U.S. Department of Transportation
National Highway Traffic Safety Administration

ODI RESUME

Investigation: EA 02-018
Prompted By: RQ02-002
Date Opened: 08/19/2002 Date Closed: 08/22/2003
Principal Investigator: TERRI DRONEBURG
Subject: RAPID TIRE DEFLATION

Manufacturer: FORD MOTOR COMPANY
Products: 1999-2001 FORD F-350,450,550 &E350,450
Population: 879103

Problem Description: A TIRE VALVE STEM EJECTS WHILE THE VEHICLE IS IN MOTION, RESULTING IN A SUDDEN AND RAPID LOSS OF TIRE PRESSURE

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	42	1107	1149
Crashes/Fires:	0	3	3
Injury Incidents:	0	0	0
# Injuries:	0	0	0
Fatality Incidents:	0	0	0
# Fatalities:	0	0	0
Other*:	0	0	0

*Description of Other:

Action: CLOSE THIS INVESTIGATION. A SAFETY RELATED DEFECT TREND HAS NOT BEEN IDENTIFIED.

Engineer: Terri Droneburg Date: *08/22/2003*
Div. Chief: *Richard Boyd* Date: *08/22/2003*
Office Dir.: *Kathleen C. DeMeter* Date: *08/22/2003*

Summary: THIS INVESTIGATION WAS OPENED ON CERTAIN FORD PICKUP TRUCKS AND VANS TO EVALUATE THE EFFECTS OF A VALVE STEM EJECTION (WITH RAPID AIR LOSS) AND A SLOW LEAKING VALVE STEM ON VEHICLE HANDING. DURING THE INVESTIGATION, ODI EVALUATED OVER 1,100 COMPLAINTS AND WARRANTY CLAIMS, CONDUCTED VEHICLE DYNAMIC TESTING ON A SUBJECT VEHICLE WITH THE FAILURE MODE REPLICATED, INTERVIEWED OWNERS, AND EXAMINED COMPLAINT VEHICLES IN THE FIELD.

THE RESULTS OF THE TEST PROGRAM INDICATES THE EFFECT OF A VALVE STEM EJECTION ON THESE VEHICLES IS EASILY CONTROLLED. FURTHER, WITH A POPULATION OF ALMOST 900,000 VEHICLES, HAVING TWO TO FOUR YEARS OF EXPOSURE, ODI IS AWARE OF ONLY 3 MINOR CRASHES AND IS UNAWARE OF ANY INJURIES.

THE SMALL NUMBER OF CRASHES RELATIVE TO THE LARGE POPULATION OF VEHICLES IS CONSISTENT WITH THE TESTING WHICH WAS PERFORMED.

THEREFORE, THIS INVESTIGATION IS CLOSED. SEE THE ATTACHED REPORT FOR FULL TECHNICAL DETAILS.

Subject: Tire Valve Stem Ejects While Vehicle Is In Motion
EA Number: EA02-018
Subject Vehicles: 1999-2001 Ford F-350, F450, F550 trucks and 1999-2001 Ford E-350 and E-450 vans

Date Opened: 19-Aug-02 **Date Closed:** 22-Aug-03

Basis:
This investigation is based on the Office of Defects Investigation's (ODI) receipt of 48 complaints that allege tire valve failure and Ford's submission of 1,085 related reports as part of the Recall Query (RQ02-002). ODI opened RQ02-002 after a Ford safety recall, which was implemented to address a potential safety risk during tire servicing. The recall was not based on a risk to motor vehicle safety during vehicle operation. Rather, the recall addressed the possibility that some 1999 through 2001 F450/550 chassis cab vehicles equipped with commercial tires may have been produced with damaged tire valve stems during installation of the stems from the beginning of the 1999 model year through October 21, 2000. Because of the particular characteristics of these commercial truck tires, they are susceptible to permanent damage if subjected to continued use in an under inflated condition. Ford conducted the recall because the damaged steel cords could cause a sidewall zipper rupture while the tire was being serviced or inflated. A rupture of that nature may result in a rapid loss of air pressure that could injure a person near the tire during the installation and/or servicing procedure.

The primary allegation in this investigation is that the tire valve stem ejects from the wheel while the vehicle is in motion. This may lead to sudden air loss during vehicle operation, which may cause the tire to rapidly deflate (in less than 10 seconds) and result in a loss of vehicle control. The loss of vehicle control was the primary issue that ODI was concerned with in this investigation. While the subject valves stems are used in many tires, this investigation is limited to their use on the certain vehicles. The subject vehicles are large trucks that are used in applications such as telephone repair trucks, small dump trucks, tow trucks and other common, but heavy, work trucks. The Recall Query included all model year 1999-2001Ford Excursion, F-Series trucks and conversion vehicles, and E-Series vans and conversions. We upgraded the investigation to an Engineering Analysis (EA) on the F350, F450, F550, E350, and E450 vehicles because of the higher rates associated with those vehicles.

Description of Component:
Some subject vehicles have rubber valve stems and other subject vehicles have all-metal valve stems. The rubber valve stems have a bulb at the base of the stem that is inserted into the rim and is made of rubber. In addition, the shaft of the stem that protrudes from the rim is coated in rubber. The all-metal valve stems are made of metal, such as chrome-plated steel or brass. NHTSA's interest in this investigation was with the rubber valve stem that Ford installed on the subject vehicles. In response to the Recall Query, Ford submitted information to the agency that identified the rubber valve stem as the Dill TR600HP (High Pressure). The Dill TR600HP valve stems were the only rubber valves experiencing failures. If the rubber valve stem fails, a tire may experience sudden air loss causing the tire to rapidly deflate in less than 10 seconds, which may result in a loss of vehicle control. Ford equipped the majority of the 2002 models of the subject vehicles with the all-metal two-piece valve stems. These metal valve stems do not appear to be failing.

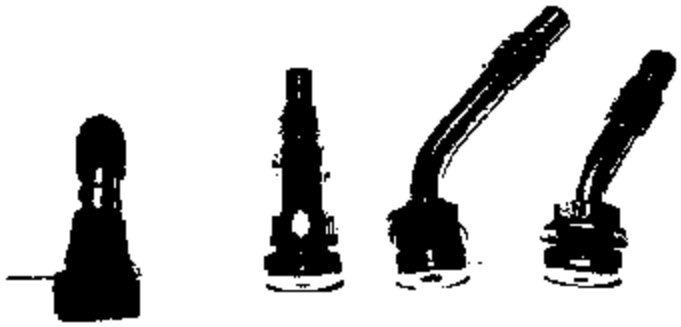

Figure A. The Dill TR600HP is shown at far left. The three other valve stems shown to the left are examples of all-metal valves stems referred to in the text.

Figure A

Failure Mode:
ODI's review of the reports indicates three failure modes:

1. The tire valve stem (i.e., the entire rubber/metal valve in one piece) ejects from the wheel while the vehicle is in motion. This may lead to sudden air loss causing the tire to rapidly deflate (in less than 10 seconds) which may contribute to a loss of vehicle control;

2. The valve stem partially ejects from the rim while driving, resulting in a slow air leak; or

3. The rubber part of the valve stem cracks, resulting in a slow leak.

Vehicle Population:
Ford manufactured approximately 879,103 vehicles during the 1999-2001 model years. See the table below for a breakdown by model year.

Table 1. Populations

Model Year	Model	Population
1999	E350	71,992
2000	E350	62,326
2001	E350	68,300
1999	E450	20,861
2000	E450	18,203
2001	E450	17,885
1999	F350	170,601
2000	F350	135,736
2001	F350	120,720

1999	F450	30,476
2000	F450	23,433
2001	F450	18,176
1999	F550	60,875
2000	F550	44,000
2001	F550	25,619
TOTAL		879,103

Problem Experience:

Warranty data and Ford complaint data were analyzed together. All complaints and warranty reports from Ford are broken down by body style and model and are shown in the following table:

Table 2. Complaints and Warranty Data

E30-ECONOLINE E350 4X2 SUPER DUTY RV CUTAWAY	10,609	1	9
E31-ECONOLINE XLT 4X2 SUPER DUTY HD WAGON	9,536	2	21
E34-ECONOLINE E350 4X2 SUPER DUTY CARGO VAN SD REG VAN	32,107	35	109
E35-E-SERIES BASE CUTAWAY	31,723	7	22
E37-ECONOLINE E350 4X2 SUPER DUTY COMM CUTAWAY	11,640	1	9
S31-ECONOLINE E350 SUPER DUTY WAGON XLT 4X2 HD WAGON	64,575	7	11
S34-ECONOLINE E350 SUPER DUTY CARGO VAN	30,999	17	55
E39-ECONOLINE E350 4X2 SUPER DUTY COMM BASIC (STRIPPED) CHASSIS	1,329	0	0
E350	192,518	70	36
E40-E-SERIES E450 4X2 SUPER DUTY RV CUTAWAY	18,203	7	38
E46-E-SERIES E450 4X2 SUPER DUTY CUTAWAY	35,513	9	25
E47-E-SERIES E450 4X2 SUPER DUTY	2,633	0	0
E49-E-SERIES E450 4X2 SUPER DUTY COMM (STRIPPED) CHASS	600	0	0
E450	56,949	16	28
F30-F-SERIES FH2 REG CAB F350 SRW 4X2	5,903	2	34
F31-F-SERIES FH4 REG CAB F350 SRW 4X4	24,277	8	33
F32-F-SERIES FH2 REG CAB F350 DRW 4X2	2,273	3	132
F33-F-SERIES FH4 REG CAB F350 DRW 4X4	1,978	0	0
F34-F-SERIES FH2 REG CHASSIS CAB F350 SRW 4X2	6,595	34	516
F35-F-SERIES F350 4X4 CHASSIS CAB-REG CAB	3,618	9	256
F36-F-SERIES F350 DRW 4X2 CHASSIS CAB-REG CAB	46,419	67	144
F37-F-SERIES F350 DRW 4X4 CHASSIS CAB-REG CAB	21,395	16	84
X30-F-SERIES FH2 SUPERCAB F350 SRW 4X2	8,703	7	80
X31-F-SERIES FH4 SUPERCAB F350 SRW 4X4	41,949	21	50
X32-F-SERIES FH2 SUPERCAB F350 DRW 4X2	14,182	11	78
X33-F-SERIES FH4 SUPERCAB F350 DRW 4X4	20,267	14	69

X34-F-SERIES FH2 SUPER CHASSIS F350 SRW 4X2	2,028	4	197
X35-F-SERIES F350 4X4 CHASSIS CAB-SUPER CAB	2,051	1	49
X36 - FH2 SUPER CHASSIS CAB F350 DRW 4X2	4,218	13	308
X37 - FH4 SUPER CHASSIS CAB F350 DRW 4X4	6,493	10	154
W30-F-SERIES FH2 CREWCAB F350 SRW 4X2	18,951	16	84
W31-F-SERIES FH4 CREWCAB F350 SRW 4X4	87,265	47	54
W32-F-SERIES FH2 CREWCAB F350 DRW 4X2	45,644	59	129
W33-F-SERIES FH4 CREWCAB F350 DRW 4X4	51,959	43	83
W34-F-SERIES FH2 CREW CHASSIS F350 SRW 4X2	1,011	0	0
W35-F-SERIES 4X4 CHASSIS CAB-CREW CAB	1,046	1	96
W36-F-SERIES 4X2 DRW CHASSIS CAB-CREW CAB	5,471	9	165
W37-F-SERIES FH4 CREW CHASSIS CAB F350 DRW 4X4	3,451	4	116
F350	**427,057**	**401**	**94**
F46-F-SERIES FH2 REG CHASSIS CAB F450 DRW 4X2	48,261	183	379
F47-F-SERIES F450 DRW 4X4 CHASSIS CAB REG CAB	13,899	32	230
W46-F-SERIES FH2 CREW CHASSIS CAB F450 DRW 4X2	6,596	36	546
W47-F-SERIES FH4 CREW CHASSIS CAB F450 DRW 4X4	3,327	13	391
F450	**72,085**	**264**	**366**
F53-F-SERIES SD CLASS A MOTORHOME CHASSIS	71,770	0	0
W56-F-SERIES FH2 CREW CHASSIS CAB F550 DRW 4X2	5,621	45	801
W57-F-SERIES FH4 CREW CHASSIS CAB F550 DRW 4X4	4,272	25	585
F56-F-SERIES FH2 REG CHASSIS CAB F550 DRW 4X2	33,554	222	662
F57-F-SERIES FH4 REG CHASSIS CAB F550 DRW 4X4	15,277	64	419
F550	**130,494**	**356**	**273**
ODI Complaints (All models)		42	
TOTAL	**879,103**	**1,149**	**131**

ODI reviewed 1,149 unique reports. Over 450 complainants allege that the valve stem ejected out of the rim (mode #1). Some complaints and warranty claims are vague and cannot be categorized. The remainder relate to leaking valve stems, or a valve stem that was partially ejected.

ODI is aware of three crashes that allegedly have been caused by this problem. Based on the reports provided to ODI regarding the three crashes, the details are as follows:

A vehicle rental facility reported to Ford on March 7, 2002, that two of its vehicles had been involved in incidents in April and May 2001. The first incident involved a F-450, which Ford remedied pursuant to the previous Ford recall, No. 01S05. Three months later, the vehicle was on the way to a job site when allegedly a valve stem failed, which "caused wheels to separated (sic) from the vehicle." The rental facility did not report any property damage or personal injuries, file a police report, or contact the insurance company. The second incident reported by the rental facility occurred one month after the above mentioned recall. Ford became aware of the second incident several months after the incident, when the rental facility attempted to obtain reimbursement for a "defective valve stem which caused the wheels to separate." No injuries were reported in connection with the second incident. Ford denied both claims because the rental facility reported the incidents late and verification was not possible. The third incident was an alleged crash, but no details were provided. The owner filed for reimbursement two years after the incident occurred. No injuries were reported. Ford denied the claim.

A large number of these vehicles are incomplete chassis sent to conversion companies that manufacture vehicles such as minibuses, stake trucks, ambulances, bucket trucks, tow trucks specialty vehicles, motorhomes, etc. Many of these vehicles have dual rear wheels, which are known as "duallies." If a valve stem fails on one of the rear wheels of a "dually" truck, the tire directly adjacent to the failed valve stem carries the load and allows the driver to maintain control of the vehicle. Thus, a vehicle with dual rear wheels has reduced safety related consequences when a single rear tire valve stem fails for whatever reason. Moreover, all of the vehicles have power steering, which provides assistance to the driver when handling the vehicle.

ODI Complaints:
ODI carefully searched the complaint database and examined all complaints on the subject vehicles where tire and/or valve stem were mentioned. Complaints expressing only a concern about the problem or about Ford's recall (01S05), or implementation of the recall were not included. Only complaints where an actual failure occurred (be it some type of tire failure, a valve stem air leak or ejection) were included. Tire failures were included even if the valve stem was not mentioned, since a failed valve stem ultimately results in air loss and eventually a flat or failed tire. As a result of this search and after reviewing the complaints, ODI determined that 42 complaints are currently in the database, which report some type of tire failure (blow out, chunking, flat, etc.). Of those 42 complaints, 33 mention some type of valve stem concern, such as a slow leak or ejection. Of the 42 complaints, 30 (71%) pertain to an E/F450 or F550. None of the complaints specifies that a crash or injury occurred.

Service Bulletins:
Ford has not issued any service bulletin related to this issue.

Parts Sales:
The Dill TR600HP tire valve is used in all of the 1999-2001 subject vehicles. Part sales were not analyzed in this investigation because the valve is used in many different OE and aftermarket applications.

Testing:
In order to measure the controllability of the vehicles when a valve stem failed, Ford conducted dynamic handling testing in March 2003 with oversight and participation by engineers from ODI and the Vehicle Research Test Center (VRTC). The test vehicle used in the evaluation was a 2002 Ford F450 XLT Super Duty,
VIN 1FDXF47F93EA00001, date of manufacture March 2002, odometer 285 miles. It was equipped with two-wheel drive, dual-rear wheels, a flat bed with roll bar and two weight boxes mounted along the centerline of the vehicle. The tires used were new General LMT 400 225-70R-19.5 inflated to 75 PSI. The vehicle was equipped with what appeared to be an OEM steering stabilizer mounted on the center link. Figure 1 is a VRTC file photograph of a 2002 Ford F450.

Vehicle Evaluation:
VRTC test engineers acted as the test drivers for the vehicle testing. They were designated Driver 1 and Driver 2. Driver 1 acted as an attentive driver and would promptly respond to tire deflations and, if possible, use only smooth and moderate control inputs to control the vehicle. Driver 2 acted as an inattentive driver and would, when possible, delay responding and initially use aggressive control inputs.

The vehicle was equipped with a device that would cause a tire valve failure on demand. This device was attached to one of the front wheels and could be manually activated from the passenger's seat by a driver's assistant. Ford personnel acted as the driver's assistant.

Figure 1 – VRTC File Photograph of a 2002 Ford F450

The evaluation was conducted in five parts on three different test surfaces. The test surfaces consisted of a straight away asphalt, a 200-foot radius asphalt left turn, and a closed course winding gravel road that included numerous elevations changes. Except as noted below in the straightaway test, for each test surface, the vehicle was loaded to approximately its Gross Vehicle Weight Rating (GVWR), and each driver drove one test in this condition. The valve stem ejections or valve core ejections were accomplished by a driver's assistant who, while seated and belted in the vehicle and following some arbitrary delay, ejected the tire valve stem/core from one of the front wheels, causing the tire to rapidly deflate.

The straightaway test was performed by driving the test vehicle at 55 mph inside a 12-foot lane. Driver 1 performed one test on the straightaway when only the valve core was ejected from the right-front wheel, causing the tire to deflate in approximately 10 seconds. This test was conducted with the vehicle loaded to its GVWR. Subsequently, each driver drove the vehicle two times when the tire valve stem was ejected, causing the tire to deflect in approximately four seconds. During the first run the vehicle was loaded to its GVWR and during the second run the vehicle was loaded to approximately its Lightly Loaded Vehicle Weight (LLVW).

The 200-foot radius turn test was performed by driving the test vehicle left onto the marked radius at 35 mph. Soon after maximum roll angle had been achieved and while the driver maintained 200-foot radius at 35 mph, the driver's assistant ejected the tire

valve stem from the right-front wheel, causing the tire to deflate in approximately four seconds.

The winding gravel road course was driven counterclockwise at approximately 45 mph. The drivers drove one lap around the course prior to driving their respective test lap. Four special valve stem caps had been prepared for this evaluation. When installed, two of these caps would simulate a "slow" leak. One cap would cause the tire to deflate from 75 PSI to 2 PSI in approximately four and one half minutes and the second cap in approximately six minutes. The two remaining caps were unmodified and would not cause a leak. Neither the driver, nor the driver's assistant, knew if they had a slow leaking front tire and, if so, whether it was the left or right side.

Results of Dynamic Testing:

Straightaway GVWR four-second deflation:

> Driver 1 reported that when the tire was deflated he gently braked and pulled the vehicle to the side of the road and reported that it was easy to control.
>
> Driver 2 reported that when the tire was deflated he began a spike (hard) brake stop and the vehicle aggressively pulled to the right. He immediately released the brake and began a gentle to moderate brake stop and was able to slowly pull the vehicle to the side of the road. He noted that when he braked gently or moderately the vehicle was easy to control.

Straightaway GVWR ten-second deflation:

> Driver 1 reported that when the tire began to deflate he was able to begin a gentle deceleration and was able to pull the vehicle to the side of the road before the tire was fully deflated. He reported that the vehicle was easily brought to a stop along the side of the road.

Straightaway LLVW four-second deflation:

> Driver 1 reported that when the tire deflated he gently braked and was able to pull the vehicle to the side of the road and that the vehicle was easy to control. He noted little difference in controlling the vehicle between the GVWR test and the LLVW test.
>
> Driver 2 reported that when the tire deflated he began a moderate brake stop and the vehicle moderately pulled to the right. He continued the moderate deceleration and was able to bring the vehicle to a stop along side the road with minimal effort.

200-foot radius left turn:

> Driver 1 reported that when the tire deflated he gently braked and allowed the vehicle to drift approximately 12 feet to the outside of the lane as if pulling to the side of the road. He noted that the vehicle was easy to control.

Driver 2 reported that when the tire deflated he gently braked and continued to steer the vehicle along the original 200-foot radius path. The vehicle came to a stop in the path and the driver advised that the vehicle was easy to control.

Winding gravel course:

Driver 1 reported that approximately six minutes into the test run he decided that, although the vehicle was easy to control, something was noticeably wrong with the right front of the vehicle. He brought the vehicle to a stop at approximately six and one half minutes into the run. He discovered that the right-front tire was deflated. A four and one half minute "slow leaker" had been installed on the right-front wheel.

Driver 2 reported that at approximately four to five minutes into the test run he began to notice an increased amount of understeer. The understeer was difficult to detect because of the loose gravel that caused the vehicle to either understeer or oversteer throughout the test run. Since the driver was able to control the vehicle, the driver decided to complete the test run. This test also had a four and one half minute "slow leaker" installed on the vehicle.

Conclusions From Testing:
Both drivers concluded that, based on the dynamic handling tests, the test vehicle presented no unusual or difficult controllability demands upon the driver when faced with either a slow or rapidly deflating front tire. See test report titled, "Evaluation of Tire Valve Failures on 2002 Ford F450 XLT Super Duty." A copy of the report will be placed in the public file at the conclusion of this investigation.

Manufacturer's Evaluation of the Alleged Defect:
Ford's position is that use of the Dill TR600HP type tire valve stem on the subject vehicles is acceptable because this valve stem is approved by the Tire and Rim Manufacturing Association (TRA) for use on vehicles such as those that are the subject of this investigation. Ford believes that the design of these valves stems is not "defective" and that they are not inadequate for use in the subject vehicles. "The entire automotive industry uses the TRA recommendations for valve stem usage." In addition, Ford is unaware of any design or manufacturing reason that may result in the subject valve stem ejecting out of the wheel while the vehicle is in motion.

Ford alleges that a valve stem that ejected out of a wheel while the vehicle is in motion most likely has been damaged during installation or during road use. According to Ford, the damage may eventually weaken the valve stem structure to the point that all or a portion of the stem is forced out of the wheel by the tire's air pressure.

Ford contends that the very limited number of loss of control incidents resulting from the valve stem ejection is an indication that no safety-related defect trend exists. Ford contends that the valve stems used on the subject vehicles do not present an unreasonable risk to motor vehicle safety.

ODI Analysis:
ODI's primary focus in this investigation was the effect on vehicle handling of a tire with an ejected valve stem and the subsequent rapid air loss, resulting in a flat tire. The concern was whether this type of failure would lead to a driver losing control of the

vehicle. These types of failures are different from a 360 degree tread separation which results in a significant loss of traction as well as a loss of cornering stiffness, and a substantial reduction in the lateral acceleration capability of the vehicle. The type of failure under investigation would not necessarily lead to an immediate destruction of the tire and, therefore, detrimental affects on vehicle handling are reduced, as compared to a tire with a belt-to-belt tread separation. Even with a flat tire, the cornering stiffness reduction is minimal.

Ford submitted a video demonstrating that a tire valve that is manually removed will deflate in less than 10 seconds in a static condition. This translates to the driver having only 10 seconds to react, brake, and negotiate his or her vehicle to the shoulder of the road. At 60 mph, a vehicle will travel approximately 880 feet in 10 seconds. With an average driver reaction time of 1.5 seconds, (1.5 seconds is the average generally accepted by accident reconstruction experts), there is minimal time to react before the tire is completely flat. ODI had this concern in mind when conducting the dynamic handling tests. The results of those tests indicate that the failure event is relatively benign. In other words, the vehicle remained stable during the rapid air loss, and vehicle control was easily maintained.

Whether a driver can maintain control of a subject vehicle with an ejected valve stem depends on a variety of subjective factors such as the vehicle's speed, the complexity of the tasks facing the driver, the driver's experience, knowledge, and alertness. The subject vehicle population is 879,000 vehicles, and these vehicles have two to four years of exposure. Despite the large numbers and lengthy time period, there are only three reported crashes that resulted in only minor property damage. The complaint/warranty data suggest, and the testing confirms, that an ordinary driver would not have difficulty controlling the vehicle when a valve stem is completely ejected from the wheel.

A second failure mode reported is that the tire valve sometimes ejects only partially or the rubber cracks, causing a leak in the tire. Owners reported finding their valve stems bent over at an angle in the rim. Those owners who have reported this type of failure have more time to react to the failure and have been able safely negotiate their vehicles to the side of the road and address the problem. These owners did not experience problems with vehicle handling because their tire, while low in pressure, still has enough air in it to enable the driver to pull over onto the shoulder of the road in a controlled fashion.

The complaint data suggests several factors contribute to the valve stem ejecting out of the rim while driving. The following four factors are prominent:

GVWR: The complaint rate increases as the GVWR increases. The heavier the vehicle, the more load is on the tires, which increases the internal temperature of the tire and increases the internal tire pressure.

Vehicle Speed: Vehicle speed is the most severe failure mode. Tire valves ejecting out of the rim completely at highway speeds of 55 mph or higher would increase the likelihood of decreased vehicle control by the driver.

Recommended Tire Pressure: The higher the GVWR, the higher the recommended tire pressure on these vehicles. The Dill TR600HP valves are

rated to 100 psi. For the subject vehicles, the recommended front and rear tire pressures range from 40-95 psi. Thus, in a worst-case scenario, the air pressure safety margin may be eliminated. For example, a tire with 95 psi at cold ambient temperature will have increased pressure due to load, speed and GVWR and at some point may exceed the 100-psi rating of the stem. This would most likely occur with a vehicle loaded to GVWR or perhaps even overloaded, which is possible given the duty cycle of these vehicles.

Ambient Temperature: The data indicate that more failures occur in the southern states than the northern states because of the higher ambient temperatures.

The small number of crashes, relative to the large population of vehicles, is consistent with testing performed by Ford, in conjunction with ODI/VRTC, at the Ford proving grounds. The conclusion derived from that testing confirmed that, for the subject vehicles, when a tire valve ejects, the effect on vehicle handling is minimal. Thus, while tires valves are ejecting at higher rates for some model/model year combinations (see Table 2 above), the test results and field data suggest that drivers can maneuver the subject vehicles to a safe stop.

Reason for Closing:

ODI opened this investigation to determine whether a safety-related defect existed in the Dill-TR600HP valve stems that were installed as original equipment on Ford F and E series vehicles. The complaint/warranty data analyzed by ODI indicate high failure rates on certain models with a high GVWR. Despite the numerous reports from the field, only three minor crashes were reported and there were no injuries. Moreover, the tests conducted by Ford and ODI/VRTC indicate that the vehicles can be safely maneuvered to the shoulder of the road in the event of a valve stem failure. Lastly, an important safety concern for NHTSA is roadside safety. However, the field data did not report any multiple vehicle roadside incidents. Furthermore, these are large vehicles (in many instances they have commercial markings) that are clearly visible when they are standing on the side of the road. Their large size and commercial markings increase their visibility, which in turn, lessens the risk that the vehicle or occupants will be struck by passing vehicles when the subject vehicle is on the side of the road.

This investigation is closed. Closing of this investigation does not constitute a finding by NHTSA that no safety-related defect exists. The agency reserves the right to take further action if warranted by the circumstances.

Terri Droneburg — 8/22/03

Terri Droneburg — Date

Richard Boyd — 8/22/03

Richard Boyd, Chief — Date
Medium and Heavy Duty Vehicle Division

8-22-03

Kathleen DeMeter, Director — Date
Office of Defects Investigation