PHMC Lessons Learned Fluor Hanford Inc.

Information Bulletin - Caution

This Bulletin is being provided to you for review, analysis, and internalization as applicable.

Date: February 2, 2006 **Identifier:** 2006-RL-HNF-0003

Title: Truck Tire Rapid Air Loss Leads to Rollover/Driver Injury

Lessons Learned Summary: The rollover was caused by the heavy mass and high center of gravity of the vehicle and heavy braking. Roll-over accidents can be avoided by stepping on the accelerator to maintain speed, applying counter steering to control the vehicle, and then applying limited use of brakes to bring the vehicle to a stopped condition.

Discussion of Activities: On August 16, 2005, at 10:40 a.m., the regulated guzzler truck was traveling unloaded to a new work location when a tire failure occurred and the truck rolled over. No other vehicles were involved. Emergency crews used the Jaws of Life to remove the driver and then transported the driver to the local hospital for evaluation.

Analysis: The regulated guzzler truck is a radiologically controlled vehicle that is used for soil excavation. The unit weighs 45,000 lbs. The vehicle was traveling northbound on a two-lane, paved road to a new work location. Traffic was light, the weather warm (85 degrees F), there were light winds (6 mph), and there were light scattered clouds. The road was in good condition with no obvious road hazards present. The vehicle experienced a left front tire failure and veered left, crossed the oncoming traffic lane, rolled, and ended up on its side in a contamination area. The containment system of the vehicle was breached, but there was no loss of contamination control. The vehicle had successfully passed an annual DOT inspection in April of 2005, and a subsequent maintenance inspection was performed in August.

Both front tires were provided to an independent forensic engineering company for analysis. The tires were 12-years old and were found to have good tread depth with no abnormal tread wear, no obvious defects, signs of manufacturing defects, overheating, side-wall flexing, or evidence of puncture repair. The location of failure was very apparent and the entire tread ripped from the tire carcass. One small hole in the tread was noted that **did not** go all the way through the tire. This hole was old, near the point of origin of the failure, and may have allowed moisture into the steel belts of the tire.

Rusted steel belts and pre-accident ply separation were evident, and it was apparent that water had infiltrated the tire. The tire probably failed due to separation between the belts, because water infiltrated into the tread, which then migrated along the steel belts causing rusting and ultimately, failure. Age of the tire and infrequent use with long periods of sitting may have contributed to the failure, which may have been initiated by a small road hazard. The forensic engineering company recommended changing out this type of tire every 8 years.

An independent accident reconstruction and analysis company reconstructed the accident. They determined that the vehicle was traveling 55-mph, and concluded with clear evidence rapid air loss or blowout of the left front tire, 143-feet of braking and side-slipping tire marks prior to roll over, 54-feet of scrapings on the pavement, and 34-feet of furrows off the shoulder of the roadway. The vehicle began to roll over prior to leaving the paved surface. 3D simulations were developed to illustrate what actions would have taken place to result in a roll-over accident. The simulations determined that the roll over occurred because of heavy braking with little or no counter steering. If counter steering had been used and pressure had been applied to the accelerator to initially gain control of the vehicle, the roll over would not have occurred.

Stepping on the accelerator to maintain vehicle control is counter-intuitive. A public safety video, courtesy of the Michelin® Tire Corporation, does an excellent job of describing what takes place when a big truck experiences tire rapid air loss, along with illustrating the proper response actions necessary to gain and maintain vehicle control. The video covers the dynamics of a blowout and why this technique works. These techniques are not currently taught to vehicle operators at Hanford.

Recommendations:

1. Change out all tires on steering axles that are greater than 8-years old.
2. Provide tire rapid air loss emergency response training to heavy vehicle operators. Consider use of the video provided by the Michelin® Tire Corporation: "The Critical Factor: Maintaining Control in a Rapid Air Loss Situation."

   \\ap001\M&SSPublic\M&SS Web Page\Safety\Michelin.wmv

Cost Savings: If this accident had been avoided, the estimated cost savings would have been $450,000. This estimate includes the costs incurred for post-accident investigations and vehicle replacement.

Originator: Fluor Hanford, Inc., submitted by Dawn E. Adams

Contact: Project Hanford Lessons Learned Coordinator; *(509) 372-2166; e-mail: PHMC_Lessons_Learned@rl.gov*

References: None

Distribution: General