorded. The ECM only has enough memory to record three such incidents. After which, it will replace the oldest record with the new data. As counsel, stress to the investigator that it is of the utmost priority to determine what type of ECM is on board the tractor, if any at all, and discover what type of information can be downloaded from it.

In addition to the ECM, counsel should not overlook other types of vehicle data recorders. GPS can be used to compare the geographic track of the tractor-trailer to the log book recordings. A more effective source of information however are on-board vehicle locating systems, such as Qualcomm, which function as a global positioning system, communication device, and on-board fax machine. The positioning system can assist in tracking the location of the tractor-trailer at any given time. The communication system allows the driver to communicate with a dispatcher at will and if put into emergency mode will alert the dispatcher to contact emergency services. Counsel must realize that this type of information is not guaranteed. Trucking companies are not required by the federal regulations to download that information and have it available for investigative inquiry nor is it efficient for large companies to download all the information for thousands of trucks. This includes both Qualcomm type data and ECM data. It must be requested by counsel within 30 days of the wreck or there is a significant probability that it will be deleted.

Other miscellaneous considerations are the condition of the power steering and correlating fluid levels. Counsel should request that the reconstruction expert carefully inspect the transmission as well. Document the transmission type, model and manufacturer as well as the transmission (gear) condition generally. If air tanks are present in the tractor or the trailer, document how many. The expert must observe the handling characteristics of changing power units and record all findings. Lubrication on all components should be documented as well as all other fluid levels. Counsel should ensure that the expert notes the position of any fifth wheels present. The expert must also note the load position and any other features of the vehicles that he or she feels might have been a contributing factor to the wreck.

For both vehicles, the reconstruction expert will inspect and document the odometer reading. He or she will also inspect and document any aspects of the vehicle tachometer. Counsel should instruct the expert to remove the vehicle tachometer so it can be retained as evidence. All other gauges must be inspected and their condition and readings noted.

For the trailer only, the reconstruction expert should document several important pieces of information including the trailer width and height, the coupler height, and king pin position. The known load, its weight, and position should be recorded. Note the presence of a refrigeration system along with the type and condition of the suspension. The slider rails must be inspected as well as the presence or absence of retroreflective tape along the sides.

## CONCLUSION

Immediate investigation of the tractor-trailer collision is imperative. If retained early enough, counsel for the injured party must be prepared to move quickly. This includes hiring an investigator and reconstruction expert to document and inspect the collision scene prior to any post-collision clean-up. All investigation needs must be broken down into two categories – collision scene and post-collision. The collision scene investigation includes the vehicles involved in the wreck, the roadway, and any witnesses available. The post-collision investigation entails detailed expert analysis of all vehicles involved in the wreck. Counsel must emphasize to the expert that no detail should be overlooked.

When investigating the tractor-trailer wreck, it is important to document all aspects of the investigation through photographs, video recordings, and diagrams. These requirements are distinct and should be conducted for each step of the investigation. This not only ensures that the proper vehicles are retained as evidence, but it also deters parties from tampering with the evidence. Photographs and video recordings can alleviate evidentiary authenticity issues in court and can prevent questions by the judge and opposing counsel as to the steps the expert followed in his or her reconstruction analysis.

Although measurements must be taken at the scene of the tractor-trailer wreck, it is important for the expert to conduct the detailed analysis at a later time. This provides a more objective and well-thought-out conclusion as to the cause of the wreck and can also yield a more effective expert witness in court.

While the investigation is nearing its end, two things must be done immediately. Counsel must file suit so that a temporary restraining order can be issued to protect the vehicles involved, their contents, and other important documents pertaining to the wreck. Counsel must also immediately request copies of the driver's log books. Federal regulations only require motor carriers to keep the driver's logs for six months. The most common mistakes made by lawyers who are not familiar with tractor-trailer cases are not obtaining the log books and not filing suit within six months.

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