

Semi-Tractor Trailer Driver Hauling Chicken Dies After Striking A Rock Wall

Incident Number: 07KY070



Photograph of motor vehicle crash involving a semi tractor-trailer. Photograph courtesy of Kentucky Vehicle Enforcement

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Kentucky Fatality Assessment and Control Evaluation (FACE) Program

Incident Number: 07KY070

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**Subject: Semi-Tractor Trailer Driver Hauling Chicken Dies
After Striking A Rock Wall**

Summary

On a sunny fall day in 2007, a 50-year old semi truck driver hauling processed frozen chicken in a refrigerated trailer, died when his semi crashed into a rock wall. The driver was north bound on an interstate highway when witnesses saw the semi in the left lane contact the concrete median barrier then veer over to the right across one traffic lane and the shoulder, then strike a rock wall. The impact caused the cab to overturn onto the driver's door while the refrigerated trailer remained standing upright. An exhaust pipe located on the back of the cab was horizontal facing skyward on the cab. The fuel line to the refrigeration unit was damaged in the crash allowing fuel to drip onto the hot exhaust pipe and ignite a fire. Numerous calls reporting the crash were placed to 911 emergency medical services. A man and woman reportedly driving behind the semi witnessed the fire start between the cab and trailer.

Emergency services arrived and found the cab and front of the trailer engulfed in flames. The local coroner was contacted and called to the scene where he declared the driver dead at the scene.

To prevent future occurrences of similar incidents, the following recommendations have been made:

Recommendation No. 1: Semi tractor-trailer drivers should be trained to recognize signs of fatigue and when to seek appropriate rest areas.

Recommendation No. 2: Highway median barriers should be designed with local input of emergency responder management allowing entrance of emergency responder personnel.

Recommendation No. 3: Long-haul semi tractor-trailer drivers should have a network of mechanics along the routes they travel in case mechanical problems arise.

Recommendation No. 4: Employers should require drivers to perform pre-trip and post-trip inspections on the tractor and trailer prior to operating them using an expanded Department of Transportation Inspection form.

Recommendation No. 5: Manufacturers of commercial refrigerated trailers should consider a sensor design that shuts off the fuel supply to the refrigeration unit when the fuel line is compromised.

Background

The trucking company the driver was employed by was formed when two freight companies merged. One company had been in business for 50 years; the second for twenty years. At the time of the interview, the company had downsized and had eight trucks, eight drivers, and three office workers. The company transported food and some general freight such as garage doors. The company hired experienced commercial driver license drivers and discussed safety with its drivers on a routine basis.

The driver had a valid commercial driver license for at least six years and had driven for another trucking company. That company became defunct and the driver found employment driving a semi with a different trucking company. His routes with the new company were variable and sometimes required him to be gone overnight. Sometimes his routes took him as far south as Atlanta and as far west as Oklahoma. The semi he drove was a condo sleeper with a fire wall in back of the cab. Ninety percent of the time the driver hauled refrigerated foods; the other ten percent was spent hauling garage doors. The driver was a diabetic and had passed the required Department of Transportation driver physical two weeks prior to the crash. It is unknown if he had a medical waiver for diabetes. He had worked for the new company for nine months when the crash occurred.

The temperatures that day ranged from 48 degrees Fahrenheit to 83 degrees Fahrenheit.

Investigation

On a sunny fall day, a male semi truck driver driving a condo sleeper semi with a refrigerated trailer loaded with garlic bread left the loading dock. His destination was 600 miles south and would take approximately 10 hours to complete. He was to deliver the garlic bread, remain overnight in the sleeper cab until morning, then pick up a back-haul and return to his point of origin. The original back-haul load was cancelled, but was replaced with a load of frozen processed chicken.

At approximately 12:30 PM the semi truck driver left the dock of a chicken processing plant with the refrigerated trailer loaded with frozen chicken breasts packed in plastic crates. His destination was in a northerly direction, 600 miles away and should have taken approximately 10 hours to complete. After leaving the loading dock, the driver stopped and fueled the semi. It is unknown if he ate at that time. Approximately four hours after leaving the loading dock, the semi-tractor trailer was traveling through a construction zone on an interstate highway in Kentucky. There was a temporary, sectioned concrete barrier wall protecting the construction zone where a third drive lane and a new three mile section of a permanent, continuous, cast-in-place concrete barrier wall was being constructed in the 60' wide median. The end of the temporary wall had been installed up to the end of a permanent cast-in-place concrete wall that had been erected in 2005. These two walls overlapped slightly and there was a 30 foot gap between them allowing construction traffic to access the site. The permanent, continuous, cast-in-place concrete barrier extended eight miles separating north and southbound traffic. The new extension lengthened the permanent wall approximately three miles to the south. The speed limit

was 55 miles per hour and because the construction zone had its own barrier wall separating traffic and workers, it was not posted as a double fine area for speeding.

To make space for the construction project, the two normal travel lanes were diverted from the normal left and right lanes to the right lane and shoulder. Where the end of the temporary construction barrier wall met the permanent barrier wall, the drive lanes opened up to three drive lanes and the shoulder. The sections of the temporary construction barrier wall were pinned together and set on the asphalt.

While driving in the construction zone, witnesses saw the semi in the left lane strike three of the 20 foot sections of the temporary concrete barrier weighing 5,000 pounds each and moving each a foot toward the median. Witnesses then saw the semi fishtail for $\frac{3}{4}$ of a mile, veer into the right and shoulder lanes, and strike a rock wall. The impact caused the cab to turn over onto the driver's door while the refrigerated trailer was left standing upright. An exhaust pipe located on the back of the cab became horizontal facing skyward on the cab. The return fuel line to the refrigeration unit was very narrow and was damaged in the crash allowing fuel to drip onto the hot exhaust pipe and ignite a fire. Calls placed to 911 emergency medical services began at 4:23 PM. Emergency personnel were dispatched at 4:24 PM. A call was received by emergency services at 4:25 PM stating the unit semi had crashed and was on fire and they did not see the driver get out of the truck. Emergency personnel began arriving at the scene at 4:33 PM. A man and woman driving behind the semi witnessed the fire start between the cab and trailer.

A Kentucky Safe Patrol operator was traveling south and saw the crash occur and tried to reach the incident scene. After some difficulty, a Kentucky Transportation employee helped the operator navigate between the permanent and temporary concrete barriers, and through the construction zone to reach the scene and offer assistance. The operator aided the Sheriff's department in rerouting traffic from the interstate at an exit approximately nine miles south of the incident onto a local highway. The State Highway Department located signs along the side of the interstate informing motorists of the detour prior to the exit. Emergency services had difficulty arriving at the scene due to the 11-mile length of the continuous concrete barrier and the construction site in the median. When they arrived at 4:33 PM, they found the cab and front of the trailer engulfed in flames. The local coroner was called to the scene. He arrived and declared the driver dead at the scene. Traffic was diverted until 10:27 PM. No skid marks were observed at the scene, and the driver had been wearing the shoulder/ lap seat belt at the time of the crash. According to the Kentucky Vehicle Enforcement Officer, the driver's log book burned up in the crash, but a diabetic pack was found. Due to the lack of skid marks, speed of the semi could not be determined; however, witnesses said the semi had not been speeding.

Cause of Death

The death certificate states the cause of death was due to "acute contusions of the midbrain at pons and blunt force injury of the head". Another significant condition which contributed to the driver's death was generalized thermal body burns.

Recommendations and Discussions

Recommendation No. 1: Semi tractor-trailer drivers should be trained to recognize signs of fatigue and when to seek appropriate rest areas.

Besides distraction, fatigue is one of the main difficulties drivers combat. Drivers should be educated to recognize when they are becoming fatigued while driving. According to an article, “Driver Fatigue: The Dangers of Driving Sleepy”, signs of driver fatigue include daydreaming, straying out of the lane, excessive yawning, feeling impatient and/or stiff, heavy eyes, and reacting slowly. Another article states that over-steering is also a sign of driver fatigue. The study “The development of a naturalistic data collection system to perform critical incident analysis: An investigation of safety and fatigue issues in long-haul trucking” states that most incidents involving fatigued drivers occur in the late afternoon and early evening hours with the highest rates occurring between 11:00 am to noon and 3:00 pm to 6:00 pm. Methods to avoid driver fatigue include being well rested, getting enough sleep, taking breaks every two hours where the driver may take a nap, eating a snack, avoiding consumption of alcohol, having a driving plan, and staying hydrated.

Every driver should have a route plan that incorporates appropriate rest areas to give the driver access to meals, a quiet place to nap, and be able to stretch. The plan should also provide information on roadside assistance if needed.

Recommendation No. 2: Highway median barriers should be designed with local input of emergency responder management allowing entrance of emergency responder personnel.

During this incident, emergency responders were delayed in reaching the semi due to construction and the length of the permanent cast-in-place concrete barrier (11 miles). Because there were no gaps in the permanent barrier or the construction barrier, emergency responders could only access the scene by driving to and from the two exits the at both ends of the crash.

Normally, emergency responders use emergency access in medians to respond quickly to emergency situations. Access gaps should be constructed every two miles in the continuous barriers to allow timely access to respond to emergency situations. “Kentucky’s Highway Management Strategic Plan”, states that local emergency responders are to have an integral part in the design of the continuous barriers in their responding area. Gaps could be created by offsetting ends of the barriers six feet in each direction creating a 12 foot access space. In a minimum width median, this would leave an eight foot inside shoulder in each direction in the section where the access gap would be constructed. This would allow enough space for large emergency vehicles to access either side of the highway in less time than resorting to use the nearest exits, which in some cases could cause emergency responders to drive as many as 20 miles or more for highway emergencies.

Recommendation No. 3: Long-haul semi tractor-trailer drivers should have a network of mechanics along the routes they travel in case mechanical problems arise.

The incident photograph of the refrigeration unit shows a line dangling from the middle of the unit to the ground. According to a motor carrier transportation professional, this line appears to be a cable. There are two possibilities as to why the cable was there. One possible reason for the

addition of the cable was if there was an electrical problem (e.g.: alternator failure). If this occurs while a driver is en route, it is common for the driver to clip one end of a cable to the alternator and clip the other end to the battery located at the back of the semi. This scenario allows the driver to complete the route and upon completion, address the failure of the refrigeration unit with the company mechanic. Another possibility is the battery on the tractor had failed and the driver used the cable to keep the battery charged to keep the tractor operating, thus allowing the driver to successfully complete the route and then have the company mechanic make the necessary repairs. These two possibilities are typically used by drivers in order to continue driving to the delivery destination and allow repair by the company mechanic. Either situation is dangerous. If the cable clip loosens and comes in contact with metal (such as the frame of the semi), a reaction could occur creating sparks that may ignite the coating of the cable or other nearby flammable material on fire. Companies should have a network of mechanics on-call along delivery routes so drivers have an efficient and reliable safe source to have mechanical repairs made when necessary.

Recommendation No. 4: Employers should require drivers to perform pre-trip and post-trip inspections on the tractor and trailer prior to operating them using an expanded Department of Transportation Inspection form.

Federal Motor Carrier Safety Administration regulations CFR 396.13 and CFR 396.11 require commercial motor vehicles to be inspected before driving the vehicle and at the completion of the day's work. CFR 396.3 requires companies to not only inspect every commercial vehicle, but to keep the vehicle properly repaired and maintained. Reports are to be completed and available for the next driver to review as part of their inspection of the vehicle. Companies should require drivers to complete the Department of Transportation Driver's Vehicle Inspection Report, DVIR, (Attachment 1) and turn them into the office each day. If the driver is on a long haul trip, the driver should contact the company office and make a report of the check list. If the driver finds a defect detrimental to safety, then it is recommended the equipment be taken to the proper mechanic for repairs. The report lists important aspects of the vehicle such as air compressor, air lines, battery, body, brakes, clutches, wheels and rims, windshield wipers, etc., which the driver is required to inspect each time the semi is operated. There is a space on the form for the driver to make notes for items not listed on the report that may need to be addressed immediately or in the future. After completing the report, the driver either signs that the vehicle is in satisfactory condition or that defects need to be corrected before the truck should be operated. The DVIR does not compel the driver to check operating mechanisms on trailers such as refrigeration units. Companies with refrigeration units should expand the DVIR to include specific items such as the refrigeration units.

Recommendation No. 5: Manufacturers of commercial refrigerated trailers should consider a sensor design that shuts off the fuel supply to the refrigeration unit when the fuel line is compromised.

Refrigeration units on tractor-trailers operate on diesel fuel. Refrigerated unit fuel tanks are typically located 1/3 of the way back on the driver's side of the trailer, but are occasionally located on the passenger side. Tanks come in three sizes: 20 gallons, 30 gallons, and the most common is 50 gallons. The fuel line, 1/4 inch in diameter, is pressurized and feeds diesel fuel

from the fuel tank to the refrigeration unit. A second line, 3/8 inch in diameter, returns unused fuel from the unit back to the fuel tank to be used later. The second line is not pressurized. Thus, diesel fuel is used and circulates through the system. Pressure in the first line fuels the refrigeration system while the second line uses gravity and drains unused diesel fuel back into diesel tank. If the second line is compromised, pressure from the first line will feed diesel fuel through to the second line until the diesel tank is empty. Due to the narrowness of the second line, the draining diesel fuel is almost aerosolized. It is in this state that diesel fuel is volatile. According to the accident reconstructionist, the fire was caused when the second fuel line was compromised and the aerosolized fuel drained onto the hot exhaust pipe, catching fire. The fire consumed the semi, destroyed the trailer, and the chicken cargo. Refrigeration units should be manufactured with switches on the fuel lines that will shut off the flow of fuel if either of the lines becomes compromised. This redesign could prevent fire from occurring, or if fire is caused by another source, limit fire intensity and damage.

Keywords

Continuous cast-in-place concrete barrier
Diabetic kit
Fire
Fuel line
Refrigeration

References

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- 5) CFR 396.13 Driver Inspection, http://www.fmcsa.dot.gov/rules-regulations/administration/fmcsr/fmcsrruletext.asp?rule_toc=765§ion=396.13§ion_toc=1954
- 6) CFR 396.11 Driver Vehicle Inspection Report(s), http://www.fmcsa.dot.gov/rules-regulations/administration/fmcsr/fmcsrruletext.asp?rule_toc=765§ion=396.11§ion_toc=1953

- 7) CFR 396.3 Inspection, Repair and maintenance, http://www.fmcsa.dot.gov/rules-regulations/administration/fmcsr/fmcsrruletext.asp?rule_toc=765§ion=396.11§ion_toc=1953

Acknowledgements

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Photograph of rear of motor vehicle crash involving a semi tractor-trailer. Photograph courtesy of Kentucky Vehicle Enforcement.



Photograph of the three temporary barrier sections semi driver struck. Marks are from the semi. Photograph courtesy of Kentucky Vehicle Enforcement.



Photograph of the diesel fuel lines on the refrigerated trailer.

Attachment 1: Copy of Department of Transportations Daily Driver's Vehicle Inspection Report

DRIVER'S VEHICLE INSPECTION REPORT

AS REQUIRED BY THE D.O.T. FEDERAL MOTOR CARRIER SAFETY REGULATIONS

CARRIER: _____

ADDRESS: _____

DATE: _____ TIME: _____ A.M. _____ P.M.

CHECK ANY DEFECTIVE ITEM AND GIVE DETAILS UNDER "REMARKS"

TRACTOR/ TRUCK NO. _____ **ODOMETER READING** _____

<input type="checkbox"/> Air Compressor <input type="checkbox"/> Air Lines <input type="checkbox"/> Battery <input type="checkbox"/> Body <input type="checkbox"/> Brake Accessories <input type="checkbox"/> Brakes, Parking <input type="checkbox"/> Brakes, Service <input type="checkbox"/> Clutch <input type="checkbox"/> Coupling Devices <input type="checkbox"/> Defroster/Heater <input type="checkbox"/> Drive Line <input type="checkbox"/> Engine <input type="checkbox"/> Exhaust <input type="checkbox"/> Fifth Wheel <input type="checkbox"/> Frame and Assembly <input type="checkbox"/> Front Axle <input type="checkbox"/> Fuel Tanks <input type="checkbox"/> Generator	<input type="checkbox"/> Horn <input type="checkbox"/> Lights Head - Stop Tail - Dash Turn Indicators <input type="checkbox"/> Mirrors <input type="checkbox"/> Muffler <input type="checkbox"/> Oil Pressure <input type="checkbox"/> Radiator <input type="checkbox"/> Rear End <input type="checkbox"/> Reflectors <input type="checkbox"/> Safety Equipment Fire Extinguisher Reflective Triangles Flags - Flares - Fusees Spare Bulbs & Fuses Spare Seal Beam	<input type="checkbox"/> Suspension System <input type="checkbox"/> Starter <input type="checkbox"/> Steering <input type="checkbox"/> Tachograph <input type="checkbox"/> Tires <input type="checkbox"/> Tire Chains <input type="checkbox"/> Transmission <input type="checkbox"/> Wheels and Rims <input type="checkbox"/> Windows <input type="checkbox"/> Windshield Wipers <input type="checkbox"/> Other
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TRAILER(S) NO.(S) _____

<input type="checkbox"/> Brake Connections <input type="checkbox"/> Brakes <input type="checkbox"/> Coupling Devices <input type="checkbox"/> Coupling (King) Pin <input type="checkbox"/> Doors	<input type="checkbox"/> Hitch <input type="checkbox"/> Landing Gear <input type="checkbox"/> Lights - All <input type="checkbox"/> Roof <input type="checkbox"/> Suspension System	<input type="checkbox"/> Tarpaulin <input type="checkbox"/> Tires <input type="checkbox"/> Wheels and Rims <input type="checkbox"/> Other
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Remarks: _____

CONDITION OF THE ABOVE VEHICLE IS SATISFACTORY

DRIVER'S SIGNATURE: _____

ABOVE DEFECTS CORRECTED

ABOVE DEFECTS NEED NOT BE CORRECTED FOR SAFE OPERATION OF VEHICLE

MECHANIC'S SIGNATURE: _____ DATE _____

DRIVER'S SIGNATURE: _____ DATE _____

ORIGINAL

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