



Virginia Commonwealth University

**Virginia
Multi-disciplinary
Crash Investigation Team**

**Technical Alert: Number 19
Five Fatality Single Vehicle Crash**

Date: November, 2008

This Technical Alert describes a single vehicle crash in which the driver of a car carrying five occupants lost control in a curve. The vehicle ran off the road, overturned, and rolled down an embankment into a creek. All five unbelted occupants died. Key issues include: speeding, lack of markings on rural roads, and driving under the influence of alcohol and/or drugs.

On a clear, dry Sunday night, shortly after midnight, a rented 2008 Mazda 6 sedan was traveling north on an unlit, rural secondary road. The Mazda driver, a 36 year old male who was visiting from another state, was accompanied by four members of his extended family, all males, ranging in age from 25 to 55 years. Although the driver no longer lived in the area, he was familiar with this rural county and the roads. The Mazda was a newer vehicle and had only 8391 miles on the odometer. The driver had rented it in his home state and driven it several hundred miles, so he had some familiarity with the way the vehicle handled, but he did not have much experience driving it under varying conditions. The men had been socializing at a party and had travelled approximately 10 miles, on their way to one passenger's home. None of the occupants wore safety restraints.

All of the occupants had consumed alcohol. Three passengers had blood alcohol contents (BACs) of .14 %, .17% and .21%, all well above the .08% legal limit for driving. The driver's BAC, however, was .04%, below the per se level of driving while impaired. A full toxicology screen was conducted on this individual, though, and this

revealed that he had cocaine and cocaine metabolites, along with metabolites of THC (the active component of marijuana), in his blood as well. He carried some cocaine in his pocket at the time of the crash.

This two lane highway, a north-south route, is approximately 18 feet wide. A long straight segment leads to a curve to the right that is approximately 13 degrees just prior to the crash site. A creek runs beneath a bridge at the north end of the curve and the road is bordered by grass and trees. Vegetation obscured the object markers (diagonally-striped vertical rectangular signs) mounted on posts at the beginning of the bridge. (*This should be trimmed by the Virginia Department of Transportation (VDOT) in order to provide better visibility of the markers.*) The pavement is asphalt and in good condition.



Photo #1 Vegetation blocking view of object marker for bridge

Generally, the road is controlled by signs which are in good condition. A sign located approximately 4/10 mile prior to the crash site identifies the posted speed limit as 25 MPH. However, this sign is in an area of light development in this otherwise rural location. State police officers who routinely worked in this county were not aware that

the sign's designated speed limit still applied in the area of the crash, which makes it unlikely that other drivers would understand that the lower limit still held. *(VDOT should consider installing additional speed limit signs on this road and conduct a speed study to determine the appropriate speed limit.)*

There is no overhead lighting. Furthermore, the road is unmarked approximately one half mile prior to the location of the crash site and the absence of edge lines means that drivers have less perceptual information to help them navigate the road, especially at night. There are no delineators or chevron alignment signs (W1-8) on this section of road to indicate a curve. *(VDOT should consider installing the appropriate delineators/chevron alignment signs in order to provide positive guidance for the motorist. VDOT should conduct an engineering study on this road to determine if additional safety features are warranted, such as guardrail, additional signing, and/or pavement markings.)*



Photo #2: View of the road facing north, in the direction the Mazda was traveling.

The crash occurred when a 2008 Mazda attempted to make the right curve while traveling more than 40 mph above the posted speed limit. The Mazda began to yaw approximately half way through the curve, marking the asphalt with all four tires. Calculations based on measurements taken from the yaw marks indicate the vehicle was traveling 68 mph just prior to the crash. As the car neared the bridge, the tires regained traction, due to steering input to the left. However, his overcorrection caused a weight shift to the right side of the Mazda. The vehicle began to rotate counter-clockwise and slid sideways off the roadway, then struck a mailbox. The Mazda continued sliding after contact with the mailbox, crossing a dirt driveway and a grassy section of yard leading to the drop-off for the creek. At the top of that embankment, the tires caught in the turf, tripped and rolled the vehicle. The car rolled down the 60 foot embankment, striking forcefully on the passenger side, and came to rest upside down in a creek. One passenger was ejected, and another was partially ejected during this violent crash sequence.

The vehicle sustained the majority of damage when the vehicle tripped and landed on the passenger side. Both passenger side tires were deflated and unseated from the rims. The rims showed scarring and were embedded with dirt and grass. Damaged areas of the vehicle intruded into the occupant compartment as much as 13 inches. The roof on the passenger side was buckled upward and torn free from its supports. The passenger side curtain airbags and side torso bags deployed in conjunction with the driver and passenger front airbags. As a result of the hard impact, the driver's seat was bent toward the passenger's door. The deformation measured 8 inches from its original position and crushed the center console. Despite the damage listed above, the occupant compartment held up very well. It is possible that this would have been a survivable crash for most of the occupants if they had been using restraints at the time of the crash.

One of the five occupants was completely ejected during the crash sequence and landed 22 feet from the vehicle at final rest, with his body partially in the water. He died from multiple traumas, including head injury. Another passenger was partially ejected, the upper part of his body extending outside the confines of the vehicle. Like the three who remained completely in the Mazda, he suffered multiple traumatic injuries, including fatal head injuries.



***Photo #3: View of the Mazda showing area of most severe damage.
Note that both right side curtain airbags deployed.***

The exact time of the crash is unknown. Based on information regarding the time the group left the party and through the local Medical Examiner's assessment, the victims died between 12:00 a.m. and 1:00 a.m. At approximately 6:00 a.m., a man noticed the vehicle while driving to work at a power station about a quarter mile beyond the crash site. He called the county emergency number to report the crash and notified the security guard at the station gate. He and others in the area returned to investigate further. Those on scene kept county officials advised, and county personnel called a local wrecker service to assist with the vehicle. As these individuals worked their way down to the creek bed, they located the Mazda occupants and confirmed the fatalities. After state police officers arrived, they shut down the road and began an investigation. A local Medical Examiner was contacted and he responded to the scene and viewed the bodies. He then released them to a local funeral home. The first sergeant in the area helped

coordinate activities and contacted the National Transportation Safety Board (NTSB), due to the high number of fatalities. The NTSB declined to conduct an additional investigation.

This tragic crash was the result of driver error. Toxicology results showed that he may well have experienced some level of impairment. Distraction by multiple passengers and the driver's limited experience with this vehicle are likely to have played a role as well. From an environmental perspective, the absence of pavement markings and delineator/alignment signs provided no visual cues about the curvature of the roadway on dark nights. This, combined with the lack of additional speed limit signs, may have also contributed to the driver's erroneous decision to travel too fast.

An animated representation of probable dynamics for this crash can be viewed using Windows Media Player through this link:

<http://www.vcu.edu/cppweb/tstc/downloads/19.wmv>