CRASH DATA RESEARCH CENTER
Calspan Corporation
Buffalo, NY 14225

CALSPAN ON-SITE POTENTIAL SAFETY-RELATED DEFECT CRASH INVESTIGATION

SCI CASE: CA06-021

VEHICLE: 1998 FORD EXPLORER
LOCATION: NEW MEXICO
CRASH DATE: JULY 2005

Contract No. DTNH22-01-C-17002

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
Washington, D.C. 20590

DISCLAIMER

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no responsibility for the contents or use thereof.

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the National Highway Traffic Safety Administration.

The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points are coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. CA06-021	*2. Government Accession No.*	*3. Recipient's Catalog No.*	
4. Title and Subtitle Calspan On-Site Potential Safety Related Defect Crash Investigation Vehicle: 1998 Ford Explorer Location: New Mexico		*5. Report Date*: December 2006 *6. Performing Organization Code*	
7. Author(s) Crash Data Research Center		*8. Performing Organization Report No.*	
9. Performing Organization Name and Address Calspan Corporation Crash Data Research Center P.O. Box 400 Buffalo, New York 14225		*10. Work Unit No.* C00410.0000.0360 *11. Contract or Grant No.* DTNH22-01-C-17002	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Washington, D.C. 20590		*13. Type of Report and Period Covered* Technical Report Crash Date: July 2005 *14. Sponsoring Agency Code*	
15. Supplementary Note An investigation of an alleged tread separation on a 1998 Ford Explorer involved in a subsequent rollover crash.			
16. Abstract This on-site investigation focused on the alleged tire tread separation and subsequent rollover crash of a 1998 Ford Explorer which resulted in fatal injuries to the 47 year old male restrained front right passenger. The crash occurred during the nighttime hours of July 2005. It was dark without artificial lighting. The reported weather was clear and was not a crash factor. The crash occurred on the southbound lanes of a two-lane divided interstate highway in rural New Mexico. The asphalt roadway was straight and level in the area of the crash. The Ford was southbound in the outboard lane traveling at approximately the 120 km/h (75 mph) speed limit. The southbound Ford Explorer was driven by a 42 year old female and was occupied by a 47 year old male front right passenger, a 37 year old male left rear passenger and a 25 year old male right rear passenger. All four occupants of the Ford were restrained at the time of the crash. The driver lost control of the Ford due to a reported “blow out” of the right rear tire. The tread separation caused the Ford to pull to the right and onto the road shoulder. The driver steered to the left in a reaction to the altered vehicle dynamics. Subsequently the Ford crossed the center divider, traveled through the inboard lane and departed the inboard road shoulder. The driver then steered back to the right in an attempt to regain the road. The vehicle tripped as it reentered the road into a left side leading roll. The vehicle rolled six quarter turns and came to rest on its roof. There were no ejections during the rollover event.			
17. Key Words Tripped rollover crash Ejection Fatal injuries Tire tread separation		*18. Distribution Statement* General Public	
19. Security Classif. (of this report) Unclassified	*20. Security Classif. (of this page)* Unclassified	*21. No. of Pages* 6	*22. Price*

TABLE OF CONTENTS

CALSPAN ON-SITE POTENTIAL SAFETY-RELATED DEFECT CRASH INVESTIGATION
SCI CASE: CA06-021

VEHICLE: 1998 FORD EXPLORER
LOCATION: NEW MEXICO
CRASH DATE: JULY 2005

BACKGROUND

This on-site investigation focused on the alleged tire tread separation and subsequent rollover crash of a 1998 Ford Explorer, **Figure 1**, which resulted in fatal injuries to the 47 year old male restrained front right passenger. The crash occurred during the nighttime hours of July 2005. It was dark without artificial lighting. The reported weather was clear and was not a crash factor. The crash occurred on the southbound lanes of a two-lane divided interstate highway in rural New Mexico. The asphalt roadway was straight and level in the area of the crash. The Ford was southbound in the outboard lane traveling at approximately the 120 km/h (75 mph) speed limit. The southbound Ford Explorer was driven by a 42 year old female and was occupied by a 47 year old male front right passenger, a 37 year old male left rear passenger and a 25 year old male right rear passenger. All four occupants of the Ford were restrained at the time of the crash. The driver lost control of the Ford due to a reported "blow out" of the right rear tire. The tread separation caused the Ford to pull to the right and onto the road shoulder. The driver steered to the left in a reaction to the altered vehicle dynamics. Subsequently the Ford crossed the center divider, traveled through the inboard lane and departed the inboard road shoulder. The driver then steered back to the right in an attempt to regain the road. The vehicle tripped as it reentered the road into a left side leading roll. The vehicle rolled six quarter turns and came to rest on its roof. There were no ejections during the rollover event.

Figure 1: Final rest position of the 1998 Ford Explorer.

The driver and two rear seat passengers reportedly exited the vehicle under their own power and were found outside the vehicle by the investigating officer. A passer-by to the crash reportedly stopped to render aid and went to the front right of the Ford. The front right occupant was seat belted and suspended in the overturned vehicle. The passer-by reportedly released the seat belt and removed the occupant from the vehicle. Shortly after laying him on the ground, the witness reported that the front right occupant became pulseless. CPR was initiated and continued after the arrival of ambulance personnel but was unsuccessful. The front right occupant was pronounced deceased at the scene. The driver and rear seat passengers of the Ford were transported by ground with police reported complaint of pain without visible injury.

Notification of this crash was supplied to the Calspan Special Crash Investigations team by an attorney representing the family of the deceased passenger. Calspan subsequently notified the National Highway Traffic Safety Administration's Office of Defects Investigation regarding the crash. ODI in-turn asked the Crash Investigation Division of the NHTSA to assign an investigation of the crash to the Calspan SCI team due to the agency's high interest in tire failures, tread separation, and rollover crashes. Calspan initiated follow-up investigation and was supplied the Police Accident Report, Autopsy Report, and background materials regarding the crash. The Ford Explorer and tire were retained by the attorney pending civil litigation of the matter and were available for inspection. The on-site inspection of the vehicle and tire took place the week of August 28, 2006. Due to the passage of time between the crash date and the SCI notification, an inspection of the crash site was not conducted.

VEHICLE DATA

1998 Ford Explorer XLT 4 x 4
VIN: 1FMZU34X1WZ (Production sequence deleted)

- Mileage: 205,768 km (127,862 miles)
- Right Rear Tire Tread Separation
- Tripped Left Side Leading Roll – Six Quarter Turns
- Maximum lateral and vertical crush located on the right roof rail within the A-pillar area
  Max Lateral Displacement: 12 cm (4.8 in)
  Max Vertical Crush: 24 cm (9.4 in)
- Damage to right rear wheelhouse and surrounding body panels from partial detread slap
- Undercarriage: Good condition, all bushings and links tight, no leaking seals, no broken springs, brake lines intact, all parts appear to be OEM.

Figure 2: Left front oblique.

Figure 3: Left rear oblique.

Figure 4: Right rear oblique.

Figure 5: Right front oblique.

Figure 6: Maximum crush in the right A-pillar area.

OCCUPANT DATA

Driver:	42 year restrained female	Front Right:	47 year old restrained male
Left Rear:	37 year old restrained male	Right Rear:	25 year old restrained male

- No ejections
- Front right passenger fatally injured – head and neck trauma;
  Cause of death listed as asphyxiation.
- Driver and rear seat passengers sustained non-life threatening injuries.

TIRE DATA

Position:	**Left Front Tire**	**Right Front Tire**
Manufacturer / Model:	LeMans AT	LeMans AT
Tire Size:	P235/75R15 M+S	P235/75R15 M+S
DOT Number:	VDHL LAT 4401	VDHL LAT 3201
Tread Depth (mm/in): (Outboard to Inboard)	6 mm 7 mm 6 mm 6 mm (7/32" 9/32" 8/32" 8/32")	4 mm 6 mm 6 mm 5 mm (5/32" 8/32" 7/32" 6/32")
Construction: Tread: Sidewall:	2 ply steel and 2 ply polyester 2 ply polyester	2 ply steel and 2 ply polyester 2 ply polyester
Notes:	Tire debeaded; inner sidewall two cuts Rim abraded 100% of circumference, heavily abraded over 50%, surface abrasions to center of wheel 30%	Tire debeaded; No abrasions to rim; Grass embedded between tire and rim

Position:	**Left Rear Tire**	**Right Rear Tire**
Manufacturer / Model:	Easy Rider LTD	Pirelli Norseman
Tire Size:	P235/75R15 M+S	P235/75R15 M+S
DOT Number:	PJHL GPKR 4800	UTHK PAB 2402
Tread Depth (mm/in): (Outboard to Inboard)	6 mm 6 mm 6 mm 6 mm (8/32" 8/32" 8/32" 8/32")	6 mm 6 mm 6 mm 6 mm (7/32" 7/32" 7/32" 7/32")
Construction: Tread: Sidewall:	2 ply steel and 2 ply polyester 2 ply polyester	2 ply steel and 2 ply polyester 2 ply polyester
Notes:	Tire debeaded; Rim abraded over 100% of its circumference, extensive surface abrasions to center of wheel	See below for detailed tire information, Rim abraded over 25% of circumference with asphalt deposits, 40% surface abrasions to wheel

Right Rear Tire

The overall general condition of the tire was considered to be good, **Figures 7 and 8**. There was adequate tread life remaining and the rubber did not appear dry rotted. Damage to the tire consisted of a combination of a separated tread section and destruction of the casing and sidewall. The casing and sidewall were cut completely through compromising the integrity of the tire. The cut measured 15 cm (5.8 in) in length and was oriented in the radial direction at 330 degrees, **Figures 9 and 10**

The separated tread section measured 150 cm (59 in) and separated from the tire between 180 to 300 degrees, **Figure 11**. This separation of this tread section occurred between the steel plys. The separated section appeared to have occurred near the construction seam located at 130 degrees, **Figure 12**. A nail was embedded in the separated tread section and was located at 120 degrees, **Figure 13**. The nail head was worn smooth and the nail point was worn flat. The nail

penetrated the tread and top steel ply but did not penetrate the casing. An arrow shape (possible fatigue) section emanated from the nail toward the construction seam. Refer to **Figures13 and 14**. There was an additional partial tread separation located from 330 degrees to 240 degrees measuring 58 cm (23 in) in length. The nail puncture may have contributed to the damage of this tire. This was not a typical/classic tread separation.

Figure 7: Overall view of tire and detread. Non DOT side shown.

Figure 8: DOT side of tire.

Figure 9: Detread section and tire.

Figure 10: Casing damage at 330 degrees

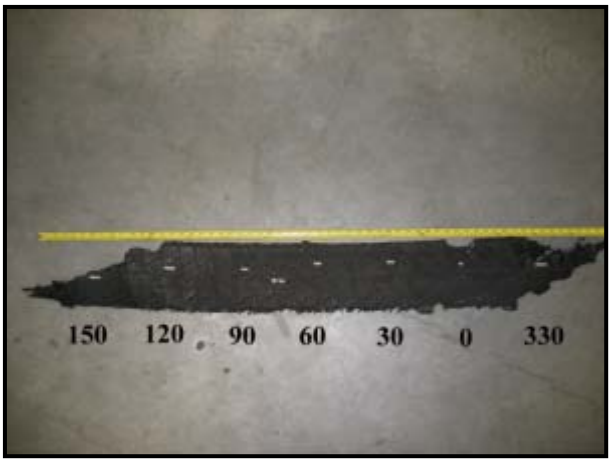

Figure 11: Detread section (Exterior side).

Figure 12: Detread section (interior side).

Figure 13: Close-up of nail and construction seam.

Figure 14: Close-up of tire at the construction seam. Note the nail location.