DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

Denial of Motor Vehicle Defect Petition, DP97–006

AGENCY: National Highway Traffic Safety Administration (NHTSA), Department of Transportation.

ACTION: Denial of petition for a defect investigation.

SUMMARY: This notice sets forth the reasons for the denial of a petition submitted to NHTSA under 49 U.S.C. 30162, requesting that the agency commence a proceeding to determine the existence of a defect related to motor vehicle safety. The petition is hereinafter identified as DP97–006.

FOR FURTHER INFORMATION CONTACT: Dr. George Chiang, Office of Defects Investigation (ODI), NHTSA, 400 Seventh Street, SW, Washington, DC 20590. Telephone: (202) 366–5206.

SUPPLEMENTARY INFORMATION: Edgar F. Heiskell, III (petitioner), Attorney at Law, 400 Bank One Center, P.O. Box 3761, Charleston, West Virginia 25337–3761, submitted a petition to the National Highway Traffic Safety Administration (NHTSA) by letter dated December 3, 1997, requesting that an investigation be initiated to determine whether to issue an order concerning the notification and remedy of a defect in model year 1983 through 1990 Bronco II sport utility vehicles (subject vehicles) manufactured by Ford Motor Company (Ford) because of concerns related to their rollover propensity.

The petitioner alleges that the subject vehicles were ''designed with handling and stability defects which have caused an extraordinary number of rollover accidents resulting in thousands of deaths and severe injuries.''

NHTSA has reviewed all information brought to its attention and reviewed crash databases and Office of Defects Investigation's consumer complaint database. The results of this review and analysis are set forth in a Petition Analysis Report for DP97–006, which is published in its entirety as an appendix to this notice.

For the reasons presented in the petition analysis report, there is no reasonable possibility that an order concerning the notification and remedy of a safety-related defect in the subject vehicles would be issued at the conclusion of an investigation. Therefore, in view of the need to allocate and prioritize NHTSA's limited resources to best accomplish the agency's safety mission, the petition is denied.

Authority: 49 U.S.C. 30162(d); delegations of authority at CFR 1.50 and 501.8.

Issued on: May 14, 1999.

Kenneth N. Weinstein,

Associate Administrator for Safety Assurance.

Appendix—Petition Analysis—DP97–006

1.0 Introduction

Edgar F. Heiskell, III (petitioner), Attorney at Law, 400 Bank One Center, P.O. Box 3761, Charleston, West Virginia 25337–3761, submitted a petition to the National Highway Traffic Safety Administration (NHTSA) by letter dated December 3, 1997, requesting that an investigation be initiated to determine whether to issue an order concerning the notification and remedy of a defect in model year 1983 through 1990 Bronco II sport utility vehicles (subject vehicles) manufactured by Ford Motor Company (Ford) because of concerns related to their rollover propensity.

2.0 Previous Inquiries and Investigations by NHTSA Into Alleged Rollover Defects

In October 1979 and July 1981, NHTSA's Office of Defects Investigation (ODI) received two petitions (DP80–002 and DP81–018) for defect investigations into the alleged instability of Jeep CJ vehicles. Both these petitions were denied due to the lack of specific information indicating that there was a defect that caused the vehicles to roll over.

In 1988, ODI received two petitions for defect investigations into the alleged rollover propensity of 1986 through 1988 Suzuki Samurai vehicles, including the convertible, the Samurai, and the SJ410 and LJ80 models (DP88–011 and DP88–019). NHTSA also denied these petitions, primarily because the available information did not show that the alleged rollovers were caused by a defect in the vehicle rather than by the driver and/or environmental factors.

In 1989, ODI conducted investigation EA89–013 concerning 1984–1989 Ford Bronco II sport utility vehicles. This investigation was opened in response to a defect petition, DP88–020. A peer analysis of rollover rates showed the Bronco II to be similar to other sport utility vehicles, as measured using the metric of first-event single-vehicle rollovers per single-vehicle crash. ODI closed this investigation in October 1990, because ''there appears no reasonable expectation that further investigation would lead to a determination of the existence of a safety-related defect with respect to any of the allegations regarding the propensity of the Bronco II to roll over.'' Also during this same time period, ODI was petitioned again to investigate Jeep CJ models (DP90-012). This petition was also denied for the same reasons as the Bronco II petition.

In 1996, ODI was petitioned to open a defect investigation into the rollover propensity of the 1986–1995 Suzuki Samurai convertible (DP96–004). The petitioner alleged that Samurai convertibles have high rollover propensity, as reflected by their low static stability factor (the track width to center of gravity ratio), and, when loaded with occupants, the vehicle is even less stable. After reviewing the materials presented in that petition and other available data and information, the agency concluded that it was unlikely that further investigation of alleged Samurai convertible rollover propensity would enable NHTSA to identify a safety-related defect. The petition was therefore denied.

In August 1996, ODI received a petition (DP96–011) from Consumers Union of the United States (CU) to investigate 1995 and 1996 Isuzu Trooper and Acura SLX sport utility vehicles because of their alleged propensity to roll over in a reverse steer maneuver. CU alleged that these vehicles were prone to tip-up during a double lane maneuver known as the CU ''short course.'' CU's testing of peer vehicles indicated different performance for the peer vehicles compared to the Trooper and SLX. NHTSA conducted crash data analysis, a computer simulation, and a comprehensive test program comparing these vehicles and a peer vehicle during its analysis of the petition. NHTSA testing showed that the results of tests on the CU short course were not repeatable and were affected by driver performance. When these driver performance inconsistencies were accounted for, the Trooper and SLX performed similarly to the peer vehicles during testing using the CU short course. This petition was denied.

3.0 Vehicle Inforamtion

3.1 Subject Vehicle Description

The Ford Bronco II is a light utility vehicle, i.e., a multipurpose passenger vehicle having a wheelbase of 110 inches or less and special features for occasional off-road use, and was originally introduced for sale in the United States in late 1983 as a 1984 model year vehicle. It continued in production through the 1990 model year. It is a two-door, four-passenger vehicle with body-on-frame construction, a 94 inch wheelbase and a 56.9 inch track width (front and rear). The vehicle was equipped with front coil and rear leaf springs and a front-mounted engine throughout its production. All 1984–1986 model year Bronco II vehicles were equipped with four-wheel drive. Beginning with the 1987 model year and through the remainder of its production, the Bronco II was also available in a two-wheel drive configuration.

3.2 Vehicles Involved

Table 1 presents the number of subject vehicles sold in the United States.

TABLE 1.—SALES OF SUBJECT VEHICLES IN THE UNITED STATES

Model year	4X4	4X2	Total
1984	144,061	0	144,061
1985	98,153	0	98,153
1986	109,846	0	109,846
1987	88,818	22,286	111,104
1988	109,524	38,201	147,725
1989	67,356	29,835	97,191
1990	38,451	16,445	54,896
Grand Total	.....	.....	762,976

4.0 Alleged Defect

The petitioner alleges that the subject vehicles were ''designed with handling and stability defects which have caused an extraordinary number of rollover accidents resulting in thousands of deaths and severe injuries.''

5.0 Complaints

5.1 Complaints to ODI Concerning the Subject Vehicles' Rollover Propensity

ODI has reviewed all owner complaints in the ODI database that may be related to the alleged defect in the subject vehicles.

Each complaint in the ODI database is given ''Fault'' codes for ''cause'' and ''result.'' Each complaint that had a ''cause fault'' or ''result fault'' of ''rollover'' was individually reviewed to eliminate duplications and non-rollovers.

Figure 1 shows the number of rollover-related complaints regarding the subject vehicles received by ODI during each calendar year from 1989 through 1998. It indicates that after EA89–013 was closed on October 31, 1990, the number of such complaints to ODI decreased sharply.

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Figure 1. Number of Bronco II Rollover Complaints Received by ODI: 1989 through 1998.

Year	Complaints
1989	33
1990	11
1991	7
1992	5
1993	6
1994	1
1995	2
1996	1
1997	1
1998	0

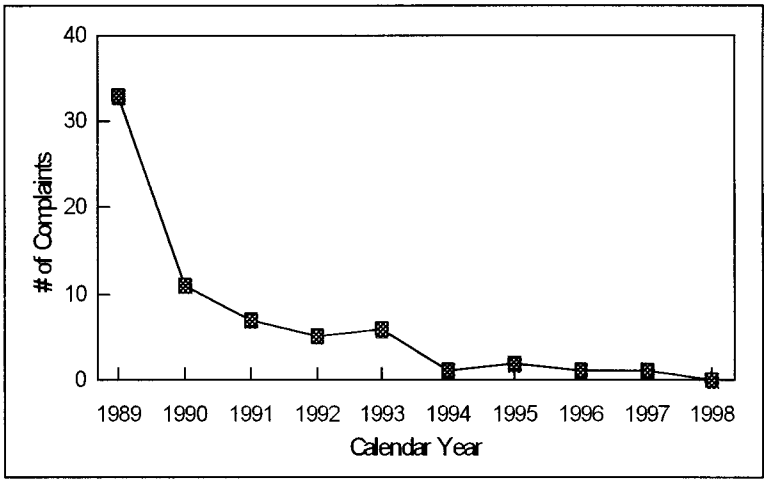

Figure 1. Number of Bronco II Rollover Complaints Received by ODI: 1989 through 1998.

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5.2 Complaints to ODI Concerning the Rollover Propensity of Peer Vehicles

ODI has also reviewed rollover-related owner complaints in the ODI database regarding certain peer vehicles. Figure 2 shows the complaint rate (the number of complaints per 100,000 vehicles sold) based on the complaints received by ODI since January 1, 1994. The rollover complaint rate of the Bronco II is much lower than those of many of the peer vehicles, including some for which ODI has recently denied petitions to open defect investigations.

Figure 2. Complaint Rate of Bronco II and Peers Based on ODI Complaints Received Since 1/1/94.

MY	Make	Model	Rate
1984-1990	Ford	Bronco II	0.6547
1984-1990	Toyota	4Runner	2.8560
1986-1990	Suzuki	Samurai	3.4914
1984-1990	Isuzu	Trooper	2.8412
1984-1990	Jeep	Wrangler/CJ7	1.3456
1984-1990	Jeep	Cherokee	0.1373
1984-1990	GMC	Jimmy	0.2835

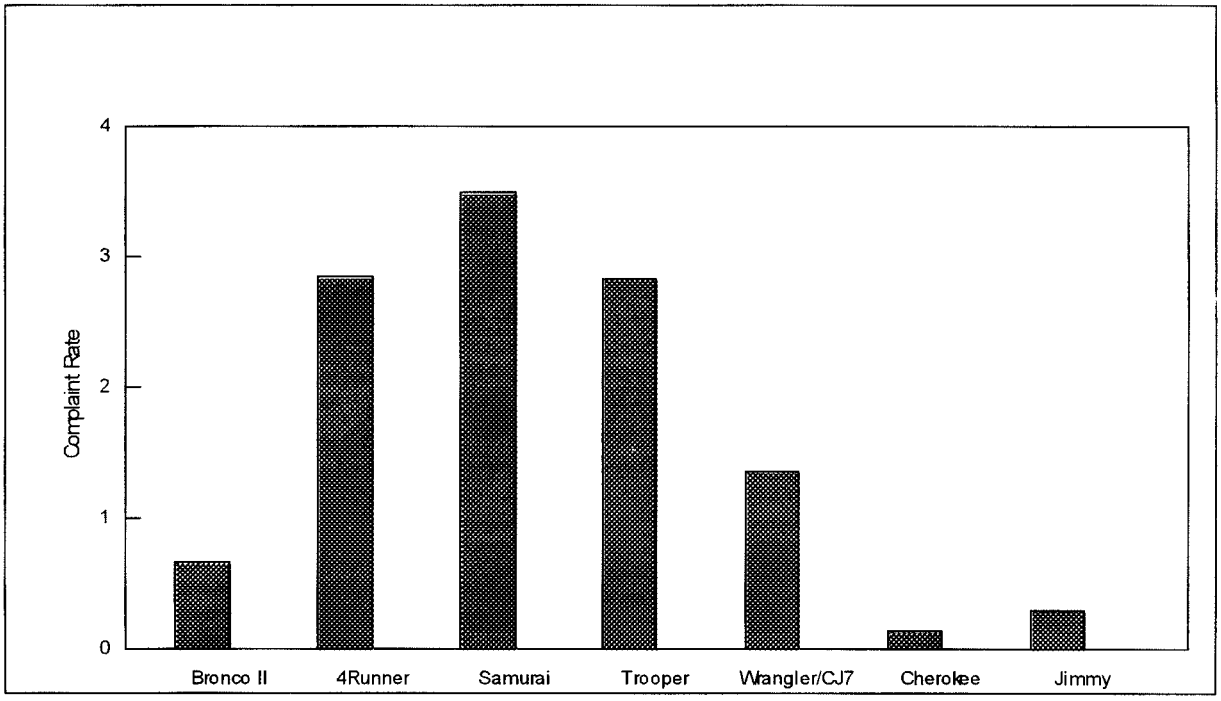

Figure 2. Complaint Rate of Bronco II and Peers Based on ODI Complaints Received Since 1/1/94.

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6.0 Additional Documents Submitted to Petition File

Prior to submitting his petition, Mr. Heiskell submitted three letters with attachments, concerning the rollover propensity of the subject vehicles. In his letters (dated March 13, April 16, and April 24, 1997), Mr. Heiskell presented arguments and provided copies of various documents that he claimed set out new information that would justify reopening EA89–013. Mr. Heiskell's letters and attachments have been placed in the DP97–006 petition file.

In addition, W. Randolph Barnhart, Esq., submitted documents on September 10, 1997, which he alleged demonstrated the rollover susceptibility of the Bronco II. By letter of September 16, 1997, Mr. Barnhart provided the agency with an index to the previously-submitted documents. Both of Mr. Barnhart's submissions have been placed in the DP97–006 petition file.

In their submissions, Mr. Heiskell and Mr. Barnhart focused on vehicle handling tests conducted by Ford in March/April 1982, during its development of the Bronco II, in which the test vehicles rolled over at speeds equal to or greater than 25 mph. They also noted that Ford had not provided reports of those tests in response to ODI's information requests in EA89–013. NHTSA has addressed Ford's failure to provide those test reports during EA89–013 in a May 29, 1998, letter from John Womack, the agency's Senior Assistant Chief Counsel. A copy of that letter has been placed in the DP97–006 public file.

ODI has reviewed the reports of the pre-production tests that were submitted by Mr. Heiskell. While they are clearly relevant to the issues raised by this petition, they do not in themselves warrant granting the petition, for the following reasons. The development of a complex motor vehicle from a concept into a marketable consumer product involves a process of design, testing, and an evaluation of test results. Generally, this leads to a cycle of re-design, re-testing, and re-evaluation, which is repeated until the product meets its performance objectives. When tests conducted during product development disclose a potential problem of any type, a manufacturer generally will take steps to resolve the problem.

When viewed from a defect investigation perspective, the fact that the test reports suggest a relatively high rollover propensity in pre-production Bronco II vehicles illustrates the extent of the problem at the pre-production stage. A variety of modifications were made to the Bronco II after those tests that were likely to affect its rollover propensity to some degree. Thus, the in-service history of the Bronco II with respect to rollover incidents is far more significant than developmental and pre-production testing.

7.0 Crash Data Analysis

ODI and the National Center for Statistics and Analysis (NCSA) have evaluated the rollover performance of a number of light sport utility vehicles by reviewing and analyzing the crash data obtained from several databases, including State data, the Fatality Analysis Reporting System (FARS) data, and the National Automotive Sampling System (NASS) Crashworthiness Data System (CDS) data. ODI also reviewed data provided by Ford on January 29, 1998 in connection with this petition, and data supplied by American Suzuki Motor Corporation (Suzuki)

in response to Defect Petition DP96–011, specifically those data related to fatal on-road rollover crashes.

The subject vehicles were manufactured from the mid 1980s through 1990, and these vehicles have been in operation and exposed to the crash environment for many years; therefore, the crash data is considered to be mature, representative, and reliable.

7.1 Previous NHTSA Analysis of Bronco II Rollover Propensity

As noted above, EA89–013 was an investigation into the rollover propensity of Bronco II vehicles. In that investigation, NHTSA applied logistic regression to the state data covering 11 groups of vehicles in order to obtain the ratio of first-event single-vehicle rollovers to all single-vehicle crashes of each group. The analytical procedure accounted for environmental factors, such as the location of the incident (e.g., rural vs. urban; straight vs. curved road), and driver characteristics, such as age and sex. By considering these variables, the rollover rate data were controlled to normalize the vehicles to a common set of outside-the-vehicle factors that can influence crash outcome. The results of that analysis, taken from the EA89–013 Closing Report, are depicted in Figure 3 and give the best estimate of the controlled first-event single-vehicle rollover rate for single-vehicle crashes for each vehicle group, along with the upper and lower 95 percent confidence intervals for crash years 1986 through 1988. For this analysis, Maryland, Michigan, New Mexico, and Utah data were combined.

Figure 3 shows that the Bronco II has a first-event single-vehicle rollover rate similar to several other vehicles, notably CJ5/6/7 (71–80), Toyota 4Runner, CJ5/7/8 (81–86), Suzuki Samurai, Isuzu Trooper II, and GM S–10/S–15.

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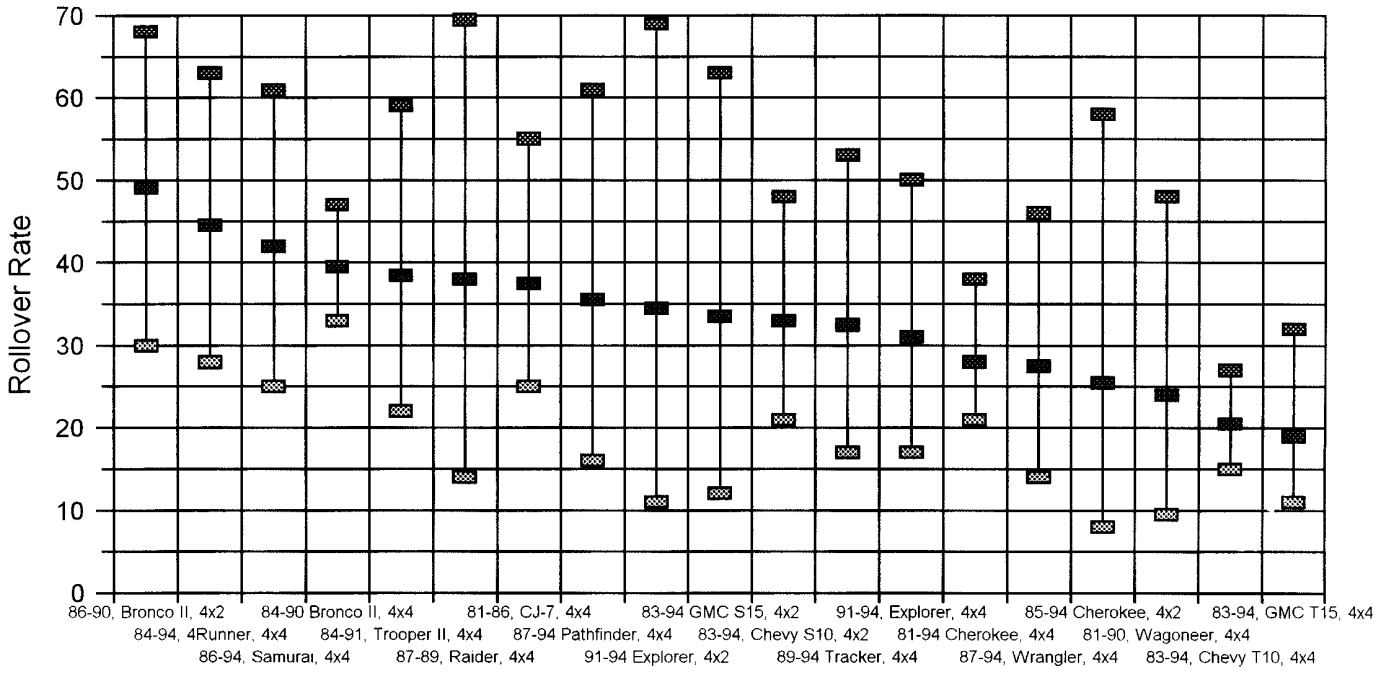

Figure 4. Ford's Analysis of Rollover Rate for Various Sport Utility Vehicles, Controlled for Age, Sex, Location, and Roadway Alignment (Michigan, Arkansas, Florida, Maryland, and Pennsylvania).

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7.2 1993 Analysis of Michigan Data

In November 1993, an analysis of Michigan state rollover data was conducted by NHTSA in connection with a proposed rulemaking effort (Docket 91–68, No. 2, Item 018). In this analysis, rollover data was computed for crash years 1986 through 1990. Table 2 presents the first-event single-vehicle rollover rates for selected sport utility vehicles.[1] When more than one variation of a make/model is included, a range of rates is presented. Table 2 shows that the Bronco II has a first-event single-vehicle rollover rate similar to several other vehicles.

[1] The vehicles were selected to match the vehicles considered in EA89–013, except the GM S and T vehicles were combined together.

TABLE 2.—MICHIGAN FIRST-EVENT SINGLE-VEHICLE ROLLOVER PERCENTAGES, CRASH YEARS: 1986–1990

Make and model*	Percent of first-event single-vehicle rollovers per single-vehicle crash**
Ford Bronco II	39–49
GM S & T series	24–34
Isuzu Trooper II	31
Jeep Cherokee	30
Jeep CJ–5	49–51
Jeep CJ–7	46–48
Jeep Wrangler	28
Suzuki Samurai	29
Toyota 4Runner	*36

*Listed Alphabetically; No data for Jeep Wagoneer.

**Make/models with a range represent the upper and lower rates reported in the Finalized Database of Michigan Data for different variations of the same make/model. This could include variations with different badges, e.g., Chevy and GMC; different drive configurations, e.g., 4x4 and 4x2, or different brake systems, e.g., ABS and non-ABS.

The vehicles compared in this table are of similar age and were fairly new during the time period that the crash data were collected. Vehicle age can affect performance due to change of components, such as new tires, wheels, and shocks absorbers, which may not be the same size or quality as the original ones. Additionally, as a vehicle ages, components on the vehicle wear, which can change the performance characteristics of the vehicle and its susceptibility to rollover.

7.3 1998 Analysis of NASS/CDS Data

Following receipt of Mr. Heiskell's petition, NHTSA analyzed the NASS/CDS data files for NASS years 1988 through 1996. The vehicles analyzed were similar to those considered in the EA89–013 analysis, except the GM S and T vehicles were combined to compare them with the Bronco II data.

Again first-event single-vehicle rollovers and all single-vehicle crashes were considered, which exclude not only crashes with other vehicles, but also with moving objects such as animals, pedestrians, and bicycles. The data are presented in Table 3. The range of model years included in the analysis was 1984 through 1990, except for the Suzuki Samurai, which began production in MY 1986, and the Jeep CJ vehicles. The model year ranges are noted in the table. The sample size (listed in the table as ''Number of NASS Single Vehicle Cases'') is small for all vehicles except the Bronco II and the GM S&T series. Based on comparison of the T-values, the Bronco II rollover rate is not statistically significantly greater than that of any other make/model listed in Table 3, except the Jeep Cherokee. Furthermore, the Bronco II rollover rate is statistically significantly lower than that of the Suzuki Samurai. Finally, the Bronco II's rollover rate is not statistically significantly different from that of all light trucks and vans considered as a whole.

Table 3 also provides an estimate of the total number of first-event single-vehicle rollovers for the time interval analyzed (1988–1996). For example, the total number of Bronco II first-event single-vehicle rollovers is estimated to be about 14,000. During this same time, the total number of first-event single-vehicle rollovers for the Blazer/Jimmy (GM S&T models) was about 19,000.

TABLE 3.—NASS/CDS FIRST-EVENT SINGLE-VEHICLE ROLLOVER PERCENT, 1988–1996

Make*/model**/year range	Number of NASS single-vehicle (SV) cases	Number of crashes, weighted	Number of NASS first-event SV rollover cases	Number of first-event SV rollovers, weighted	First-event SV rollover sample error	Percent first-event SV rollovers per single-vehicle crash	Percent sample error (SE)***	T-value****
Ford Bronco II, 84–90	108	38,078	47	13,620	3,697	36	8.6	0
GM S&T series, 84–90	167	77,557	30	18,935	8,875	24	7.2	−1.014
Isuzu Trooper, 84–90	14	4,049	6	2,453	1,877	61	22.0	1.052
Jeep Cherokee, 84–90	32	7,074	6	1,061	523	15	5.6	−2.020
Jeep CJ–5, 71–80	47	19,375	23	12,476	9,840	64	22.9	1.169
Jeep CJ–7, 81–86	30	15,270	10	8,086	4,690	53	16.8	0.910
Jeep Wagoneer, 84–90	6	1,431	1	296	296	21	20.2	−0.687
Suzuki Samurai, 86–90	25	12,829	13	10,712	7,659	84	12.3	3.170
Toyota 4Runner, 84–90	30	9,102	13	4,005	2,605	44	12.4	0.544
Passenger cars, 84–90	5,494	2,260,883	596	256,910	45,658	11	1.0	−2.810
Light trucks and vans, 84–90	1,855	773,115	431	203,131	42,125	26	3.1	−1.036

*Makes listed alphabetically.

** Data for Jeep Wrangler was too small to analyze and is not presented in this table.

*** NASS estimates have a sampling error because NASS is a survey rather than a complete census of all crashes. Rollover rates for two vehicles can be compared to each other for significant differences using the sample error at the 95 percent confidence interval as follows: If $|R_a - R_b| > 1.96$ multiplied by SQRT $[SE_a^2 + SE_b^2]$, then they are different; where R=rate, SE=sample error, SQRT=square root, and a & b are different vehicles.

**** The T-value for a vehicle in the table is obtained by: (1) computing the difference between its percentage of first-event SV rollovers and that of Bronco II, (2) computing the standard error of that difference as the square root of the sum of the squares of the two standard errors involved, and (3) dividing the difference by its standard error. If the statistic is greater than 1.96, the compared vehicle is statistically different from the Bronco II at the 95% confidence interval. Positive values of T indicate that the compared vehicle has a greater rollover rate than the Bronco II. Conversely, negative values of T indicate that the compared vehicle has a lower rollover rate than the Bronco II.

7.4 Analysis of FARS Data

FARS data were analyzed for first-event single-vehicle rollovers in all single-vehicle crashes where at least one occupant in the vehicle was fatally injured. This excluded non-occupant fatal single-vehicle crashes, such as pedestrian fatalities. FARS years 1984–1996 were included to maximize the size of the sample. The Jeep CJ–5 and CJ–7 vehicles were not included in the FARS analysis because they were not produced during the same range of years (1984–90) as the Bronco II. The model year range for each make/model was selected to be as similar as possible to that of the subject vehicle. Unlike the State data described in Section 7.1, these FARS data are not adjusted and have not been controlled for environmental, roadway, or driver differences. Table 4 gives the results of this analysis by number of vehicles involved in fatal crashes, while Table 5 considers the total number of fatalities within each fatal vehicle.

TABLE 4.—FATAL VEHICLES IN FIRST-EVENT SINGLE-VEHICLE ROLLOVER CRASHES

Make and model*	Model year	Fatal vehicle single-vehicle crashes**	Fatal vehicle first-event SV rollover crashes	Percentage of the rollovers in fatal single vehicle crashes	Percent standard error [SQRT(P*Q/N)]
Chevy/Blazer GMC/Jimmy	84–90	385	168	44	2.53
Ford Bronco II	84–90	1259	762	61	1.38
Isuzu Trooper	84–90	99	39	39	4.91
Jeep Cherokee	84–90	296	111	38	2.81
Suzuki Samurai	84–90	203	81	40	3.44
Toyota 4Runner	84–90	326	175	54	2.76

*Makes listed alphabetically.
**FARS years 1984–1996.

TABLE 5.—FATALITIES IN FATAL VEHICLES IN FIRST-EVENT SINGLE-VEHICLE ROLLOVER CRASHES

Make and model*	Model year	Fatalities in single-vehicle crashes**	Fatalities in first-event SV rollover crashes	Percentage of single vehicle crash fatalities in the rollovers	Percent standard error [SQRT(P*Q/N)]
Chevy/Blazer GMC/Jimmy	84–90	423	183	43	2.41
Ford Bronco II	84–90	1364	823	60	1.32
Isuzu Trooper	84–90	109	43	39	4.68
Jeep Cherokee	84–90	316	115	36	2.71
Suzuki Samurai	84–90	214	85	40	3.34
Toyota 4Runner	84–90	361	194	54	2.6

*Makes listed alphabetically.
**FARS years 1984–1996.

The fifth column of Tables 4 and 5 shows that the Ford Bronco II has a higher percentage of fatal vehicles and fatalities in first-event single-vehicle rollovers than that of the other five peer vehicles, although it is somewhat similar to the Toyota 4Runner. While the Bronco II rollover rate is not statistically significantly different from that of its peers, these FARS analyses indicate that there could be an issue regarding the relative crashworthiness of Bronco II vehicles in rollovers. In an effort to cast additional light on the crashworthiness issue, several analyses were performed, as documented in section 7.5.

7.5 Crashworthiness Analyses

7.5.1. Crashworthiness Aspects

NCSA analyzed the NASS/CDS and FARS data using the same vehicles listed in the above FARS tables to compute the ratio of the number of fatally injured occupants in first-event single-vehicle rollover crashes (from FARS) to the number of involved occupants in such crashes (from NASS/CDS). Table 6 presents these data.

TABLE 6.—CRASHWORTHINESS ANALYSIS OF FIRST-EVENT SINGLE-VEHICLE ROLLOVER CRASHES***

Make/model for model years 1984-1990*	Number of involved occupants (weighted NASS data)	Number of fatalities (FARS data)	Percentage of fatally injured occupants to involved occupants	Standard error of percentage	T difference in percentage**
Chevy/Blazer GMC/Jimmy	27,935	183	0.65	0.27	−2.979
Ford Bronco II	17,721	823	4.44	1.24	0
Isuzu Trooper	5,334	43	0.80	0.33	−2.831
Jeep Cherokee	2,772	115	3.98	1.46	−0.238
Suzuki Samurai	22,199	85	0.38	0.26	−3.195
Toyota 4Runner	9,886	194	1.93	1.10	−1.517

*Makes listed alphabetically
**The T-value gives the difference in the percentage of fatalities divided by the standard error of the difference between the Bronco II and each vehicle. If the absolute value of the statistic is greater than 1.96, the compared vehicle is statistically different from the Bronco II at the 0.05 confidence level. Negative values indicated that the compared vehicle has a lower percentage of fatalities per involved occupant than the Bronco II.
***Involved occupants were from NASS years 1988–1996, and fatally injured occupants were from FARS years 1984–1996.

These data indicate that the Bronco II has a significantly higher percentage of fatally injured occupants per the total number of involved occupants in first-event single-vehicle rollover crashes than three of the peer vehicles. However, it has a similar percentage when compared to the Jeep Cherokee and possibly to the Toyota 4Runner. This would suggest that if a first-event single-vehicle rollover occurs, there is more likely to be a fatality in a Bronco II than in some, but not all, of its peers.

7.5.2 FARS Ejection Path Analysis

To attempt to determine whether the unique design of the rear side windows in the Bronco II may have affected rollover crashworthiness, ODI reviewed available data on ejection path, including 1991–1996 FARS data on ejection path. FARS data prior to 1991 do not include such information.

Since FARS uses police reports to generate the data entered in the FARS system, it is generally limited to the data contained in the Police Accident Report (PAR). Most of the time, the ejection path is not reported on the PAR. In fact, for the 1991–1996 FARS, the data for first-event single-vehicle rollover crashes indicate that there were 16,124 unknown ejection paths out of the 21,325 ejected persons, whether or not they were fatalities.

Distribution of the ejection paths identified in FARS for each vehicle analyzed in section 7.4 is shown in Table 7. In these analyses, the parameter of ''side door'' includes all side doors; ''side window'' includes all side glass; ''through roof opening'' is through a convertible top which is down or a sunroof; and ''through roof'' is through a convertible roof which is up.

TABLE 7.—DISTRIBUTION OF EJECTIONS BY PATH IN FATAL FIRST-EVENT SINGLE-VEHICLE ROLLOVERS

Make/model, model years 1984–1990	Side door (percent)	Side window (percent)	Windshield (percent)	Back window (percent)	Back door (percent)	Through roof opening (percent)	Through roof (percent)	Other path (percent)	Unknown path (percent)
Chevy/Blazer, GMC/Jimmy	2.1	11.0	0.7	0.0	0.0	0.7	0.0	1.4	84.2
Ford Bronco II	2.3	7.4	1.7	1.3	0.2	0.0	0.0	0.2	87.0
Isuzu Trooper	0.0	11.9	2.4	4.8	0.0	0.0	0.0	0.0	81.0
Jeep Cherokee	5.3	9.7	4.4	0.9	0.0	0.0	0.0	0.0	79.6
Suzuki Samurai	1.3	2.6	0.0	0.0	0.0	3.9	5.3	0.0	86.8
Toyota 4Runner	2.9	6.2	1.1	2.2	0.0	10.5	1.5	1.8	73.8

FARS data: 1991–1996.

The results shown in Table 7 do not indicate a difference between the Bronco II and its peers in the ejection path for these fatal crashes. For ejection through the side windows including the rear side windows, the Bronco II rate is lower than that of three of its peers. When all glazing is considered as a single ejection path (Side Windows + Windshield + Back Window), the Bronco II still remains in the middle of the peer vehicles. It is noted that these results are based on a small sample of the crashes because most of the ejection paths are coded ''unknown'' in FARS.

7.5.3 NASS Case Analysis

To further study the ejection path issue, a hard copy review of all Bronco II rollover crashes in the NASS Crashworthiness Data System was conducted. Both totally and partially ejected occupants were included in this review.

As shown in Table 3, there were 47 NASS cases in which there was a Bronco II first-event single-vehicle rollover. ODI reviewed each of these cases and found that out of the 47 cases (each case contains one rollover incident), 23 cases had ejections involving 33 occupants (27 totally ejected and 6 partially ejected), 22 cases had no occupant ejections, and in 2 cases occupant ejections were unknown.

Table 8 shows recorded ejection paths for the 33 ejected occupants.

TABLE 8.—EJECTION PATHS FOR 33 EJECTED OCCUPANTS

Ejection path	Number of ejections	Weighted number of ejections*	Weighted percentage of ejections by ejection path
Unknown	11	667	19
Left Front (Driver Window)	7	822	24
Left Door Opened	2	344	10
Right Front (Passenger Window)	5	924	27
Windshield	3	447	13
Left Rear Window (Fixed)	2	67	2
Right Rear Window (Fixed)	1	62	2
Rear Backlight	1	30	1
Sunroof	1	86	3

*The total for all ejection paths does not equal to that shown in Item 4 of section 7.5.2. because the partial ejections are included in this analysis.

ODI's review of the 47 cases indicate the following:

1. In a majority of the cases, the crash scenario involved running off the road at highway speed and driver overcorrection, resulting in vehicle yaw, followed by rollover.

2. There was a wide variation in crash dynamics in the incidents reviewed.

3. Distortion of the vehicle body during rollover typically created several potential occupant ejection paths when glazing disintegrated at several locations.

4. The data reviewed are inconclusive with respect to identification of a ''most probable'' occupant ejection path during rollover.

7.6 Other Data Reviewed

7.6.1 Ford Data Review

Ford supplied analyses of rollover propensity in its January 29, 1998, submission in response to this petition. (A copy is in the public file.) These included an overall rollover rate analysis and a logistic regression analysis similar to the NHTSA analysis used in EA89–013.

In the Ford overall rollover rate analysis, rollover crash data were collected from five states and combined to obtain an overall rollover rate. The following states and crash years were used: Alabama, 1990–95; Arkansas, 1987–94; Michigan, 1985–91; Maryland, 1986–94; and Pennsylvania, 1988–

95. For exposure, Ford used registered vehicle years (RVY) for these same states and periods. Ford analyzed all types of vehicles, and included about 700 make/model/model year combinations.

For illustration purposes, Table 9 presents Ford's data for the first 11 sport utility vehicles in Ford's table as shown in Exhibit B of Ford's January 29, 1998, submission. In addition to the 11 sport utility vehicles in Ford's table, there were 4 other vehicles, including 3 pickup trucks (83–94 Ford Ranger—Rollover Rate—76; 81–83 Toyota pickups—75; and 84–94 Toyota pickups—67) and one passenger car (87–94 Mitsubishi Precis—68.)

The NASS/CDS analysis reported in Section 7.3 included four additional vehicle groups not in Table 9, which are the GM–S&T series, Isuzu Trooper, Jeep Cherokee, and Jeep Wagoneer. Their rollover rates ranged from about 20 rollovers per 10,000 Registered Vehicles Years (RVY) to about 36 rollovers per 10,000 RVY, with the remainder in the low to high twenties.

TABLE 9.—FORD STATE DATA ANALYSIS ROLLOVER RATES

Make and model	Model years	Type	RVY*	Rollover crashes	Rollover rate (rollovers/ 10,000 RVY*)
Toyota J4 Land Cruiser	81–83	4×4 SUV	762	8	105
Geo Tracker	89–94	4×4 SUV	46,966	370	79
Jeep CJ–7	81–86	4×4 SUV	137,670	1,032	75
Honda Passport	94	4×4 SUV	1,243	9	72
Ford Bronco II	84–90	4×4 SUV	605,297	4,132	68
Geo Tracker	91–94	4×2 SUV	8,255	56	68
Ford Bronco II	86–90	4×2 SUV	50,217	321	64
Dodge Raider	87–89	4×4 SUV	31,263	188	60
Toyota 4Runner	84–94	4×4 SUV	121,813	728	60
Jeep CJ–5	81–83	4×4 SUV	12,852	74	58
Suzuki Samurai	86–94	4×4 SUV	81,780	451	55

*RVY: registered vehicle years.

For the occupant injury analysis, Ford looked at injury rate data in four states for several crash years, Arkansas, 1987–94; Michigan, 1985–91; Maryland, 1986–94; and Pennsylvania, 1988–95. The total number of rollover crashes, total number of occupants involved in those crashes, and number of severe and fatal injuries were reported for about 700 make/model/model year combinations of vehicles. For illustration purpose, Table 10 presents selected data from Ford's analysis for vehicles similar to the Bronco II.

TABLE 10.—FORD OCCUPANT INJURY RATES IN ROLLOVER CRASHES

Make,* model, model year range	Number of crashes	Number of occupants	Number of severe injured occupants	Number of fatal injured occupants	Percent severe and fatal injured occupants in rollover crashes
Ford, Bronco II, 84–90	4,074	6,453	492	55	8.5
GM, S&T series, 83–94	3,261	5,130	415	68	9.4
Isuzu, Trooper II, 84–91	446	718	53	4	7.9
Jeep, Cherokee, 81–94	1,301	2,078	98	15	5.4
Jeep, CJ–5, 81–83	72	106	12	3	14.2
Jeep, CJ–7, 81–86	989	1,492	122	12	9.0
Jeep, Wagoneer, 81–90	205	330	20	1	6.4
Jeep, Wrangler, 87–94	378	577	46	4	8.7
Suzuki, Samurai, 86–94	418	601	73	6	13.1
Toyota, 4Runner, 84–94	675	1,067	98	14	10.5

*Makes listed alphabetically.

Ford also conducted a logistic regression analysis similar to the analysis conducted by NHTSA during EA89–013. In this analysis, the rollover rates for several sport utility vehicles were compared. The data were normalized for driver and environmental factors, which included age, sex, location, and roadway alignment, and included crash data from Michigan (85–91), Arkansas (87–94), Florida (89–94), Maryland (86–88), and Pennsylvania (88–95). Figure 4 presents these data. The upper and lower 95 percent confidence intervals are presented along with each vehicle's average adjusted rollover rate. This analysis indicates that while the rollover propensity of the Bronco II is relatively high (in fact, the two-wheel drive model has the highest rate), it is not statistically significantly different from that of most of its peers.

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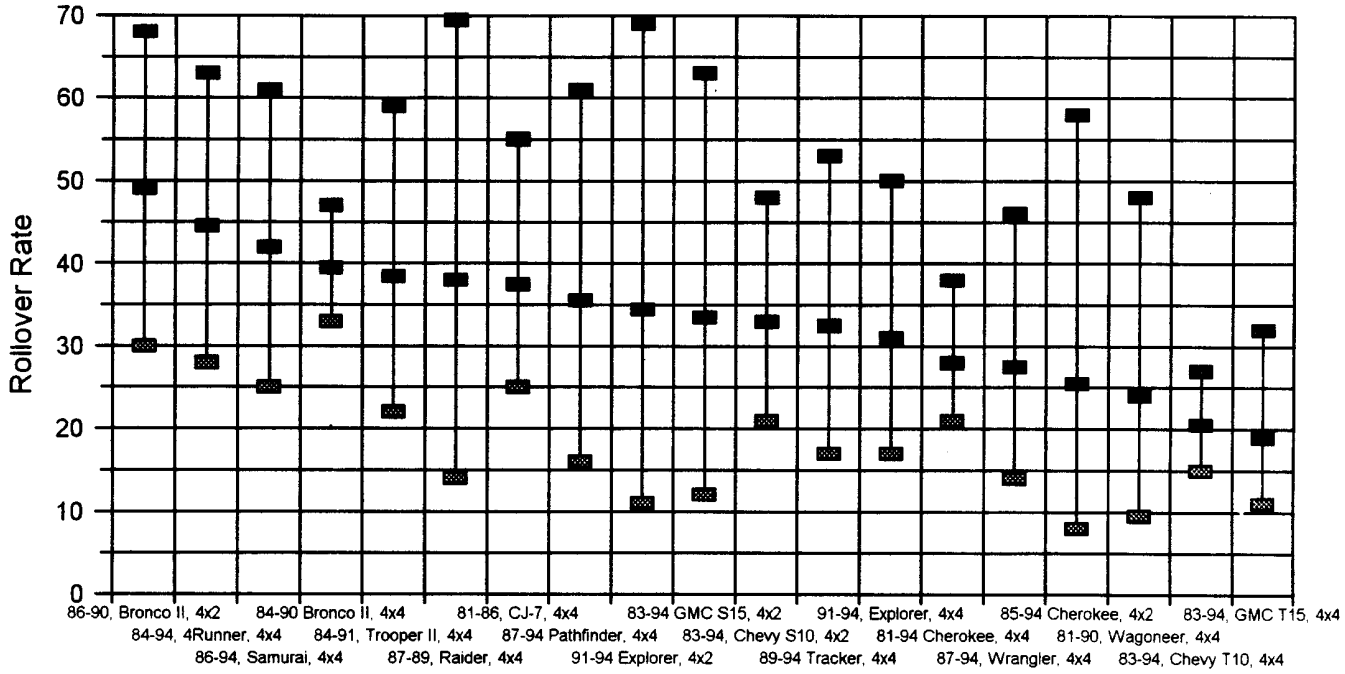

Figure 4. Ford's Analysis of Rollover Rate for Various Sport Utility Vehicles, Controlled for Age, Sex, Location, and Roadway Alignment (Michigan, Arkansas, Florida, Maryland, and Pennsylvania).

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7.6.2 Suzuki Data Review

On March 19, 1997, Suzuki submitted a FARS data analysis related to certain 4X4 SUV rollovers. This analysis only considered those vehicles where the rollover occurred ''on road,'' hence no off-road rollovers were considered. Suzuki stated that comparison of on-road rollovers tends to normalize the rollover rate for some environmental and roadway conditions where the crash occurred. FARS years 1982 through 1995 were used in the analysis. Table 11 presents data for these vehicles.

Table 11 indicates that the rate of on-road first-event single-vehicle rollovers in fatal single-vehicle crashes per 100 vehicles with at least one occupant fatality for the Bronco II is slightly lower than the Toyota 4Runner, and is higher than that of the other five peer vehicles.

TABLE 11.—SUZUKI FARS ANALYSIS REGARDING ON-ROAD FIRST-EVENT SINGLE-VEHICLE ROLLOVERS

Make and model	Model years	On road first-event single-vehicle rollovers in fatal SVCs**	SVC involved vehicles with occupant fatality	On road first-event single-vehicle rollover in fatal SVCs per 100 vehicles with occupant fatality
Toyota 4Runner	90–94	40	188	23.8
Ford Bronco II	84–90	291	1,372	21.2
Nissan Pathfinder	87–94	22	185	11.9
Jeep Grand Cherokee	93–94	9	76	11.8
Chevrolet T10 Blazer	83–90	108	1,057	10.2
Ford Explorer	91–94	22	227	9.7
Isuzu Trooper	84–89	14	146	9.6

** SVCs: Single Vehicle Crashes.

8.0 PETITIONER'S DATA ANALYSIS

In support of his petition, the petitioner stated that sworn deposition testimony of Dr. Michelle Vogler, a statistical expert retained by Ford in Bronco II product liability litigation, shows, by actual count, that there have been 5,672 rollovers of Bronco II vehicles in six states during a six-year time period. The petitioner extrapolated this figure to assert that ''there have been 50,000 Bronco II rollovers nationally since the subject vehicles were first placed in the hands of American consumers.'' By his estimation, ''as many as 300,000 Bronco II owners are going to suffer the same fate [rollover].''

After reviewing NASS/CDS data, the agency believes that Mr. Heiskell's extrapolation overstates the number of Bronco II rollovers that would be expected in a 14-year period. Regardless, the absolute number of rollovers is an inappropriate measure for an analysis of rollover propensity. The petitioner's extrapolation focuses on the number of rollovers of any type (as opposed to first-event rollovers) and represents the raw number of rollovers expected (as opposed to the rollover rate) over a 14-year period, without adjusting for attrition of the Bronco II fleet over time. In contrast, NHTSA's analysis uses the percentage of single-vehicle crashes in which a first-event single-vehicle rollover occurred.

First, the total number of rollovers is, to a large degree, related directly to the number of vehicles on the road. Thus, everything else being equal, two make/models with equivalent rollover propensity could have vastly different numbers of rollovers based solely on variations in the on-road fleet of each make/model. Therefore, the total number of rollovers is insufficient on its own to assess risk. Risk assessment is based on normalized populations and expected outcomes, and can be best accomplished using the agency's long-accepted metric, ''first-event single-vehicle rollovers per single-vehicle crash.''

Secondly, the agency used first-event single-vehicle rollovers as its measure because these crashes focus more on the handling and stability aspects of vehicle performance than do all rollovers combined. Subsequent event rollovers, which were included in the petitioner's extrapolation, generally result from multiple-vehicle collisions and collisions with objects such as utility poles, guardrails, etc., where the inherent handling and stability of each vehicle plays a lesser role due to the presence of forces exerted upon the vehicle by its collision partner.

The use of first-event single-vehicle rollovers per single-vehicle crash has been the focus of most serious efforts to relate vehicle roll stability measures to real-world vehicle rollover propensity. The agency subscribes to this approach, and believes that this measure is an effective way to focus on the contribution of vehicle stability to rollover propensity, while the total number of rollovers experienced by a particular make/model is not.

9.0 Findings

1. An analysis of rollover complaints in the ODI consumer database reveals a sharp decrease in Bronco II rollover complaints since EA89–013 was closed. Additionally, an analysis of ODI rollover complaints received since 1994 on peer vehicles does not suggest that the subject vehicles have an abnormally high rollover propensity compared to other sport utility vehicles.

2. Earlier analyses of rollover propensity demonstrated that the Bronco II first-event single-vehicle rollover rate was consistent with that of its peers, and the recently updated analyses, using both state and NASS data, confirm this finding.

3. FARS data indicate that the subject vehicles have a percentage of first-event single-vehicle rollover fatal crashes (out of all fatal single vehicle crashes) and a percentage of first-event single vehicle rollover fatalities (out of all fatalities in single vehicle crashes) that are substantially higher than that of five peer vehicles, although the results for the Bronco II are somewhat similar to those for the Toyota 4Runner.

4. The Bronco II had a similar number of fatalities per involved occupant in first-event single-vehicle rollover crashes when compared to the Jeep Cherokee and possibly to the Toyota 4Runner, and had more fatalities per involved occupant in first-event single-vehicle rollover crashes when compared to three other peer vehicles. This suggests that if a first-event single-vehicle rollover occurs, there is more likely to be a fatality in a Bronco II than in some, but not all, of its peers.

5. A review of FARS data between 1991 and 1996 describing occupant ejection path did not indicate a difference between the Bronco II and its peers, in part because most ejection paths were coded ''unknown'' in FARS.

6. A detailed review of the 47 NASS cases in which there was a Bronco II first-event single-vehicle rollover did not permit an identification of a ''most probable'' occupant ejection path.

7. In analyses conducted by Ford, the Bronco II's first-event single-vehicle rollover rate, measured as a proportion of the number of registered vehicles, is similar to that of several of its sport utility vehicle peers, pickups and a passenger car. In a logistic regression analysis which controlled for driver and roadway variables, a duplication of NHTSA's EA89–013 analysis using newer data, the Bronco II rollover rate was relatively high, but was not statistically significantly different from that of most of its peers.

8. Suzuki's FARS analysis indicates that the Bronco II and one of its peers have a similar rate of ''on-road'' first-event single-vehicle rollovers as a percentage of all single vehicle fatal crashes.

9. The petitioner's estimate of the number of rollover crashes involving the Bronco II appears to overestimate the number. In any event, the total number of rollover occurrences involving a particular vehicle is not an appropriate analytical tool to assess rollover risk.

10.0 Conclusion

The focus of this defect petition was on the allegedly high rollover propensity of the Bronco II. Consistent with its findings several years ago at the time it closed EA89–013, ODI's analysis of more recent data indicates that the rollover propensity of the Bronco II does not stand out from that of other peer SUVs. Although it was not directly raised by the petitioner, ODI conducted an extensive analysis of the crashworthiness of the Bronco II in rollover crashes. These analyses indicated a cause for concern, since the Bronco II vehicles have a percentage of first-event single vehicle rollover fatal crashes and a percentage of first-event single vehicle rollover fatalities that are substantially higher than that of most of the peer vehicles. However, ODI was unable to identify a most probable ejection path or to identify a specific aspect of the vehicle that appeared to adversely affect the vehicle's rollover crashworthiness.

Based on the information presented above, as well as the age of the subject vehicles, it is unlikely that NHTSA would issue an order for the notification and remedy of a safety-related defect in the subject vehicles at the conclusion of the investigation requested in the petition. Therefore, in view of the need to allocate and prioritize NHTSA's limited resources to best accomplish the agency's safety mission, the petition is denied.

[FR Doc. 99–12579 Filed 5–14–99; 3:29 pm]

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DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

[Docket No. NHTSA–99–5683; Notice 1]

Dan Hill & Associates, Inc.; Application for Renewal of Temporary Exemption From Federal Motor Vehicle Safety Standard No. 224

We are asking for comments on the application by Dan Hill & Associates, Inc. (''Dan Hill''), of Norman, Oklahoma, for a renewal of its existing temporary exemption from Motor Vehicle Safety Standard No. 224 *Rear Impact Protection*. As before, Dan Hill asserts that compliance would cause substantial economic hardship to a manufacturer that has tried in good faith to comply with the standard.

We are publishing this notice of receipt of the application in accordance with our regulations on the subject. This action does not mean that we have made a judgment yet about the merits of the application.

We granted Dan Hill a 1-year temporary exemption from Standard No. 224 on January 26, 1998 (63 FR 3784). The exemption was to expire on February 1, 1999, but Dan Hill filed a timely application for renewal, and, as provided by 49 CFR 555.8(e), the exemption will continue in effect until we make a decision on its application. The company has requested an extension of this exemption until February 1, 2001.

The information below is based on material from Dan Hill's original and renewal applications.

Why Dan Hill Needs to Renew Its Exemption.

Dan Hill manufactures and sells a horizontal discharge trailer (''Flow Boy'') that is used in the road construction industry to deliver asphalt and other road building materials to the construction site. The Flow Boy is designed to connect with and latch onto various paving machines (''pavers''). The Flow Boy, with its hydraulically controlled horizontal discharge system, discharges hot mix asphalt at a controlled rate into a paver which overlays the road surface with asphalt material.

Standard No. 224 required, effective January 26, 1998, that all trailers with a GVWR of 4536 Kg or more, including Flow Boy trailers, be fitted with a rear impact guard that conforms to Standard No. 223 *Rear impact guards*. Installation of the rear impact guard will prevent the Flow Boy from connecting to the paver.