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September 26,2012

Dear Customer:

The following is the proof-of-delivery for tracking number **800793415870**.

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Shipping Information:

Tracking number:	800793415870	**Ship date:**	Sep 24, 2012
		Weight:	4.0 lbs/1.8 kg

Recipient:
DAVID L STRICKLAND
NHTS A
1200 NEW JERSEY SE WEST BLDG
20590 US

Shipper:
PAUL V. SHERIDAN
SHERIDAN, PAUL V
22357 COLUMBIA ST
481243431 US

Reference EA12 005

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To: Mr. David L. Strickland *
NHTSA Headquarters
West Building
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

Date: 24 September 2012 VIA FEDEX AIRBILL 8007 – 9341 - 5870

From: Mr. Paul V. Sheridan
DDM Consultants
22357 Columbia Street
Dearborn, MI 48124-3431
313-277-5095 / pvs6@Cornell.edu

Subject: Chrysler Defense Expert Testimony 0f 7 September 2012: *"The tank's on its own."*
Reference: EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)

Referencing the underride accident mode, the vehicles identified by EA12-005, and the photograph found under Attachment 11, Chrysler defense expert Mr. Robert Banta testified as follows:

Question: **Now, in looking at that photo, can you tell me what part of the vehicle protects the part of the tank that we're looking at in that photograph?**

Witness: ***No. It's covered by the fascia.***

Question: **So if a vehicle were to strike just that yellow piece of the car, whether it be because it's lower or some kind of vehicle that's not even a car, let's say it was a recreational vehicle of some sort, what would protect that portion of the tank that we see here in yellow.**

Witness: ***Just the tank surface itself.***

Question: **So in other words, whatever the material of the tank is at the time?**

Witness: ***The tank's on its own.***

The public record confirms that Chrysler has known that the Jeep fuel tank systems identified by EA12-005 cannot protect occupants from MHE fire-death and injury, especially during the underride accident mode. Likewise, would it be reasonable to assert that if Chrysler experts admit that ***"the tank's on its own"*** by virtue of a mere photograph, then certainly Chrysler dealers who have confronted extensive, daily visual data during decades of having Jeep vehicles aloft on their service lifts are also aware of that same rudimentary fact??

I am confident, temporally and empirically, that the closed-door meeting between Chrysler and NHTSA on 29August2012 did not discuss the statistical implications of the above testimony.

I am also confident that the Chrysler attendees avoided the statistic discussed in the section below entitled: **Chrysler Expert Testimony, Recall Yield for Fire-Related Actions:** ***"Almost a hundred percent."***

To: Mr. David L. Strickland *
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Subject: Chrysler Defense Expert Testimony 0f 7 September 2012: *"The tank's on its own."*
Reference: EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)

Courtesy Copy List **

Mr. Clarence Ditlow, Director
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(202) 328-7700

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National Highway Traffic Safety Administration
Washington, DC 20590
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202-366-4929

* *Available with hyperlinks:* http://links.veronicachapman.com/Sheridan2Strickland-8.pdf
** *By email or USPS (Letter and attachments only)*

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24 September 2012 VIA FEDEX AIRBILL 8007 - 9341 - 5870

Mr. David L. Strickland
Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

Subject: **Chrysler Defense Expert Testimony of 7Sep2012:** ***"The tank's on its own."***
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Dear Mr. Strickland:

Before addressing the subject, a prior concern needs to be revisited.

Closed-door NHTSA/Chrysler Meeting of 29 August 2012

A meeting to review the status of EA12-005 has not been scheduled with the petitioner, Center for Auto Safety. However, a meeting with Chrysler Group LLC was held on 29August2012. This closed-door NHTSA meeting was attended by Chrysler executives, defense experts and defense attorneys. This agency behavior is not without precedent (ATTACHMENT 1).

In my letter of 3Sep2012 I opened with concerns regarding *"the past relationship between NHTSA and Chrysler."* As a brief introduction I included the following two documents:

1. Internal "confidential" Chrysler meeting minutes of early 1995 which describe the conspiracy deployed by Chrysler executives/lawyers, the Department of Justice, and NHTSA to defraud taxpayers of their right to review NHTSA Engineering Analysis EA94-005 (ATTACHMENT 2):

> *"NHTSA has agreed that they will deny all FOIA requests to place their investigative files, including the crash test video, on the public record, and that the Department of Justice will defend any lawsuits seeking to compel production under FOIA."*

2. A "confidential" letter, written on 27 October 1994 by NHTSA Assistant Chief Legal Counsel Kenneth Weinstein to former internal Chrysler Product Litigation attorney Lewis Goldfarb [i], which invited Chrysler to secretly review the Conclusions of Engineering Analysis EA94-005 (ATTACHMENT 8):

"Although NHTSA does not ordinarily share the results of its analysis or testing with a manufacturer before the completion of an EA, it is prepared to do so in this instance. However, this willingness should not be construed by Chrysler or by any other manufacturer as a precedent for future agency actions."

I am concerned that the NHTSA precedent was once-again extended to Chrysler on 29August2012. In my letter to you of 9Feb2011 I reviewed the real world consequences of this precedent. Our current efforts must ensure that similar horrific consequences do not emerge during EA12-005 (ATTACHMENT 9). [ii]

Chrysler Defense Expert Testimony of 7Sep2012: Introduction

As a precondition for taxpayer-funded bailout, Chrysler declared bankruptcy. As a result a New Jersey dealership is now the primary defendant in product defect litigation involving the MHE fire-death, of a housewife and mother of two, which occurred after underride to the unprotected fuel tank system of a 1996 Jeep Grand Cherokee. [iii]

Mr. Robert Banta was identified by Chrysler Group LLC; the latter defense lawyers are working closely-with and in-behalf of this former New Jersey Chrysler dealership. [iv] In trial records Chrysler defense lawyers have qualified Mr. Banta as an expert witness, with 33 years of prior employment with Chrysler, numerous and significant participation in product litigation, and as an employee they entitled "senior engineer." [v]

Mr. Banta was a loyal Chrysler employee, is credible and competent. He has been involved in several Jeep Grand Cherokee MHE fire-death litigations. I consulted with the plaintiff attorney prior-to and attended both sessions of the Banta deposition. The second portion occurred on 7 September 2012 which is detailed below. [vi]

Chrysler Defense Expert Testimony: Jeep Crash Testing at Chrysler

In my letter to you of 27 August 2012 I made the assertion:

> *"The Chrysler claim that 'rear impact fires . . . were the result of high speed, high energy crashes in which a skid plate would have made no difference' is baseless to the point of being fraudulent."*

With that assertion as partial context I made the following request of you in that same letter:

> *"Please request from Chrysler Group LLC all 'high speed, high energy' impact tests that support their public allegations that 'a skid plate would have made no difference.' "*

During his deposition Mr. Banta testifies that he reviewed or attended a vast majority of the internal Jeep crash testing; stating such as further qualification as a Chrysler expert. On page 253 of the transcript, Mr. Banta testified:

Question: You agree with the fact that Chrysler never did any vehicle-to-vehicle testing?

Witness: That's right.

On page 257, on the specific issue of skid plate effectiveness, Chrysler expert Mr. Banta testified:

Question: Do you know if anyone, Chrysler or anyone, did any kind of high speed vehicle-to-vehicle testing to determine the effectiveness of the skid plate or lack of effectiveness in the ZJ?

Witness: No.

Therefore, as I had asserted on 27 August 2012, it appears that "*the Chrysler claim that . . . a skid plate would have made no difference' is baseless to the point of being fraudulent"* is affirmed. To the best of my knowledge NHTSA has not requested or received any information that refutes this affirmation.

Chrysler Defense Expert Testimony: ***"The tank's on its own."***

It is indicated by the NHTSA attendees at the closed-door meeting with Chrysler on 29 August 2012 that a broad-brush statistical analysis remains a priority approach. To clear up any uncertainty I will be blunt: That approach to EA12-005 is unworthy of NHTSA. My position involves but is not limited to Endnote ii. As you will see in this and the following section, my position is overwhelmingly justified by Chrysler's own expert testimony. My position will be fortified by former NHTSA Policy Advisor and Deputy Associate Administrator Dr. Carl E. Nash. Dr. Nash has been retained by plaintiff counsel, and has submitted an expert report which does not prioritize broad-brush statistics, but instead concentrates on the implicit Jeep safety defect and its failure mode.

My communications, ranging from submissions to DP09-005, PE10-031 and EA12-005, have emphasized the correct approach to automotive safety management, as culminated in my letter of 15June2012 (ATTACHMENT 10):

> *"As chairman of the Chrysler Safety Leadership Team (SLT), my priority involved Failure Mode Effects Analysis (FMEA) as the basis of preliminary and ongoing examination of a safety concern. In my role it did not matter that only one person may be affected during vehicle service life. What mattered was that a failure mode existed, and when provoked would cause serious harm. Hypothetically, the fact that a vehicle service life was statistically "lucky," and a failure mode was provoked "only once," was not gala. Such an approach would merely confirm incompetence as a safety manager."* [vii]

My communications have also focused on the Jeep fuel tank system failure modes which are readily provoked by underride. This focus was detailed in my letters to you of 27 July 2012, 27 August 2012, and 3 September 2012. These letters were presented to Mr. Banta on 7 September; beginning at pages 125 thru 133. Referencing underride and a photograph from my letter to you of 27 July, Mr. Banta testified as follows:

Question:	**Now, in looking at that photo, can you tell me what part of the vehicle protects the part of the tank that we're looking at in that photograph? (**ATTACHMENT 11)
Witness:	***No. It's covered by the fascia.***
Question:	**So if a vehicle were to strike just that yellow piece of the car, whether it be because it's lower or some kind of vehicle that's not even a car, let's say it was a recreational vehicle of some sort, what would protect that portion of the tank that we see here in yellow.**
Witness:	***Just the tank surface itself.***
Question:	**So in other words, whatever the material of the tank is at the time?**
Witness:	***The tank's on its own.***

The public record confirms that Chrysler has known that the Jeep fuel tank systems identified by EA12-005 cannot protect occupants from MHE fire-death and injury, especially during the underride accident mode. Likewise, would it be reasonable to assert that if Chrysler experts admit that ***"the tank's on its own"*** by virtue of a mere photograph, then certainly Chrysler dealers who have confronted extensive, daily visual data during decades of having Jeep vehicles aloft on their service lifts are also aware of that same rudimentary fact??

In the Worst Case configuration, a statistical analysis of the FMEA for the underride event for the Jeeps identified by EA12-005 would have a failure rate of almost 100%.

I am confident, temporally and empirically, that the closed-door meeting between Chrysler and NHTSA on 29August2012 did not discuss the statistical implications of the above testimony. I am also confident that the Chrysler attendees avoided the statistic discussed in the next section.

Chrysler Defense Expert Testimony, Recall Yield for Fire-Related Actions: ***"Almost a hundred percent."***

Throughout my career in the automotive industry we used the term 'recall yield' when projecting warranty repairs, safety defect recalls, and so-called "customer service actions." During my chairmanship of the Chrysler Safety Leadership Team (SLT) we documented that the #1 recall yield involved those actions that would warn the customer of a fire hazard/danger. [viii] In the context of EA12-005, one of the most important portions of the testimony of 7 September 2012 involves our examination of these historical facts.

Beginning on page 173 Mr. Banta testifies as follows:

Question:	**Recall yield?**
Witness:	***Well I translate that to mean completion rate, how many of them were actually done. Yield is a term the auto industry doesn't use, but they use completion rate. For example, when I estimate the cost of a recall, I would estimate it at, say, a 75 percent completion, 80, 85, 90 and 95.***
Question:	**And I'm more focusing on what customers generally heed in terms of the recalls. In other words, there's a percentage of all recalls that people just don't bother doing. Correct?**
Witness:	***That's right, depending on the nature of it.***
Question:	**Wouldn't you agree with me that a person who thinks there might be a fire would be more likely to pay attention to the recall as opposed to, like, if your radio doesn't work right?**
Witness:	***Very high completion.***
Question:	**Very high?**
Witness:	***For a fire. 'Almost a hundred percent.***

Conclusion

1. Since not later than August 1978, it has been well-known to Chrysler engineering and executive management, Chrysler defense lawyers and experts, and Chrysler dealership principals that a fuel tank located behind the rear axle, below protective structure and without encapsulation is ***"on its own"*** during foreseeable underride accidents.

2. The layperson, to whom NHTSA is directly responsible for and indebted to, remains unaware of Conclusion #1.

3. It is known to NHTSA that actions that involve fire have a completion rate of ***"almost a hundred percent."***

Requests

1. Unlike EA94-005, wherein that petitioner was not invited to review that investigation, please schedule a meeting as soon as possible with the petitioner of DP09-005 so that review and status of EA12-005 can be equitably shared.

2. Please review the expert report of former NHTSA Deputy Administrator Dr. Carl E. Nash (ATTACHMENT 12)

Please do not hesitate to contact me at any time.

Respectfully,

Paul V. Sheridan

Attachments/
Enclosure (Robert Banta deposition transcript of 7Sep12)

Endnotes

[i] Lewis Goldfarb was in constant contact with me during 1993 and 1994, in my role as chairman of the Safety Leadership Team (SLT), received SLT meeting agendas/minutes, and had assigned a subordinate to attend/receive similar information (Judith B. Shumaker-Holland). Goldfarb, after being made aware of my intention to report concerns to NHTSA about Chrysler safety defects, was central to the raiding of my office and confiscation of all safety files (ATTACHMENT 3). He was central to the *ex parte* lawsuit against me, which occurred immediately after his attendance at the secret EA94-005 NHTSA/Chrysler meetings (ATTACHMENT 4 AND 5 RESPECTIVELY). Goldfarb was central to a gala for a former Chrysler employee, Jacqueline Glassman, upon her *"revolving door"* appointment as NHTSA Acting Administrator (ATTACHMENT 6). Later, with their lawsuit allegations exposed as a fraud, a Goldfarb defense colleague, President of the Michigan Bar Association Thomas Kienbaum, confirmed that the central portent/focus of their original decision to dismiss my employment ex *parte* was in-truth my intention to report concerns to NHTSA regarding the defective minivan liftgate latch. This Weinstein/Goldfarb/Kienbaum conspiracy transpired with full awareness at NHTSA (ATTACHMENT 7).

[ii] Upcoming litigation may contain the allegation that this emergence has already occurred relative to the WJ-Body Jeep Grand Cherokee MHE fire-death of 4-year-old Remington Walden Cole on 6 March 2012 in Bainbridge, Georgia.

[iii] It is my information/understanding that under New Jersey law the seller "stands in the shoes of the manufacturer" in product defect litigation.

[iv] Chrysler Group LLC has inserted themselves as a "discovery defendant" in product liability litigations, and has represented former Chrysler executives at their depositions via the long-retained Troy, Michigan law firm of Miller-Canfield PLC.

[v] See page 6 of 18 in ruling of Safeco Insurance versus DaimlerChrysler, Southern Chrysler-Plymouth Inc, et al., Third Circuit Court of Appeal of Louisiana, 31 July 2002, No. 01-1641.

[vi] The first session of the deposition of Chrysler expert Mr. Robert Banta took place on 28 June 2011. As of this writing the deposition of this witness in the New Jersey litigation is not yet complete.

[vii] The OEM commonality and notoriety of the FMEA process, and its contemporaneous standing during development of the Jeep products is shown in the Failure Mode and Effects Analysis Reference Manual of 1993/1995.

[viii] Typically the term 'completion rate' was/is used after the campaign response data is known. In my expert report of almost three years ago (which was reviewed by Chrysler expert Mr. Robert Banta) I stated:

> *"In my expert experience I have personally/professionally examined the consumer response to safety recalls. This response rate or yield is dependent on the safety issue involved and although the precise statistics are claimed to be a "trade secret" by the automotive industry, it is well known that the highest safety defect recall yield by far correlates to customer notices that involve the elimination/reduction of a vehicle fire risk . . . I am confident that if the (NAME REDACTED) family had been made aware of the salient facts contained in the main portion of this report and was offered, in a formal Chrysler recall, a retrofit that afforded the protection of a 'Fuel Tank Skid Plate Shield,' they would have responded responsibly by having their 1996 Jeep Grand Cherokee retrofitted by a competent Jeep dealer*."

From his testimony of 7 September 2012, it appears that Mr. Banta and I are substantially in-agreement.

ATTACHMENT 1

Mr. David L. Strickland
Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

24 September 2012

Subject: **Chrysler Defense Expert Testimony of 7Sep2012: *"The tank's on its own."***
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

One Page:

Closed-door NHTSA meeting with Chrysler Group LLC held on 29 August 2012.

Memorandum

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

Subject: EA12-005 Jeep Fuel Tank Investigation Date: August 30, 2012

From: Larry Hershman
Office of Defects Investigation, NVS-212

To: EA12-005 File

On August 29, 2012, a meeting was held at DOT with Chrysler Group LCC on the EA12-005 Jeep fuel tank investigation. Chrysler discussed its analysis of data related to the investigation. No material was distributed during the meeting. The list of attendees at the meeting is below. When presentation material is submitted, it will be placed in the public file.

If you have any questions, please contact Larry Hershman at x64929 or Peter Ong at x60583.

Name	Organization
NHTSA:	
Frank Borris	Director, Office of Defects Investigation, NVS210
Scott Yon	Chief, Vehicle Integrity Division, NVS212
Larry Hershman	Program Analyst – Vehicle Integrity Division, NVS212
Peter Ong	Engineer – Vehicle Integrity Division, NVS212
Tonja Lindsey	Program Analyst, Traffic Records & Analysis Div., NVS424
Donna Glassbrenner	Statistician – Mathematical Analysis Division, NVS421
Rajesh Subramanian	Statistician – Mathematical Analysis Division, NVS421
Otto Matheke	Senior Attorney, Office of Chief Counsel, NCC-111
Chrysler:	
Mr. David Dillon, Sr. Mgr.	Product Investigation
Ms. Erika Jones	Mayer Brown, Outside Counsel
Dr. Laurentius Marais	Weekers Associates, Outside Consultant

ATTACHMENT 2

Mr. David L. Strickland
Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

24 September 2012

Subject: **Chrysler Defense Expert Testimony of 7Sep2012: *"The tank's on its own."***
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Two Pages:

Internal "confidential" Chrysler meeting minutes of early 1995 which describe the conspiracy deployed by Chrysler executives/lawyers, the Department of Justice, and NHTSA to defraud taxpayers of their right to review NHTSA Engineering Analysis EA94-005.

MINIVAN LATCH ISSUE

Proposed Agreement with NHTSA

1. **Crash Test Video and the Public Record:**

   - NHTSA has agreed that they will deny all FOIA requests to place their investigative files, including the crash test video, on the public record and that the Department of Justice will defend any lawsuits seeking to compel production under FOIA.

   - We would agree with NHTSA that their engineering analysis will remain open while we conduct the service campaign to provide them additional bases to argue that release of the materials would interfere with their investigation.

   - The Department of Justice says there is less than a 50/50 chance of keeping the video off the record for the full duration of the investigation, i.e. the campaign, if there is a court ruling. Given the possibility that a lawsuit could be filed at any time, they anticipate that the legal process would take at least four months, regardless of the outcome.

2. **Service Action Only - No Recall:** NHTSA has agreed that a Chrysler service campaign would fully satisfy all of their concerns and they would give full public support to such an effort. The critical elements that differentiate the service campaign from a recall (mostly reflected in the two attached letters) are as follows:

   - no admission of defect or safety problem;

   - stated purpose of the campaign - to ensure peace of mind in light of media coverage;

   - campaign does not count as a NHTSA action - not included in NHTSA recall numbers, no Part 573 or Part 577 letters;

   - statements to owners, the public and NHTSA assert that no defect has been found; and

   - NHTSA acknowledges that replacement latch is not a 100% solution.

3. Chrysler Announcement: Chrysler controls publication of its action with the following provisions:

- Chrysler goes first with its own statement and reads approved NHTSA statement supporting Chrysler's action;
- Chrysler characterizes campaign as done solely to ensure the peace of mind of its owners, i.e. "your concern is our concern";
- Letter from Martinez to Chrysler and NHTSA press statement praise Chrysler action as fully satisfying all of NHTSA's concerns and state that Chrysler is a safety leader;
- NHTSA officials acknowledge publicly that there has been no finding of defect and that there will be none; and
- NHTSA officials acknowledge that owners should not be concerned over the delayed implementation of the action and that they can best protect themselves by keeping seat belts buckled at all times.

4. Additional Provisions: The following points have been requested by NHTSA and appear to be reasonable:

- The letter to owners makes reference to the NHTSA hot line phone number;
- Latch replacement will be offered as part of any routine minivan servicing (once replacement latches are available);
- Chrysler will submit six quarterly reports on the progress of the campaign (helps to support defense of FOIA requests); and
- NHTSA can make reference to the service campaign in response to owner inquiries.

ATTACHMENT 3

Mr. David L. Strickland
Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

24 September 2012

Subject: **Chrysler Defense Expert Testimony of 7Sep2012: *"The tank's on its own."***
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Four Pages:

Raiding of my office and the confiscation of all safety files by Chrysler Legal and Security Personnel.

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ROSEVILLE OFFICE
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ROSEVILLE, MICHIGAN 48066
(810) 773-3455

July 14, 1995

Thomas G. Kienbaum, Esq.
500 Woodward Ave., Suite 4000
Detroit, Michigan 48226-3406

Re: Chrysler vs. Sheridan

Dear Mr. Kienbaum:

I am in receipt of your most recent correspondence regarding the magistrate's recommendation and our providing of information to you regarding office materials. I do not know how you could have reasonably concluded from the correspondence that was forwarded to you that we are of the opinion that there is no basis to conclude that evidence may have been tampered with in this case. Indeed, the anxiety exhibited by the fact that you immediately faxed your reply to me suggests that in reality you hold the opposite opinion. Due to the necessity of my attendance at federal court in Wichita, Kansas this week, I did not believe that I was going to be able to comply with the July 14, 1995 deadline. Now, it appears that we are in a position to comply.

The information provided hereunder is based upon our limited and restricted ability to review materials which were allegedly seized from Mr. Sheridan's work space. That review is neither complete, nor did it have as its purpose the ferreting out of all details of evidence tampering which may exist. Lack of inclusion of any specific item in this list shall not be taken as an admission of the authenticity of such a document or other tangible item.

The document submitted by the plaintiff entitled, "Confidential Inventory of Material from Paul V. Sheridan's Cubicle at the Chrysler Technology Center", dated March 16, 1995, has numerous general inconsistencies and inaccuracies based on defendant's knowledge and cursory examination of the actual inventory:

1. This "inventory" fails to list and does not contain the following files:

- Liftgate Latch - General
- Liftgate Latch - Competitive
- Safety Leadership Team - Meeting Minutes
- Safety Leadership Team - Preliminary
- Liftgate Latch - Safety Office
- H. G. Cook Study
- FMVSS 206 - General
- Seat Back Strength - General
- Seat Back Strength - FMVSS 207 Specifications
- Offset Impact - General
- Rear Crash Survivability - General
- FMVSS - 301
- Side Crashworthiness Issues
- FMVSS - 214
- Bumper Issues - General
- NS-Body Bumper
- Taillamp Studies - Zarowitz
- Amber Taillamp - NS-Body
- Rear Seat Headrest - General and Zarowitz
- Back-up Light - General

2. The "inventory" lists files but inaccurately portrays their original/current contents:

- Box #1 - File "NS Liftgate System". This file contained subfiles such as "Customer Injury", "Saginaw", et al. Also contains photographs that were originally in the "Liftgate Latch - General" file which is missing per #1 above. (see page 4 of inventory).

- Box #1 - File "NHTSA News" contains only half its original contents (see page 4 of inventory).
- Box #1 - File on "Muth Technologies" not listed; subfile "RSZ" not listed (see page 4).

- Entry on page 8 of inventory indicates that a file contained "correspondence for Dr. Detroit Motorsports". No correspondence was ever sent to Mr. Sheridan's Chrysler office for Dr. Detroit Motorsports, nor was any on file at that location.

3. The "inventory" identifies files and file locations by box number but the location identified was found to be inaccurate.

4. The "inventory" fails to explain/list file materials that were found in the actual inventory by defendant:

- Documents relating to FMVSS-208 dated December 21 were found in Box #1 in file "NS-Restraints". This file is not listed on inventory. (see page 4)

5. This "inventory" fails to accurately explain/list documents allegedly found in the cubicle, as described during the deposition of plaintiff's investigators.

6. The "inventory" fails to list files that were found in the actual inventory.

7. The "inventory fails to list/identify location of specific video tapes:

- Environmentally Safe Oil Changes
- Formula SAE
- IIHS Bumper Tests
- Etc.

8. The "inventory" fails to accurately list contents of computer disks and computer hard drive.

This response is not complete. Further examinations of inventory is still pending. Preliminary examinations cover documents listed through page 18, but not Box #7. Document listings from page 18 through 39 have not yet been examined.

Sincerely,

Courtney E. Morgan, Jr.

CEM/mn
cc: George Googasian, Esq.
(Via Facsimile)

ATTACHMENT 4

Mr. David L. Strickland
Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

24 September 2012

Subject: **Chrysler Defense Expert Testimony of 7Sep2012: *"The tank's on its own."***
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

One Page:

Internal Chrysler Product Litigation Attorney Lewis Goldfarb was central to the *ex parte* lawsuit and dismissal against me during the Christmas holidays of 1994, which occurred shortly after his attendance at the secret meeting between NHTSA and Chrysler regarding EA94-005 which occurred on 17 November 1994 (See Attachment 5).

CHRYSLER CORPORATION

William J O'Brien
Vice President
General Counsel and Secretary

February 17 , 1995

Kenneth N. Weinstein, Esq.
National Highway Traffic
Safety Administration
400 Seventh Street, S.W.
Washington, DC 20590

Chrysler Corporation v. Paul Sheridan

Dear Ken:

As we discussed this afternoon, I confirm that Chrysler has no objection to NHTSA receiving information relevant to your Engineering Analysis 94-005 concerning rear latches on the liftgates of Model Year 1984-1994 Chrysler minivans from Mr. Paul Sheridan or anyone else.

The litigation against Mr. Sheridan was commenced because of our concerns about his unauthorized disclosure of confidential and proprietary Chrysler business information to unrelated third parties, some of which information eventually appeared in the public press.

As you know, we have been cooperating with NHTSA on all aspects of this Engineering Analysis, and we will continue to do so. Mr. Sheridan's responsibilities at Chrysler did not involve the minivans which are the subject of this Engineering Analysis, and in seeking the Restraining Order entered against Mr. Sheridan it was not our intent to preclude NHTSA from receiving any information concerning those minivans.

We will inform the Court at the hearing on Wednesday that we have no objection to NHTSA receiving any documents or information that Mr. Sheridan may have that are relevant to this Engineering Analysis. We would, of course, like to have copies of any such documents and information that Mr. Sheridan may eventually provide to you.

If there is anything we can do to facilitate this matter for you, please give Lew Goldfarb or me a call.

Thank you.

Sincerely,

Bill O'Br

cc: L. H. Goldfarb, Esq.
G. J. Ridella, Esq.

Chrysler Corporation
12000 Chrysler Drive
Highland Park, MI 48288-1919
313 956 5420

EXHIBIT
3
MT 2/14/03

ATTACHMENT 5

Mr. David L. Strickland
Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

24 September 2012

Subject: **Chrysler Defense Expert Testimony of 7Sep2012: *"The tank's on its own."***
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

One Page:

NHTSA memorandum of secret meeting held on 17 November 1994 between NHTSA and Chrysler regarding EA94-005, attended by internal Chrysler Product Litigation Attorney Lewis Goldfarb.

U.S. Department of Transportation

National Highway Traffic Safety Administration

Memorandum

Subject: Engineering Analysis: EA94-005

Date: DEC 28 1994

From: Julie Abraham
Safety Defect Engineer

Reply to Attn of:

To: File

A meeting between NHTSA and Chrysler Corporation officials was held on November 17, 1994. The purpose of the meeting was for the Office of Defects Investigation to brief Chrysler about the results of its analysis and testing in relation to the minivan liftgate latch investigation. The following people were present at the meeting:

Coleman Sachs, NHTSA Chief Counsel Staff
Bill Boehly, NHTSA Enforcement
Lou Brown, NHTSA Office of Defects Investigation (ODI)
John Hinch, NHTSA (ODI)
Tom Cooper, NHTSA (ODI)
Julie Abraham, NHTSA (ODI)
Dale Dawkins, Chrysler
Lou Goldfarb, Chrysler
Ron Boltz, Chrysler
Jim Tracy, Chrysler

ATTACHMENT 6

Mr. David L. Strickland
Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

24 September 2012

Subject: **Chrysler Defense Expert Testimony of 7Sep2012: *"The tank's on its own."***

Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

One Page:

Former internal Chrysler Product Litigation Attorney Lewis Goldfarb was part of gala for a former Chrysler employee, Jacqueline Glassman, upon her "revolving door" appointment to NHTSA as Acting Administrator.

Dear Friends:

As you probably know, Jackie Glassman has recently been appointed Chief Counsel of the National Highway Traffic Safety Administration. We cordially invite you to join us for a reception in Jackie's honor:

Thursday, March 14, 2002
5:30 pm – 7:30 pm

Fulbright Center
Hogan & Hartson L.L.P.
555 13th Street, N.W.
13th Floor – West Tower
Washington, DC

R.S.V.P. to Angela Minor at arminor@hhlaw.com.

ATTACHMENT 7

Mr. David L. Strickland
Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

24 September 2012

Subject: **Chrysler Defense Expert Testimony of 7Sep2012: *"The tank's on its own."***
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Four Pages:

With their lawsuit allegations exposed as a fraud, a Lewis Goldfarb defense colleague, President of the Michigan Bar Association Thomas Kienbaum, confirmed by amendment that the central portent/focus of their original decision to dismiss my employment *ex parte* was in-truth my intention to report concerns to NHTSA regarding the defective minivan liftgate latch.

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Job listings
Model Homes
Place an ad

Essentials
Editorials
Horoscope
Lottery
Weather
Death Notices
CyberSurvey
Search Engine
Back Issues
Site highlights

News Sections
Accent
Autos
Business
Casino Guide
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Metro
Money
Movie Finder
Nation/World
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Outlook
On Detroit
Pets
Rearview Mirror
Screens
Showtime
TV Listings
Voices

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Sports
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Pistons
Tigers
Wings
College
U-M
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State Colleges
High Schools
Motor Sports
Golf Guide

Chrysler sues former employee for $82 million in minivan affair

By Kenneth Cole / Detroit News Washington Bureau

Sheridan

WASHINGTON -- Chrysler Corp. is seeking $82 million from a former safety staffer-turned-whistleblower who's testifying in high-stakes lawsuits involving latch designs on the automaker's older minivans.

The demand, long kept secret, was disclosed in a just-settled rear liftgate latch lawsuit in Los Angeles.

The $82-million figure represents Chrysler's estimate of its losses following an October 1995 interview of Dearborn resident and former Chrysler employee Paul Sheridan on ABC-TV's 20/20 news program.

Legal experts say it may be the largest sum ever sought from a whistleblower by a corporation.

It is only one highlight of Ornelas vs. Chrysler, which was settled for an undisclosed amount this week in Los Angeles Superior Court. The case involved four passengers allegedly ejected from a Chrysler minivan in a low-speed crash in 1995.

"I don't track it, but I'd be surprised if an individual has ever been sued for more by a corporation," said Clarence Ditlow, executive director of the Center for Auto Safety in Washington, D.C. "It is reflective of how much a whistleblower can cost a company -- especially when it's tried to cover up a defect."

Tom Kienbaum, the Birmingham attorney representing Chrysler in its lawsuit against Sheridan, was not available for comment.

David Tyrrell, the company's lead counsel in the minivan-latch lawsuits, described Sheridan as "a disgruntled former employee."

Chrysler fired Sheridan in December 1994 for allegedly disseminating secret crash-test data on the 1996 minivan. It sued him in Oakland County Circuit Court later that month for "in excess of $10,000."

The company amended the lawsuit in the fall of '95 after Sheridan appeared on 20/20 and said the company knew its minivan latches weren't strong enough to secure the rear liftgate in even low-speed

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accidents.

According to federal regulators, malfunctions with Chrysler minivan latches have resulted in at least 37 deaths and 100 serious injuries.

Sheridan, 45, declined to comment. His attorney, Courtney Morgan of Detroit, said Chrysler contends in the lawsuit that Sheridan's interview hurt sales of its 1996-model minivans. They had just gone on the market when the TV show aired.

"Never mind the fact that Paul never said a word about the 1996 minivans on the show," Morgan said.

The $82 million Chrysler is seeking from Sheridan is based on lost sales and how much it figures it would have had to spend on television ads rebutting Sheridan's interview.

"But even if that logic holds, how the hell can you get the money if you never spent it?" argued Morgan, who is representing Sheridan in a countersuit against the automaker.

Elletta Callahan, a professor of law and public policy in Syracuse University's School of Management, concurred Chrysler will have a difficult time collecting, saying: "It's always difficult to prove lost profits."

Chrysler attorneys apparently believe it will be equally difficult to convince juries that there never was a problem with its pre-1995-model minivan latches. The Ornelas case is the third the company has settled this year since a South Carolina jury rendered a record $262.5-million verdict in a similar case.

"They recognize that if a juror sees all the evidence they'll lose over and over again, so they're paying very large and very secret amounts of money to keep that from happening," said Mikal Watts, a Corpus Christi, Texas, attorney representing many plaintiffs in latch lawsuits against the company.

Ken Gluckman, assistant general counsel for product liability litigation at Chrysler, said the settlements simply reflect a flawed judicial system.

"The sad truth is that in today's judicial system, jurors can do anything," he said. "They're guided by emotion and aren't controlled by factual circumstances."

Four passengers -- including 1-year-old Lorena Casteneda and 4-year-old Diana Perez -- were allegedly ejected from the back of a Chrysler minivan in a low-speed crash in Los Angeles on Jan. 21, 1995, in the Ornelas case.

Gluckman noted 13 people were riding in the minivan designed for seven. Many were unbelted, he said, and there's evidence the minivan driver may have run a light.

"The plaintiffs in this case broke three laws," Gluckman said. "Yet we're supposed to be the evil ones."

Larry Grassini, the plaintiff's attorney in Ornelas, said his client "made a mistake by allowing so many people to ride" in the minivan.

"But that was a short-term mistake," he said. "Chrysler knew about their's for a long time."

Grassini said six of the 12 Ornelas jurors and one of the four alternates accepted questions from attorneys after the case was settled. He said they told a Chrysler jury consultant they would have wanted to hear from Sheridan, had the case gone trial.

"The jurors saw him as a key witness in what many of them said seemed to be some sort of corporate cover-up involving these latches," Grassini said.

Chrysler's Tyrrell said there was no cover-up and if the case had been tried, jurors would have learned Sheridan was not an engineer.

"Rather, he held a marketing position," Tyrrell said. "He never designed a liftgate latch and he never tested a latch."

Chrysler demoted Sheridan for poor job performance before firing him, Tyrrell said, and that further impugns his testimony.

That, however, contradicts Chrysler's performance evaluations of Sheridan obtained by The Detroit News. As recently as October 1994 -- two months before the automaker canned him -- various company brass wrote:

* "Paul does a thorough, detailed, organized and tireless job. He became an active promoter of advancing safety in the minivan program, only slowing when the reality of the interest from management became apparent to him."
* "Paul (Sheridan) did a good job as Chairman of the Minivan Safety Leadership team."
* "He is extremely knowledgeable and may very well be one of the best all around technical persons on staff."
* "Overall, I think Paul has done an excellent job."

What Sheridan said

Former Chrysler employee Paul Sheridan was fired in December 1994 for allegedly disseminating secret crash-test data on the 1996 minivan. He later appeared on 20/20 and said the automaker knew its minivan latches weren't strong enough to secure the rear liftgate in even low-speed accidents.

The law

Three years ago tomorrow, Sheridan sued Chrysler and three of its employees alleging they violated his rights under whistleblowers' protection laws. Those laws offer protection from companies that lash out against staffers who uncover wrongdoings. Chrysler, however, has argued Sheridan was fired for defensible reasons.

Who is Paul V. Sheridan?

The former employee at the center of high-stakes litigation involving Chrysler's minivan rear liftgate latches worked for two of the Big Three automakers since the early '80s.

Employment: Worked from 1981-84 for Ford Motor Co., including product and powertrain planning. From 1984-94, his duties at Chrysler Corp included engineering planning, helping arrange a

deal to equip Chrysler trucks with Cummins diesel engines and working on the minivan platform team.

Status: Seeking full-time employment. Chrysler fired him after finding phone records traced to a reporter for the trade weekly Automotive News. The automaker later sued him for disclosing company secrets involving minivan crash tests and comments about minivan latches on TV.

What's next

This week Chrysler settled a minivan latch case in Los Angeles before Sheridan was set to testify. It faces at least six more latch cases in next four months. Lawsuits between Sheridan and Chrysler are scheduled to go to trial in June.

Comments?

ATTACHMENT 8

Mr. David L. Strickland
Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

24 September 2012

Subject: **Chrysler Defense Expert Testimony of 7Sep2012: *"The tank's on its own."***
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Two Pages:

A "confidential" letter, written on 27 October 1994 by NHTSA Assistant Chief Legal Counsel Kenneth Weinstein to former internal Chrysler Product Litigation attorney Lewis Goldfarb, which invited Chrysler to secretly review the Conclusions of Engineering Analysis EA94-005.

Lewis H. Goldfarb, Esquire
Assistant General Counsel
Chrysler Motors Corporation
12000 Chrysler Drive
Highland Park, Michigan 48288-1919

Re: EA94-005

Dear Mr. Goldfarb:

On October 27, 1994, representatives from the National Highway Traffic Safety Administration's (NHTSA's) Office of Chief Counsel and Office of Defects Investigation (ODI) met with you and with Dale E. Dawkins, Director of Vehicle Compliance and Safety Affairs for Chrysler Corporation (Chrysler), concerning the above-referenced engineering analysis (EA), which involves rear liftgate failures on 1984 through 1994 Dodge Caravan, Plymouth Voyager, and Chrysler Town and Country vehicles. At the meeting, both you and Mr. Dawkins requested that Chrysler be given an opportunity to review the material developed in the course of NHTSA's investigation before the agency completes this EA.

Although NHTSA does not ordinarily share the results of its analysis or testing with a manufacturer before the completion of an EA, it is prepared to do so in this instance. However, this willingness should not be construed by Chrysler or by any other manufacturer as a precedent for future agency actions.

As a condition to our agreement to brief Chrysler on the results of ODI's investigation, Chrysler must agree, in writing, to the following:

1. Chrysler will not be allowed to copy materials used for the briefing, but will be allowed to take notes.

2. By November 30, 1994, Chrysler will provide ODI with its response to the briefing.

3. By November 28, 1994, Chrysler will provide ODI with a written response to the enclosed information request, including copies of all documents and other materials specified in items 1 through 5, 7, and 12 that Chrysler has not previously furnished to NHTSA. All such documents and other materials that Chrysler receives in the future shall be provided to NHTSA within five working days of their receipt.

If you have any questions concerning this matter, please contact me or Coleman Sachs of my office at 202-366-5263.

Sincerely,

KNW

Kenneth N. Weinstein
Assistant Chief Counsel
for Litigation

Enclosure

ATTACHMENT 9

Mr. David L. Strickland
Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

24 September 2012

Subject: **Chrysler Defense Expert Testimony of 7Sep2012: *"The tank's on its own."***
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Three Pages:

"The past relationship between NHTSA and Chrysler"

The Real World Consequences

The following three pages are directly attached to my cover letter of 27 October 1999 to Attorney General Janet Reno. This 1999 letter in its entirety was forwarded to NHTSA (Mr. David Strickland) on 9 February 2011 under PE10-031. Tab 3 of that Reno letter/binder contains the Conclusions portion of a secret presentation made to Chrysler executives and lawyers on 17 November 1994.

As such the following three pages only document the period from 27 December 1994. A more accurate legal rendering of this real world example of the consequences of *"the past relationship between NHTSA and Chrysler"* should have begun with the injuries and deaths that commenced subsequent to the secret NHTSA/Chrysler meeting of 17 November 1994.

Chrysler Minivan Liftgate Latch Failures : Known Injury and Death Accidents *

THE *EX PARTE* MICHIGAN MUZZLE ORDER - THE CRUCIAL ONE-YEAR PERIOD

December 27, 1994
Oakland Circuit Court Issues Ex Parte Restraining Order Against Paul V. Sheridan

through

October 27, 1995
Date of Airing of ABC News 20/20 Program featuring Sheridan interview about latch*

Listed by Month in 1995:

January 1995

Ornelas v Chrysler ; Date of Accident : January 21, 1995
Lorena Casteneda, 2 years old, Killed
Diana Perez, 3 years old, Killed
Arecelas Casteneda, 20 year old man, Killed
Iscelas Ornelas, 21 year old woman, Killed

Pinkston v Chrysler ; Date of Accident : January 31, 1995
Jeff Pinkston, injury/death status TBD

Vega v Chrysler ; Date of Accident : January 1, 1995
Daniel Vega, injury/death status TBD

February 1995

Haas v Chrysler ; Date of Accident : February 6, 1995
Frank Haas, injury/death status TBD

March 1995

Bonnici v Chrysler ; Date of Accident : March 3, 1995 - Featured on Canadian News/TV
Thomas Bonnici, 5 year old boy, Killed

Woodard v Chrysler ; Date of Accident : March 11, 1995 - Featured on *ABC News Inside Edition*
Crystal Woodard, 8 year old girl, Killed
Tyndall Woodard, boy, serious injury
Sherri Lynn Woodard, girl, minor injury

Stewart v Chrysler ; Date of Accident : March 16, 1995
Michael Stewart, injury/death status TBD

March 1995 con't

Danish v Chrysler ; Date of Accident : March 17, 1995
Anjum Danish, injury/death status TBD

Vela v Chrysler ; Date of Accident : March 26, 1995
Maria Vela, injury/death status TBD

April 1995

None Admitted to by Chrysler

May 1995

Bordelon v Chrysler ; Date of Accident : May 8, 1995
Terry Bordelon, injury/death status TBD

June 1995

Ramjohn v Chrysler ; Date of Accident : June 5, 1995
J. Ramjohn, injury/death status TBD

Riley v Chrysler ; Date of Accident : June 25, 1995
Renada Riley, injury/death status TBD

July 1995

(Chrysler Files 'Contempt of Court' Allegation against Sheridan, Morgan and Mazur)

Zimmerer v Chrysler ; Date of Accident : July 2, 1995
Dylan Zimmerer, injury/death status TBD

Maxwell v Chrysler ; Date of Accident : July 4, 1995
Karle Maxwell, injury/death status TBD

Tatom v Chrysler & Prudhomme v Chrysler ; Date of Accident : July 16, 1995
Bernadine Tatom, girl, injury/death status TBD
Cynthia Prudhomme, girl, injury/death status TBD

Abercrombie v Chrysler ; Date of Accident : July 21, 1995 - Featured on ABC News 20/20*
Van Nguyen, woman, amputation of left arm
Mark Jones, 20 year old, serious injury
Tyler Hearndon, 7 year old boy, minor injury
Kim Nguyen, 30 year old woman, serious injury
Dao Nguyen, 70 year old woman, killed

July 1995 con't

Matthews v Chrysler ; Date of Accident : July 24, 1995
Stevie Weston, 14 year old girl, paraplegic

August 1995

Gross v Chrysler ; Date of Accident : August 12, 1995 (not listed on Eaton Exhibit #40)
Sandra Tate Gross, woman, killed
Tiffany Grady, woman, serious injury
Alica Gross, girl, serious injury
Cedric Gross, man, minor injury
Billy Ray Gross, Jr., man, minor injury

Yoo v Chrysler ; Date of Accident : August 24, 1995
Soo Ok Yoo, injury/death status TBD

September 1995

Auer v Chrysler ; Date of Accident : September, 4, 1995 - Featured on ABC New 20/20*
Brandon Auer, 8 year old boy, Killed

Duke v Chrysler ; Date of Accident : September 22, 1995
Lois Duke, girl, injury/death status TBD

Cockerel v Chrysler ; Date of Accident : September 24, 1995
K. M. Cockerel, injury/death status TBD

October 1995

Edwards v Chrysler ; Date of Accident : October 25, 1995
Chris Edwards, boy, injury/death status TBD

Hong v Chrysler ; Date of Accident : October 26, 1995
Sok Hong, unknown, injury/death status TBD

* Source : Chrysler submission to NHTSA.

ATTACHMENT 10

Mr. David L. Strickland
Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

24 September 2012

Subject: **Chrysler Defense Expert Testimony of 7Sep2012: *"The tank's on its own."***
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Eight Pages:

Letter of 15 June 2012 to Mr. David L. Strickland, NHTSA Administrator.

Subject : Correct Statistical Approach to NHTSA Defect Investigation EA-12-005 – File Update

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June 18,2012

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To: Mr. David L. Strickland *
NHTSA Headquarters
West Building
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

Date: 15 June 2012 VIA FEDEX 8007-9341-5837

From: Mr. Paul V. Sheridan
DDM Consultants
22357 Columbia Street
Dearborn, MI 48124-3431
313-277-5095
pvs6@Cornell.edu

Subject : Correct Statistical Approach to NHTSA Defect Investigation EA-12-005 – File Update

Courtesy Copy List **

Mr. Clarence Ditlow, Director
Center for Auto Safety - Suite 330
1825 Connecticut Ave, NW
Washington, DC 20009-5708
(202) 328-7700

Senator John Rockefeller IV
Commerce, Science and Transportation Committee
531 Hart Senate Office Building
Washington, DC 20510
(202) 224-6472

Mr. Sergio Marchionne, Chairman
Chrysler Group LLC
1000 Chrysler Drive
Auburn Hills MI 48321-8004
248-576-5741

Mr. Courtney E. Morgan, Jr.
Morgan & Meyers, PLLC / Suite 320
3200 Greenfield Road
Dearborn, MI 48120
313-961-0130

Mr. Larry Hershman
Office of Defects Investigation, NVS-212
National Highway Traffic Safety Administration
Washington, DC 20590
202-366-4929

* *Available with hyperlinks:* http://links.veronicachapman.com/Sheridan2Strickland-4-Links.pdf
** *By email or USPS*

DDM Consultants
22357 Columbia Street
Dearborn, MI 48124-3431
313-277-5095

15 June 2012 VIA FEDEX AIRBILL # 8006-9341-5837

Mr. David L. Strickland, Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

Subject : Correct Statistical Approach to NHTSA Defect Investigation EA-12-005 – File Update

Dear Mr. Strickland:

Notoriously, Chrysler and its defense counsel have promoted various probabilities associated with the fire death or injury outcomes which result from rear-end collisions to the Jeep Grand Cherokee (ZJ-Body and WJ-Body). Unfortunately, NHTSA sometimes also promotes incorrectly formulated statistics as its criteria for analyzing automotive defects, frequently using the ludicrous phrase "defect trends." The underlying incompetence in the approach of both organizations is use of the entire Jeep population as the denominator. This approach is not remotely competent or responsible.

The denominator that is relevant is derived from the real-world rear-end collision events involving the Jeep (and later use of the fire/injury outcome frequencies WITHIN that event population for various numerators). Using a denominator which includes the larger portion of "lucky" Jeep owners, the datum that have never experienced a rear-end collision, has no meaning; no statistically significant information. The fortunate portion of the Jeep population has never been tested in the real-world and offers no subject-relevant insight. By-definition, this portion contains no collision event outcome data. By-definition the lucky portion tells us nothing about the crashworthiness of the Jeep fuel tank system.

And yet this is the historical approach that insidiously underpins everything from defense lawyer/expert court room ruses, to the ongoing PR rhetoric from Chrysler.

The formulation of the correct denominator for NHTSA EA-12-005 involves the exercise of singling-out ONLY those Jeep vehicles that suffered a rear-end collision event, and then WITHIN THAT population determining the various event outcomes to arrive at meaningful probabilities. This approach by-definition contains statistically significant information which is focused on and provides insight regarding the true crashworthiness of the rear-mounted Jeep fuel tank system.

This correct statistical approach portends very bad news for the Jeep Grand Cherokee owners. When the correct denominator is used, when the tested, unlucky population is the focus of statistical analysis, the results are horrifically poor (i.e. too high). Alternatively, Chrysler makes the claim that the probability of a rear-end collision in the Jeep Grand Cherokee that results in a fire-caused death is very low. In the narrow, carefully coached legal and semantic sense, Chrysler is not guilty of lying. But in terms of ethics or competence, the Chrysler rhetoric is diversionary at-best, outright deception for-sure. Indeed the real-world reality is the opposite of the Chrysler rhetoric:

If you are involved in a rear-end collision in a Jeep Grand Cherokee, the probability that you are horribly burned or die from fire is so high that only the unethical would feign no concern, and take no action. *

This latter point needs elaboration. In my letter to you of 9 February 2011, I stated:

> *"As chairman of the Chrysler Safety Leadership Team (SLT), my priority involved Failure Mode Effects Analysis (FMEA) as the basis of preliminary and ongoing examination of a safety concern. In my role it did not matter that only one person may be affected during vehicle service life. What mattered was that a failure mode existed, and when provoked would cause serious harm. Hypothetically, the fact that a vehicle service life was statistically "lucky," and a failure mode was provoked "only once," was not gala. Such an approach would merely confirm incompetence as a safety manager.*
>
> *For perspective, I have testified in litigation wherein defense counsel has deployed two themes: 1) "compliance with all government safety standards" and 2) various NHTSA statistics. However, when the jury in Jimenez v Chrysler learned of the latter's foreknowledge that FMVSS-206 failed to address the failure mode that was responsible for the death of an 8-year-old boy, that standard and related NHTSA statistics were rendered legally and morally worthless. Similarly, when the jury in Flax v Chrysler learned that FMVSS-207 did not address the failure mode that was responsible for the death of an infant, that standard and related statistics were deemed irrelevant."* †

In NHTSA EA-12-005 there are indications that #2 may be deployed as the underlying criteria by which dismissal could be executed. This is seen, by some, as insinuated by inclusion of the Jeep Liberty and the Jeep Cherokee. Therefore to avert such misinterpretation, I request that the same correct approach, as detailed above for the Jeep Grand Cherokee, be used for your additional investigation of the Jeep Liberty and the Jeep Cherokee vehicle lines.

Relating to probabilities, I conclude with in-person insight: In all Center for Auto Safety (CAS) crash tests, conducted to simulate the real-world crashworthiness of the Jeep Grand Cherokee fuel tank system, the probability that the Jeep fuel tank system would fail was determined to be 100%. ‡ §

Please do not hesitate to contact me at any time.

Respectfully,

Paul V. Sheridan

Attachment

Endnotes

---

[*] President Barack Obama and his family are datum of the lucky Jeep Grand Cherokee population.

[†] To the best on my knowledge, as a former employee of the Chrysler Jeep and Dodge Truck Engineering (JTE) organization, no FMEAs were ever conducted on the rear-mounted fuel tank systems of ZJ-Body or WJ-Body vehicle lines, these were only subjected to the Ford Pinto based FMVSS-301 compliance regimen.

[‡] As you are aware, a similar test conducted on the Ford Explorer, which has a similar chassis layout/fuel tank system to the WK-Body, had no breach of the fuel tank system. As you are also aware, the WK-Body, since introduction in September 2004 as a 2005 model year Jeep Grand Cherokee, has no subject-relevant FARS data entries.

[§] In the 15 June 2012 New York Times article, Investigation of Jeep Grand Cherokee Portends a Recall, Safety Advocate Says, CAS Director Mr. Clarence Ditlow is quoted, *"We want NHTSA to move faster, but the only way it would move faster is if it had more resources and authority. NHTSA's band of defect investigators is going up against trillion-dollar companies."* After our introduction on 19 May 2010 in Room 253 of the Russell Senate Office Building, I had a meeting with Senator Jay Rockefeller (D-WV). During this latter conversation I alluded to the relationship between NHTSA's very important role to that of the ongoing debate on national health care costs. Briefly, I essentially remarked to Senator Rockefeller that Congress and the Administration needed to review or reestablish the cost-benefit analysis between *"the nickels and dimes spent on NHTSA to the effect that increased funding will have on reducing the hospital bed population of highway accident victims"* (my words). In the context of the instant NHTSA investigation (EA-12-005), one can deduce with confidence that the cost avoidance related to a Jeep Grand Cherokee burn victim (that survives for three weeks on life-support, and then perishes) is comparatively miniscule. When one objectively relates these facts to the general issue of furthering a connected, interrelated and competent national policy on health care, the detractor and advocate alike are hard-pressed to establish a proverbial downside to *"more resources and authority"* to NHTSA.

The New York Times
Wheels
The Nuts and Bolts of Whatever Moves You

June 15, 2012, 11:17 am

Investigation of Jeep Grand Cherokee Portends a Recall, Safety Advocate Says

By CHRISTOPHER JENSEN

Chrysler Group1998 Jeep Grand Cherokee, one of the models included an upgraded federal investigation relating to the S.U.V.'s safety performance in rear-impact collisions.

With the National Highway Traffic Safety Administration having decided to upgrade its investigation of rear-impact fires involving Jeep Grand Cherokees, a recall of millions of those vehicles is "certain," said Clarence Ditlow, the executive director of the Center for Auto Safety, the organization whose work prompted the federal inquiry.

Chrysler produced about three million Grand Cherokees belonging to the affected model years, 1993-2004, of which about 2.2 million were still registered in 2011, according to Experian Automotive.

Mr. Ditlow and his organization have insisted there was a heightened risk of fire in the vehicles since at least 2009.

Eric Mayne, a spokesman for Chrysler, said in an interview that there was no safety problem with the vehicles and that a recall was "absolutely not" certain.

In an e-mail, Karen Aldana, a spokeswoman for N.H.T.S.A., wrote that it was agency policy to refrain from commenting on possible outcomes of ongoing investigations.

In its filing on Thursday, the agency said "rear-impact-related tank failures and vehicle fires are more prevalent in the J.G.C. than in non-Jeep peer vehicles." This marked the first time the agency made such a strong condemnation in the case, directly refuting thousands of pages of documentation provided by Chrysler to the agency.

The agency said it would expand the investigation beyond the Jeep Grand Cherokees to include the 1993-2001 Cherokee S.U.V. and 2002-7 Liberty compact crossover.

Combined with the three million Grand Cherokees, the investigation consists of 5.1 million vehicles — though the agency noted old age might have reduced the number of vehicles in use.

Mr. Ditlow has argued that the Grand Cherokees were far more likely to experience fast-spreading and deadly rear-impact fires for two reasons.

One is that the gas tank is positioned behind the rear axle, so it lacks the protection of that structure and is in a location engineers often refer to as a "crush zone." The other reason relates to the fuel filler pipe, which can rip away in a rear impact, leaking gasoline.

In its redesign of the Grand Cherokee for the 2005 model year, Chrysler positioned the gas tank in front of the rear axle, but said the change was not undertaken for safety reasons.

Mr. Ditlow estimated the cost of repairing the Grand Cherokees would be $100 per vehicle. The vehicles would need a steel shield under the fuel tank and a check valve to keep gasoline from leaking if the fuel-filler pipe were ripped off, he said.

Based on the estimate provided by Experian of 2.2 million affected Grand Cherokees on the road, such a recall would cost Chrysler about $220 million, irrespective of any recall action for the Cherokee or Liberty.

Mr. Mayne, the Chrysler spokesman, declined to comment on the possible cost of any repair.

"The reality is there is no defect, so we are not contemplating costs," he said.

Research and advocacy by Mr. Ditlow and the Center for Auto Safety prompted the federal investigation. Late in 2009, Mr. Ditlow filed a formal request, known as a defect petition (PDF), which argued that the agency failed to notice an important safety issue: that Grand Cherokees from the 1993 to 2004 model years were more likely to burst into flame when struck from behind than other S.U.V.'s in their peer group

Federal regulations dictate that the agency must at least consider whether a defect

petition merits an investigation. In August 2010, the agency granted the request and began what was called a Preliminary Evaluation.

During that evaluation, the agency determined there was enough cause for concern to merit an upgrade of the inquiry to an Engineering Analysis, which it announced Thursday.

Allan Kam, a Maryland safety consultant who spent much of his career at the safety agency and retired as its senior enforcement attorney, said in an interview there was "frequently" a recall after the agency upgraded an investigation to an Engineering Analysis. In a review by Wheels of 26 engineering analyses by the agency over roughly the last two years, 18 were found to have resulted in recalls. The other eight ended without action.

Mr. Ditlow lamented what he said was the slow pace of the investigation, but said the agency had its hands full. "We want N.H.T.S.A. to move faster, but the only way it would move faster is if it had more resources and authority," he said. "N.H.T.S.A.'s band of defect investigators is going up against trillion-dollar companies."

This post has been revised to reflect the following correction:

Correction: June 15, 2012

An earlier version of this post misidentified the author as Jonathan Schultz.

ATTACHMENT 11

Mr. David L. Strickland
Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

24 September 2012

Subject: **Chrysler Defense Expert Testimony of 7Sep2012: *"The tank's on its own."***
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

One Page:

Referencing underride and the attached photograph from my letter of 27 July, Mr. Banta testified as follows:

Question: **Now, in looking at that photo, can you tell me what part of the vehicle protects the part of the tank that we're looking at in that photograph?**

Witness: ***No. It's covered by the fascia.***

Question: **So if a vehicle were to strike just that yellow piece of the car, whether it be because it's lower or some kind of vehicle that's not even a car, let's say it was a recreational vehicle of some sort, what would protect that portion of the tank that we see here in yellow.**

Witness: ***Just the tank surface itself.***

Question: **So in other words, whatever the material of the tank is at the time?**

Witness: ***The tank's on its own.***

ZJ-Body Jeep Grand Cherokee:

What Showroom Customer Would See if Fuel Tank was <u>not</u> colored to match rear underbody / rear suspension components.

ATTACHMENT 12

Mr. David L. Strickland
Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

24 September 2012

Subject: **Chrysler Defense Expert Testimony of 7Sep2012: *"The tank's on its own."***

Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Forty One Pages:

Expert report of former NHTSA Policy Advisor and Deputy Associate Administrator Dr. Carl E. Nash. Dr. Nash has been retained by plaintiff counsel, and has submitted an expert report which does not prioritize broad-brush statistics, but instead concentrates on the implicit Jeep safety defect and its failure mode.

Carl E. Nash, Ph.D.
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August 3, 2011

Angel M. DeFilippo, Esq.
Grieco Oates & DeFilippo, LLC
414 Eagle Rock Avenue,
West Orange, NJ 07052

Dear Ms. DeFilippo:

The following report is an assessment of the safety defects in the 1996 Jeep Grand Cherokee (hereinafter "Jeep") that resulted in fatal crash fire injuries to Susan M. Kline. The report is based on my experience teaching and conducting research in the field of automotive safety, my work as a senior executive in the National Highway Traffic Safety Administration (NHTSA), and my analyses of several crash tests involving Jeep Grand Cherokees.[1]

The Crash and Crash Injuries

According to the Police Accident Report,[2] the driver of a 1998 Subaru Legacy traveling south in the right lane of I287 (a 55 mph, 4 lane Interstate highway) "suddenly slowed down drastically, after she noticed she had missed the exit to her destination." The Jeep, which was following the Subaru "then slowed down to a very low speed . . . ." The driver of a third vehicle which was behind the first two, a 2004 Toyota Sienna apparently failed to recognize that the vehicles ahead of her had slowed, and her vehicle struck the rear of the Jeep "causing it to explode and both vehicles became engulfed in flames." The Jeep then "continued to travel forward and struck [the rear of the Subaru].

The fire so badly burned the Jeep that much of the evidence concerning this crash was consumed. The plastic fuel tank of the Jeep was completely burned in the fire which apparently consumed most of the fuel originally contained within it. As a consequence, the exact failure of its fuel system leading to the fire has not, to the knowledge of this expert, been determined.

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[1] Resume of Carl E. Nash, Ph.D.
[2] New Jersey Police Crash Investigation Report #B080 2007 00445A: February 24, 2007.

Ms. Kline's severely burned body was found in the right front seat. The Autopsy/Toxicology report by Dr. Carlos A. Fonseca of the Morris County Medical Examiner's Office,[3] found that she was fatally injured by "smoke inhalation and thermal injuries." An analysis by Dr. Ross I.S. Zbar[4] concluded that "Ms Morris was conscious after impact; moved to the passenger seat in order to attempt escape; and died as a result of acute thermal injury. She did not suffer any other injuries that would indicate she was unconscious or thrown out of the driver's seat at the time of impact." Neither of the drivers of the other two vehicles directly involved in this crash was seriously injured.

Reconstruction of the Crash

The crash reconstruction report by Donald R. Phillips, PE[5] concluded that "The resultant pre-impact speed of the Morgan-Alcaka Toyota Sienna was approximately 51.8 mph." Although this expert did not independently estimate the impact speed, it is consistent with the evidence.

A crash of this type would have been unlikely to have seriously injured the occupants of any of the vehicles in the absence of a fire. In fact, none of the vehicle occupants involved in this case suffered serious injuries as a direct result of the collisions.

Crash Statistics

Serious to fatal injuries are relatively rare in rear impact crashes: vehicles suffering rear impact damage as the principal impact point accounted for less than 7 percent of all vehicle involved in fatal crashes in the year 2000.[6]

According to NHTSA, in a period that encompasses the time in which the 1996 Jeep Grand Cherokee was designed and built, "There are 1,200 to 1,300 passenger vehicles with fire annually in FARS (Fatality Analysis Reporting System) in all types of crashes. In addition, there are an estimated 4,000 passenger vehicles involved in injury crashes with fire and 5,000 property

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[3] Fonseca, Carlos A.,, M.D., Report of the Autopsy on Susan V. Morris, Office of County Medical Examiner, County of Morris, Morristown, New Jersey: October 22, 2008.

[4] Zbar, Ross I.S., MD, FACS, Report to Angel DeFilippo Re: Susan Morris, concerning the death of Ms. Morris following a motor vehicle crash.

[5] Phillips, Donald R., PE, Supplemental Report to Angel M DeFilippo, Esq. concerning the crash of a 1996 Jeep Grand Cherokee resulting in the death of Susan Morris Kline: Lansdale, PA: July 25, 2011.

[6] Fatal Accident Reporting System for the year 2000.

damage only crashes with fire."[7] In the rulemaking to upgrade FMVSS 301,[8] the agency stated, "According to an analysis of data in the agency's Fatality Analysis Reporting System (FARS) in 2001, 3.5% percent (1,449 fatalities) of light vehicle occupant fatalities occurred in crashes involving fire. Overall, the fire itself was deemed to be the most harmful event in the vehicle for about 24 percent (341) of these fatalities." A footnote stated that "These fatalities included fatalities due to burns and/or impact injuries, but not due to asphyxiation."

A further conclusion from NHTSA's study of crash statistics was:

> Based on the methodology used in this analysis, we estimate that 309 burn-related trauma fatalities occurred in 1995 in the United States. Further, based on the distribution of burn-related trauma fatalities, about 143 (46 percent) of these would have occurred in rear impact crashes.
>
> A thorough review of the crash conditions in the rear impact cases revealed a consistent crash and fire scenario. According to the study, "[i]n all 16 rear impact cases the vehicle [was] struck in the rear causing loss of fuel from the tank area which ignites during impact and results in a rapidly spreading fire and resulting fatalities." The study concluded that striking a stationary vehicle at 50-55 mph with a moving deformable barrier (MDB) at a 70 percent overlap (width of vehicle engagement) would provide a reasonable crash simulation of real world rear impact fatal burn cases.[9]

Fatal crashes with fire involving light trucks have gone down dramatically from 1979 to 2000.[10] This reduction occurred as most light truck manufacturers were moving their fuel tanks to better protected locations, inboard ahead of the rear axle.

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[7] National Highway Traffic Safety Administration, *Preliminary Regulatory Evaluation,* FMVSS No. 301 Upgrade, Office of Regulatory Analysis of the Office of Plans and Policy, November 2000.

[8] *Federal Register*, Volume 68, pp. 67068-86, Final Rule: Fuel Systems Integrity, Federal Motor Vehicle Safety Standard 301, December 1, 2003.

[9] *Federal Register*, Volume 65, pp. 67693-67707, 2000, Notice of Proposed Rulemaking, Fuel System Integrity, Federal Motor Vehicle Safety Standard 301, November 13, 2000.

[10] Digges, Kennerly H., R. Rhoads Stephenson and Paul G. Bedewi, *Fire Safety Performance of Motor Vehicles in Crashes*, Motor Vehicle Fire Research Institute (MVFRI), International Technical Conference on the Enhanced Safety of Vehicles, Paper Number 422, Nagoya, Japan: May 2003. This paper stated: "For the year 2001, there were a total of 1,657 fatal crashes in which there was a fire. This is about 2.9% of all fatal crashes. Analysis of FARS data indicates that the fire rates in cars has dropped by 43.7% and LTVs (pick-ups, vans and SUVs) by 59.7% since the 1979. In 2000, the fire rate for passenger cars was 5.14 fires/million vehicle years, compared to 6.39 for light trucks."

These statistics indicate that death due to fire burns is a rare event in the roughly 40,000 fatal crashes. Fire is also relatively rare in the hundreds of thousands of injury crashes, and the millions of property damage crashes that have occurred each year in the U.S. However, when they occur, they are often from rear impacts to vehicles in which fuel is lost from the tank area and ignites.

Fundamental Principles of Vehicle Crash Safety

In 1952, Hugh DeHaven[11] set forth the basic principles of vehicle crash safety. These principles have been the basis of all industry and government crashworthiness research and practice since that time: a kind of *Newton's Laws* of automotive crash protection. DeHaven quaintly described these principles using the analogy of the principles used by a packaging engineer – the principles used to protect valuable, fragile objects from damage during shipment.[12] In his words, these principles can be summarized as follows:

1. . . . the package [i.e. the vehicle body or a fuel tank] should not open up and spill its contents and should not collapse under expected conditions of force and thereby expose objects [occupants] inside it to damage.
2. . . . packaging structures which shield the inner container [occupant compartment] must not be made of brittle or frail materials; they should resist force by yielding and absorbing energy applied to the outer container [vehicle body] so as to cushion and distribute impact forces and thereby protect the inner container [the occupant compartment and fuel tank].
3. . . . articles [occupants] contained in the package [vehicle] should be held and immobilized inside the outer structure by what packaging engineers call interior packaging [in the case of vehicles, safety belts and air bags hold the occupants].

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[11] DeHaven, Hugh: *Accident Survival – Airplane and Passenger Car*, Society of Automotive Engineers Annual Meeting; Detroit, Michigan: January 14-18, 1952. DeHaven founded the Crash Injury Research project at the Cornell University Medical College, which became part of the Cornell Aeronautical Laboratory. This organization carried out much of the earliest independent research into automotive crashworthiness in the 1940s and later that provided a basis for major NHTSA research and standards. He developed the basic principles for modern crash investigation as are used by NHTSA. The importance of this paper was emphasized when it was included in the book, Haddon W, Suchman EA, Klein D. *Accident research: methods and approaches,* New York, NY: Harper & Row, 1964. Haddon became the first Director of the National Highway Safety Bureau which later became NHTSA.

[12] The packaging routinely found protecting new televisions, computers and other electronic equipment typically reflects these principles.

4. . . . means for holding an object [occupant] inside a shipping container [occupant compartment] must transmit the forces applied to the container to the strongest parts of the contained objects [occupants].

These principles have been the basis for both the Federal motor vehicle safety standards and for safe vehicle design since at least the late 1960s. These principles apply not only to vehicle occupants; they apply to anything that is vulnerable or potentially hazardous in a vehicle, such as its fuel, as well.

The vehicles involved in this crash mostly reflect an application of these principles. None of the occupants was ejected in the crash and there was not excessive intrusion into the occupied parts of the occupant compartments of any of them (the first principle). There was apparently adequate padding in the interiors of all vehicles and their crush zones (areas between the outer surfaces of the vehicle and the occupant compartment) absorbed the crash energy (the second principle). The occupants of all vehicles were apparently restrained so that they were effectively immobilized within the vehicles at the time of a collision (the third and fourth principles).

The crush zones at the front and rear of these vehicles functioned by collapsing in a controlled manner in response to the crash forces to cushion the occupant compartments from the full force of the impacts. For the Jeep, the rear crush zone is from its rear bumper forward to the back of the rear seat. This part of the vehicle in fact crushed extensively as did the front of the Toyota, and probably helped to protect Ms. Kline from serious *impact* injuries.

The first packaging principle also applies to other vulnerable parts of the vehicle that need to be protected in a crash. In particular, the fuel tank is an "inner container" that holds a potentially highly dangerous fluid (gasoline) that must be protected by its packaging. The gas tank "should not open up and spill its contents and should not collapse under expected conditions of force and thereby expose objects [gasoline] inside it to damage [spillage and ignition]."

Defective Design of the 1996 Jeep Grand Cherokee Fuel System

The fundamental defect in the Jeep is the location of the gas tank in the rear crush zone. A secondary defect is the specific design of the tank, its filler assembly, and the structure surrounding them that made the fuel containment system vulnerable to collapse and to opening up and spilling the contents of the tank (highly flammable gasoline).

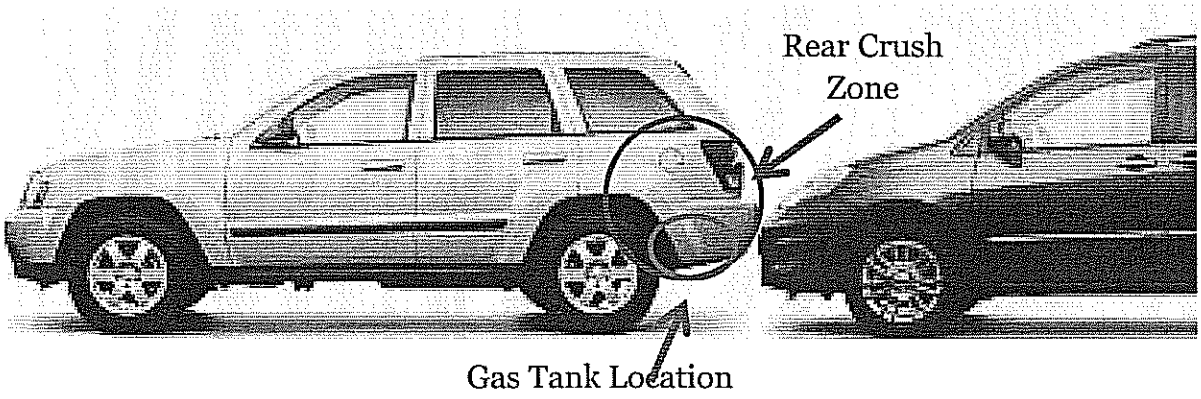

Figure 1. Location of the fuel tank of the Jeep Grand Cherokee (vehicle shown is a later model that is similar to the 1996 Jeep) in relation to the rear impact crush zone and a striking minivan.

The Jeep gas tank is in the rear crush zone of this vehicle (Figure 1) where it is highly vulnerable to collapse under conditions of force in a common rear crash such as this one. The DeHaven principles, which are well known to all properly trained automotive safety professionals, were articulated decades before the Jeep Grand Cherokee was designed, and should have been fully understood by the engineers responsible for designing and testing the Jeep.

When a senior Chrysler engineer was asked about the justification for its fuel tank location, he responded – perhaps ironically – that ". . . the engineers are there to make sure that regardless of where in the end the tank is located *for packaging reason*, for other reason, it would provide adequate safety to the occupant of the car. [emphasis added]"[13] A competent engineer or packaging specialist would not locate the gasoline tank in such a vulnerable location without providing substantially greater protection around it. The design of other SUVs such as the Ford Explorer, which has its gas tank located ahead of the rear axle, shows that it was not necessary to located the gas tank behind the rear axle. Furthermore, in its 2005 model year redesign of the Grand Cherokee, which did not significantly change its overall size or packaging, the fuel tank was placed ahead of the rear axle, under the rear seat.

The Jeep fuel tank is exposed below the bumper to potential impact damage if a striking vehicle underrides the Jeep. Underride, such as occurred in this crash, is common when the rear of a utility vehicle is struck by a passenger vehicle. Further compromising the design of this fuel system, the filler neck is

[13] Deposition of Chrysler engineer Francois Castaing, June 14, 2011, p. 79.

vulnerable to various types of distortion in this crush zone that can shear its connection to the tank or disconnect it from its filler cap assembly.

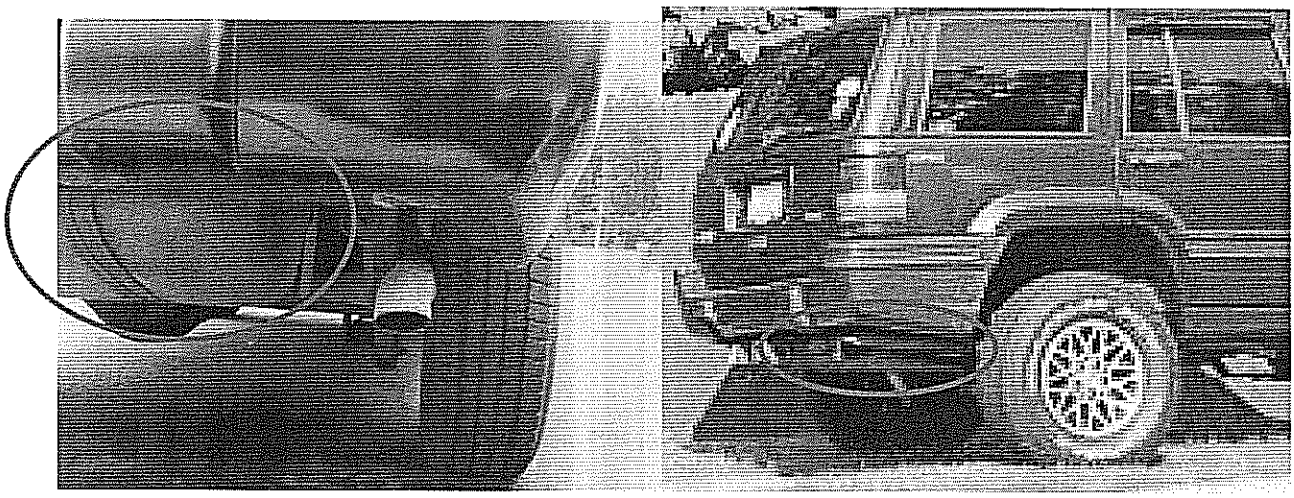

Figure 2. The 1996 Jeep Grand Cherokee fuel tank hangs in an exposed position below the rear bumper which is mounted above the level required for passenger cars.

The Jeep fuel filler neck is routed through the rear frame rail at a point adjacent to its attachment to the fuel tank. In a rear impact to the Jeep, a force on this frame rail is likely to cause a failure (bending) at a weak point such as where the rail has a large hole. This routing makes the fuel filler vulnerable to failure that would open the fuel system and permit the contents of the fuel tank to easily pour out. That failure mode was demonstrated in one of the crash tests in which a section of the tank itself was pulled out by its filler neck. In this test, the collapse of the tank then forced fuel out in a spray that was obvious in the video recorded at the time.

The Jeep has a crush zone that was available (whether consciously designed for this purpose or not) to absorb the energy of a collision in a rear impact. Thus, the space in which the gas tank was located would necessarily be compromised as this part of the vehicle functions as a crush zone. The rear of the Jeeps in the Kline crash and in three recent rear crash tests did fulfill their function as a crush zone. In the Kline crash, the part of the vehicle below the belt line and between the bumper and rear axle was compressed against the rear of the occupant compartment – completely collapsing the space in which the gas tank was located. A similar compromise of this space occurred in the three crash tests discussed below.

In another crash test, the underriding Taurus contacted the tank, which protrudes below the rear bumper, and caused cracks that permitted the fuel to

leak out. Although Jeep offered an optional metal shield to partly protect the tank from direct contact with a striking vehicle, the Kline Jeep was not equipped with such a shield. A shield was later made standard equipment on Jeep Grand Cherokees that had rear mounted gas tanks. It should be noted, however, that the shield would not have protected the fuel supply system from either a failure of the filler neck or from compression of the tank from a rear impact. It should be noted as well that the rear bumper of the Jeep is higher than the front bumpers of passenger cars because this vehicle is not required to meet the requirements of the Federal bumper standard (see Figure 4 below)[14] which increases the likelihood of underride in a rear collision.

Had the gas tank of this vehicle been placed ahead of the rear axle, and had reasonable measures taken in the vehicle design such as to ensure that the filler assembly was not vulnerable to impact damage, it is highly unlikely that a significant failure of the fuel system would have occurred in a collision of this severity. Although there was some damage to the structure ahead of the rear axle in this crash, a tank located in this area would not have been vulnerability to direct puncture by the striking vehicle or to serious compression.[15] It is even possible to protect a fuel tank mounted behind the rear axle from rear crash failure, but it requires advanced structural and other design features – which the Jeep did not have – to do so.

Since the autopsy of Ms. Kline indicated that the cause of death was smoke inhalation and thermal injuries (burns), it is likely that she would have survived this crash with only moderate injuries had there been no massive fuel leakage leading to a fire that rapidly consumed the Jeep's occupant compartment. Rear crashes are nearly always survivable, particularly for restrained occupants, in the absence of fire or ejection from the vehicle.

Evidence from Crash Tests

According to engineers involved in the development of the Grand Cherokee, only two rear impact tests were conducted of this vehicle: one to a prototype and one to a vehicle with a somewhat different design than the 1996 model. The tests that they performed were specified in Federal motor vehicle safety standard 301 before it was amended.[16] That test uses a moving, non-deformable 4,000 pound flat barrier to strike the rear of a test vehicle at 30 mph. This barrier cannot

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[14] 49 C.F.R. §581, Bumper Standard.

[15] Beginning with the 2005 model year, the Jeep Grand Cherokee was finally redesigned to place the fuel tank ahead of the rear axle, under the rear seat.

[16] 49 C.F.R. 571.301.

underride the rear of the vehicle. It is obvious that the designers of the Jeep were somewhat concerned that it comply with the Federal standard, but that they did not seriously consider whether their new vehicle might be vulnerable to failure in a more realistic crash typical of what regularly occurs on public roads.

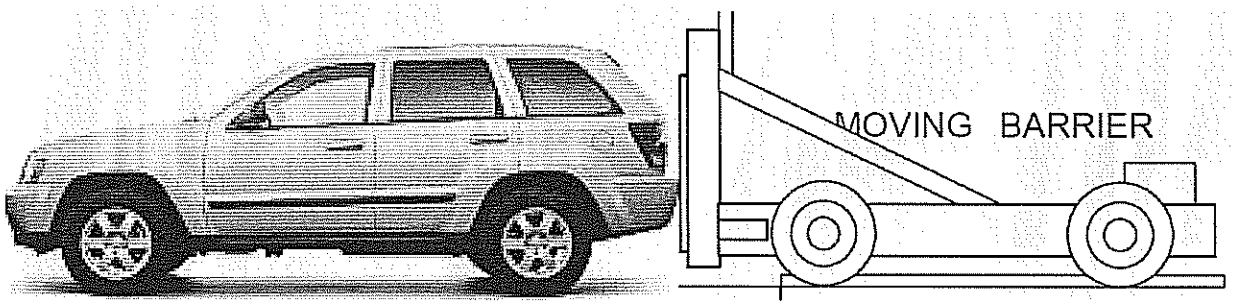

Figure 3. Diagram of FMVSS 301 (old) moving barrier impact test that was used by Chrysler to certify compliance with FMVSS 301 of its 1996 model vehicles.

Since the weight of the moving barrier is only slightly greater than the Jeep, the change in velocity of the Jeep in this test is less than 20 mph. The test specified in this standard has since been upgraded. It now specifies that a 3015 pound deformable barrier, shaped approximately like a passenger vehicle, strike the test vehicle with a 70% overlap between the barrier and the vehicle at a speed of 50 mph. This test is more severe because it focuses the crash force in a manner more typical of a passenger vehicle impact, and because crash energy, which increases with the square of the speed, is more than twice as great in the new test.

Recently, three rear impact tests have been conducted on first generation Grand Cherokees (1993-1997 models). In all of these tests, the rear of the Jeep was struck by an older Ford Taurus. The tests were all conducted at a 30 percent offset on the left corner of the Jeep (that is, the centerline of the Taurus was offset an amount that is approximately 30 percent of the width of the Jeep from its centerline so that the crash force focused on the left rear of the Jeep).

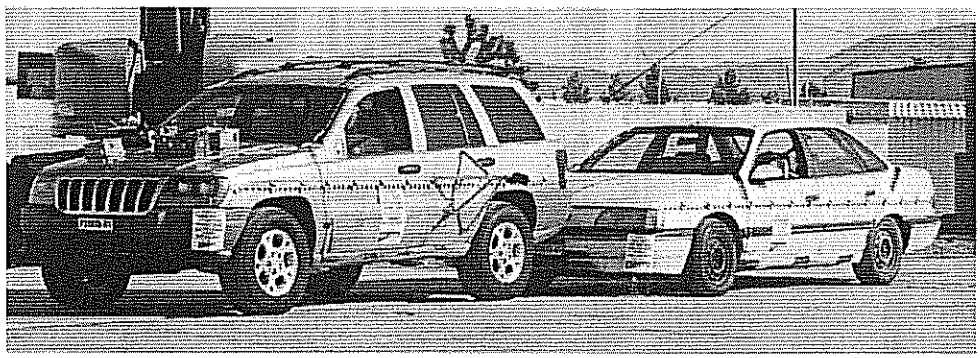

Figure 4. Test setup at Karco for offset 50 mph rear impact test.

Following is a description of the purpose and outcome of each of the tests.

1. *FHWA 50 mph test.*[17] While it was not the purpose of this test to determine the Jeep's fuel system integrity, it is noteworthy that the Jeep's fuel tank system ruptured and much of the Stoddard fluid in the tank (a non-flammable gasoline substitute) sprayed out during the impact. Subsequent investigation showed that a plastic plate that was "welded" into the side of the plastic fuel tank, and that carried the filler neck and a second pipe, had pulled completely free of the tank leaving a hole of roughly ten square inches in the side of the tank.

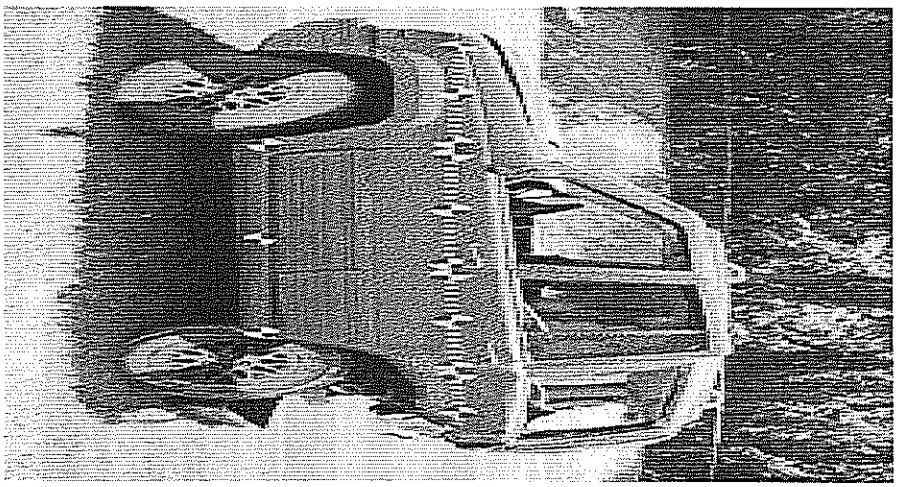

Figure 5. 1996 Jeep Grand Cherokee after Ford Taurus rear impact at FOIL.

2. *Karco 50 mph test.*[18] According to Karco, "This 80.5 km/h [50 mph] 30% offset rear impact test was conducted to examine the fuel system integrity of the subject target vehicle, a 1999 Jeep Grand Cherokee Limited 5-door MPV, when impacted by a target vehicle, a 1987 Ford Taurus 4-door sedan, under conditions similar to those of [the amended] FMVSS 301." This test was also similar to the first test (at FOIL, described above) except that the 1999 model's fuel system had been somewhat redesigned. The fuel filler

[17] A 50 mph rear impact test conducted as an "Experimental Test of Occupant Entrapment" for the Federal Highway Administration at the Federal Outdoor Impact Laboratory (FOIL) on July 1, 2010.

[18] Karco Engineering, LLC: *50 mph Vehicle to Vehicle 30% Offset Rear Impact*, 1999 Jeep Grand Cherokee Laredo 1987 Ford Taurus, prepared for the Center for Auto Safety: Adelanto, CA: May 31, 2011.

was no longer routed through the frame rail and its attachment to the tank was redesigned. The Karco report stated, "The target vehicle had no Stoddard solvent leakage immediately after the impact event. After the impact test, the vehicle was placed on a rollover spit to perform an FMVSS 301 style rollover. At the 90° position of the rollover the Stoddard solvent began to leak out of the fuel tank and the rollover was stopped. All of the Stoddard solvent that was present in the tank leaked from the fuel tank at the 90° position." Investigation of the vehicle showed that the filler neck had pulled out of the left rear fender filler cap assembly leaving it open. The reason fuel had not escaped during the crash test is that a valve in the fuel tank designed to prevent backflow when the filler cap is removed had temporarily sealed the tank. However, when the vehicle was rolled 90°, this valve opened, permitting the fluid to flow freely from the tank.

Figure 6. 1999 Jeep Grand Cherokee after 40 mph rear impact by a Taurus at Karco.

3. Karco 40 mph test.[19] According to Karco Engineering, LLC, which conducted the test, "This 40 mph (64.4 km/h) 30% offset rear impact test was conducted to examine the fuel system integrity of the subject target vehicle, a 1996 Jeep Grand Cherokee Limited 5-door MPV, when impacted by a target vehicle, a 1988 Ford Taurus 4-door sedan, under conditions similar to those of FMVSS 301." In this test, "The Target Vehicle had

[19] Karco Engineering, LLC, *40 mph Vehicle to Vehicle 30% Offset Rear Impact, 1996 Jeep Grand Cherokee Laredo 1988 Ford Taurus, prepared for the Center for Auto Safety: Adelanto, CA: June 7, 2011.*

immediate Stoddard solvent leakage as a result of the impact with the bullet vehicle. Solvent leaked out from two (2) locations on the fuel tank, both of them were cracks formed on what was the bottom of the fuel tank. All of the Stoddard solvent leaked from the fuel tank from these two (2) locations after the impact, with only trace amounts remaining in the tank."

Figure 7. 1996 Jeep Grand Cherokee after a 40 mph rear impact by a Ford Taurus.

These tests demonstrated three different failure modes of the 1993-2004 Jeep Grand Cherokee fuel system that can recur in rear impacts.

These tests were not designed to emulate the conditions of the Kline crash, and their purpose is not to show how the fire occurred in that vehicle. Rather they are cited to show the defects in the Jeep fuel system and its general vulnerability to serious loss of integrity when another vehicle collides with the rear of the Jeep that could result in major fuel spillage and a fire.

By comparison, two rear impact tests were conducted at FOIL in which a Ford Taurus struck the rear of a Ford Explorer SUV at 70 mph.[20] One of the tests was a 30° offset and one was a full engagement test. A 70 mph test involves

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[20] National Crash Analysis Center, *Experimental Test Of Occupant Entrapment Ford Taurus Into Rear Of Ford Explorer,* 30% Offset, 70 MPH, Federal Highway Administration Federal Outdoor Impact Laboratory; Test Date: August 3, 2010, Fairbank, VA: September 25, 2010. National Crash Analysis Center, *Experimental Test of Occupant Entrapment*, Ford Taurus into Rear of Ford Explorer at 70 MPH, Federal Outdoor Impact Laboratory, Test Date: September 28, 2010, Fairbank, VA: September 30, 2010

approximately twice the energy of a 50 mph test since kinetic energy is proportional to the square of speed.

The Explorer fuel tank is located under the rear seat of this vehicle. In neither of these tests was the integrity of the Explorer fuel system violated. One might assume that Ford learned, the hard way, about the vulnerability of fuel tanks with the Ford Pinto fuel tank defect. The fuel tank in the Pinto was located behind the rear axle, and in a rear impact it could be punctured as it was pushed into the ends of bolts of the rear suspension. Bad publicity from this defect recall has been blamed for the end of production of the Pinto.

Federal Requirements

This vehicle was certified as being in compliance with all Federal motor vehicle safety standards applicable at the time it was built. This certification is questionable in that Chrysler could produce no test results or other analysis indicating that the specific design of the 1996 Grand Cherokee complied with FMVSS 301 (as tested by a 30 mph flat barrier rear impact).

Regardless of whether it complies, the National Traffic and Motor Vehicle Safety Act specifically states:

> (e) COMMON LAW LIABILITY.—Compliance with a motor vehicle safety standard prescribed under this chapter does not exempt a person from liability at common law.

This means that a claim that a vehicle meets all Federal motor vehicle safety standards does not excuse a manufacturer from the responsibility to make safe vehicles. While compliance with the standards is a necessary condition for selling vehicles to the public under the law, it is not a sufficient one.

Value of Life

In 2009, a Department of Transportation memorandum stated: "Treatment of the Economic Value of a Statistical Life in Departmental Analysis . . . is now . . . $6 million, based on the Wages and Salaries component of the Employment Cost Index, in constant dollars, and the Consumer Price Index (CPI-U)."[21] This number is used by the Department in its analyses of regulations designed to reduce the loss of life.

Summary

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[21] Szabat, Joel and Lindy Knapp: *Treatment of the Economic Value of a Statistical Life in Departmental Analyses – 2009 Annual Revision, Office of the Secretary of Transportation, Washington, D.C.; March 18, 2009.*

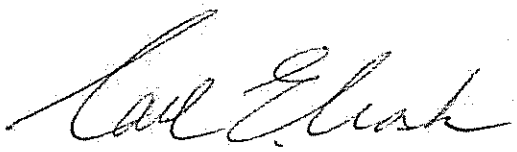
It is a serious violation of the DeHaven principles to locate a vulnerable component of a vehicle in a position where it is exposed to crash forces that can cause it to "open up and spill its contents and [it] should not collapse under expected conditions of force . . . ." This major defect resulted in a fatal fire in what would otherwise have been an unfortunate, but easily survivable crash.

While it is not advisable to locate the fuel tank of a vehicle in the rear crush zone, it may be feasible to do so if measures are taken to protect the tank from direct or indirect intrusion or crushing in the event of a rear impact. In the case of the 1996 Jeep Grand Cherokee the design did not anticipate the consequences of a typical rear impact crash and did not provide adequate protection for the fuel tank or its filler hose. Furthermore, Chrysler Corporation did no testing that would have demonstrated whether its design would have provided adequate protection and fire safety in easily foreseeable crashes on public roads.

The consequence of the defective design of the Jeep fuel system was the horrific burning death of Susan Morris Kline.

This report may be revised and/or expanded if and when further information becomes available to me or in response to the opinion of other experts.

Sincerely,



Carl E. Nash, Ph.D.

Attachments:

1. Resume of Carl E. Nash, Ph.D.
2. New Jersey Police Crash Investigation Report #B080 2007 00445A: February 24, 2007.
3. Fonseca, Carlos A.,, M.D., Report of the Autopsy on Susan V. Morris, Office of County Medical Examiner, County of Morris, Morristown, New Jersey: October 22, 2008.
4. Zbar, Ross I.S., MD, FACS, Report to Angel DeFilippo Re: Susan Morris, concerning the death of Ms. Morris following a motor vehicle crash.
5. Phillips, Donald R., PE, Supplemental Report to Angel M DeFilippo, Esq. concerning the crash of a 1996 Jeep Grand Cherokee resulting in the death of Susan Morris Kline: Lansdale, PA: July 25, 2011.
6. National Highway Traffic Safety Administration, Preliminary Regulatory Evaluation, FMVSS No. 301 Upgrade, Office of Regulatory Analysis of the Office of Plans and Policy, November 2000.
7. *Federal Register*, Volume 68, pp. 67068-86: Fuel Systems Integrity, Federal Motor Vehicle Safety Standard 301, Final Rule, December 1, 2003.
8. *Federal Register*, Volume 65, pp. 67693-67707, Notice of Proposed Rulemaking, Fuel System Integrity, Federal Motor Vehicle Safety Standard 301, November 13, 2000.
9. DeHaven, Hugh: Accident Survival – Airplane and Passenger Car, Society of Automotive Engineers Annual Meeting; Detroit, Michigan: January 14-18, 1952.
10. A 50 mph rear impact test conducted as an "Experimental Test of Occupant Entrapment" for the Federal Highway Administration at the Federal Outdoor Impact Laboratory (FOIL) on July 1, 2010.
11. Karco Engineering, LLC: 50 mph Vehicle to Vehicle 30% Offset Rear Impact, 1999 Jeep Grand Cherokee Laredo 1987 Ford Taurus, prepared for the Center for Auto Safety: Adelanto, CA: May 31, 2011.
12. Karco Engineering, LLC, 40 mph Vehicle to Vehicle 30% Offset Rear Impact, 1996 Jeep Grand Cherokee Laredo 1988 Ford Taurus, prepared for the Center for Auto Safety: Adelanto, CA: June 7, 2011.
13. National Crash Analysis Center, Experimental Test Of Occupant Entrapment Ford Taurus Into Rear Of Ford Explorer, 30% Offset, 70 MPH, Federal Highway Administration Federal Outdoor Impact Laboratory; Test Date: August 3, 2010, Fairbank, VA: September 25, 2010. National Crash Analysis Center, Experimental Test of Occupant Entrapment, Ford Taurus into Rear of Ford Explorer at 70 MPH, Federal Outdoor Impact Laboratory, Test Date: September 28, 2010, Fairbank, VA: September 30, 2010

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Carl E. Nash, Ph.D.

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Dr. Nash has worked in the field of automotive safety for more than thirty years. After earning his doctorate, he became a public interest auto safety advocate. He was a Senior Executive with the National Highway Traffic Safety Administration for 16 years, directing programs in safety standards engineering, crash investigation, and evaluation. He has conducted research and published in the field, and has taught graduate courses in motor vehicle safety.

Dr. Nash has substantial experience in crash investigation and analysis from (1) his government experience where he directed the development of training and quality programs for the National Accident Sampling System, (2) teaching courses in crash investigation, modeling and data analysis at the George Washington University, and (3) the detailed reconstruction of dozens of crashes. He has written extensively on how injuries occur in rollover crashes.

He has worked on issues of vehicle handling, structural performance, restraints, energy absorption, and the economics of motor vehicle safety, regulation, and has conducted statistical analysis of motor vehicle crash data.

EXPERIENCE

1999-2004 Founder, Partner, and Consultant Xprts, LLC

- President and Technical Director, Xprts, LLC, an automotive crash forensics group.
- Conducts systems analyses of motor vehicle crashes, advises attorneys and testifies as an expert witness in product liability cases involving crashworthiness, restraints, and other aspects of motor vehicle safety.

1996-ongoing Consultant and Writer

- Provides research, consulting and drafting services to organizations such as the Union of Concerned Scientists and the Center for Auto Safety
- Prepares and delivers research papers at scientific meetings on motor vehicle safety and other professional meetings
- Participates substantively in Federal rulemaking and other matters before the National Highway Traffic Safety Administration

1996-ongoing Adjunct Professor of Engineering, National Crash Analysis Center, The George Washington University

- Taught the introductory graduate courses in motor vehicle safety to incoming engineers
- Taught crash investigation and documentation, crash data analysis, and modeling
- Participated in discussions and reviews of research and research programs ongoing at the Center and on its education programs
- Directed the research of graduate students pursuing advanced degrees in engineering

1992-1995 Director, Office of Strategic Planning and Evaluation National Highway Traffic Safety Administration (NHTSA)

- Initiated, designed and directed an innovative strategic planning program for the agency's goals and objectives, technological progress, institutional relations, and management. Directed the agency's participation in the National Performance Review and drafted its plan for streamlining organization and management.
- Directed major evaluations of key programs including the highway safety program, automatic occupant crash protection, anti-lock brakes, and the New Car Assessment Program. These evaluations are the basis for amending and improving existing regulations and programs. Drafted NHTSA's five-year evaluation plan.

1990-1991 Director, Office of Budget, Planning, and Policy Development, NHTSA

- Designed basic plans guiding NHTSA's activities including its Priority Plan and the Department's Heavy Truck Safety Plan. Assisted in drafting legislation and devising a legislative strategy for the agency's major reauthorization in the Intermodal Surface Transportation Efficiency Act of 1991. Advised on regional reorganization.
- Directed research on classification of impairment from injury, costs of trauma, and program benefit assessment. Prepared a major study for the Office of Management and Budget that showed the benefits of NHTSA's activities far exceeded their costs.
- Directed NHTSA's budget preparation and justification before OMB and Congress, prepared Congressional testimony and responses, oversaw budget implementation.

1983-1989 Chief, Accident Investigation Division, National Center for Statistics and Analysis

- Managed the $8 million, 180-person field data collection program of the National Accident Sampling System that had 50 Primary Sampling Units and four Zone Centers providing quality control, technical assistance, training, and other support.
- Managed the $3.5 million Fatal Accident Reporting System: 100 field staff, major quality and training programs, and advanced communications and data systems.
- Conducted special crash investigations; directed research on investigation and data collection; automated data processing for data base assembly and analysis; and developed classification and codification systems for crash and trauma data.

1980-1982 Deputy Associate Administrator for Rulemaking and Director, Engineering Systems Staff, NHTSA

- Managed a staff of 50 engineers, scientists, and economists and a $1 million budget. Supervised development of motor vehicle safety standards, fuel economy standards, and consumer information programs. Conducted research into alternative means of stimulating motor vehicle safety improvement. Provided engineering services.

1977-1979 Policy Advisor to the Administrator, NHTSA

- Reviewed and critiqued the development and implementation of NHTSA's policies, programs, and budgets; conducted special investigations; analyzed technical issues facing the agency; and prepared reports on key issues facing the Administrator.

- Represented the Administrator in policy meetings with other agencies and governments, Congressional staff, the press, industry, and private groups; chaired task forces on automatic restraints, fuel systems, and human surrogate research.

1975-1977 Professional Staff, Office of Technology Assessment, U.S. Congress

- Conducted transportation policy studies on issues before the Congress. Developed and initiated OTA assessment of automotive transportation through the year 2000.

1975 Expert Consultant, Federal Housing Administration

- Planned and organized the Office of Mobile Home Standards; prepared budget and staffing plans; developed standards and enforcement programs; defined and initiated a research agenda; and represented the Commissioner in meetings with state regulators, manufacturers, trade associations, standards organizations, and the press.

1971-1974 Professional Staff, Public Interest Research Group

- Critiqued Federal policies and programs in traffic and motor vehicle safety, identified key issues, developed and advocated alternative programs and strategies, testified before Congress, prepared reports and press releases.

EDUCATION

Ph.D., theoretical physics, University of North Carolina at Chapel Hill, 1971

B.A., physics, San Jose State College, 1964

The followings are a few of the short courses and seminars completed:

- The Attorney General's seminar on negotiation led by Herb Cohen (author of "You Can Negotiate Anything")
- Senior Managers in Government, the Kennedy School, Harvard University
- "Japanese Methods for Management of Productivity and Quality," by Dr. W. Edwards Deming

PROFESSIONAL AFFILIATIONS

Editorial Board, *Accident Analysis and Prevention* 1996-2001

Association for the Advancement of Automotive Medicine

American Society for Testing and Materials (formerly a member of Committee E-36 that wrote standards for certification of testing laboratories)

Senior Executives Association

Treasurer, *The Theater Chamber Players* 1994-2004

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J. C. Fell and Carl E. Nash, "The Nature of the Alcohol Problem in U.S. Fatal Crashes", *Health Education Quarterly* Vol. 16(3), Fall 1989, p. 335-343.

Nash, Carl E., "Occupant Restraint Policy in the U.S.", *Proceedings of the First Bag and Belt Symposium,* Cologne: 1990.

Nash, Carl E., "Air Bags are Everywhere: How are they Doing?", *Proceedings of the Second Bag and Belt Symposium,* Cologne: 1992.

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Nash, Carl E., "Life and Love: Bags and Belts in America", *3rd International Symposium on Automotive Occupant Restraint Systems,* Cologne: 1994

Nash, Carl E., "Crash Aftermath Must be Addressed (letter to the editor)", *Automotive News,* June 3, 1996.

Nash, Carl E., "Higher Speeds Require Smart Cars and Roads", *Automotive News*, July 29, 1996.

Nash, Carl E., "The Next Automotive Revolution", *Conference on Policies for Fostering Sustainable Transportation Technologies,* Asilomar, Pacific Grove: 1997.

Nash, Carl E., "A Virtually Exact Calculation of Safety Belt Effectiveness", *16th International Technical Conference on the Enhanced Safety of Vehicles,* p.1360, Windsor: 1998.

Nash, Carl E., "Bags and Belts for the 21st Century", *5th International Akzo Nobel Symposium on Automotive Occupant Restraint Systems,* Cologne: 1998.

Nash, Carl E., "Must We Rollover and Die", *6th International Symposium on Automotive Restraint Systems,* Cologne: 2000.

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Recent Rulemaking Comments and Petitions to NHTSA

- Petition for a defect investigation into the center safety belts of Ford Ranger trucks (2000)
- Petition for action on safety belt use inducements and a follow up request for reconsideration (2000, with Donald Friedman)
- Various Comments on Roof Crush (NHTSA Docket 1999-5722, 2001-2003, some with Donald Friedman and Clarence Ditlow)
- Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, December 4, 2001.
- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, January 31, 2002.
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- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, December 24, 2002.
- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, January 20, 2003.
- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, April 28, 2003.
- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, October13, 2003.
- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, October 17, 2003.
- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, January 7, 2004.
- Petition for a defect investigation into sudden acceleration of 1996-1997 Chevrolet Cavaliers (2003, with Donald Friedman)
- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, April 7, 2004.
- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, April 16, 2004.
- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, April 23, 2004.

- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, July 12, 2004.
- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, September 3, 2004.
- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, September 20, 2004.
- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, October 25, 2004.
- Supplemental Comments to Docket No. 1999-5572, Notice 2; FMVSS 216; Roof Crush Resistance Protection, NHTSA Submission, December 8, 2004.
- Comment to Docket 2005-22143, Notice 1; FMVSS 216; Roof Crush Resistance Protection, Center for Auto Safety, NHTSA Submission, November 11, 2005.

ACCIDENT SURVIVAL - AIRPLANE AND PASSENGER CAR

By

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(For Presentation at the SAE Symposium on Packaging the Passenger)

Written Discussion of This Paper Will Be Accepted
At SAE Headquarters Until March 1, 1952

For presentation at the
SAE ANNUAL MEETING
Hotel Book-Cadillac, Detroit, Michigan
January 14-18, 1952

SOCIETY of AUTOMOTIVE ENGINEERS, Inc., 29 West 39th Street, New York 18, N. Y.

During the last ten years a notable increase of safety has evolved in the design of small airplanes through use of protective structures to prevent injury of pilots and passengers in accidents. Efforts to increase "crashworthiness" or "crash safety" by the improvement of details of aircraft and automobiles are not new. In the automotive field shatterproof glass, turret tops and other details of design worked out by automobile engineers have saved thousands of lives and spared enormous numbers of injuries. But what has developed in small planes has gone far beyond improvement of details. In six of the newest small planes built in this country crash safety has been increased not only by the improvement of details but by use of the configuration and engineering of the whole airplane structure. I for one, believe that at least one of these specially designed planes normally will prevent serious injury of pilots in run-of-the-mill vertical impact crashes at 60 miles an hour. In the other five small planes similar principles have been applied whereby danger of injury in crackups will be offset to a very important degree. As the principles used in these developments are closely related to the principles used by packaging engineers for increasing the protection and safety of valuable goods in transit, and, as these developments are of interest to laymen as well as engineers, I shall discuss these current developments in accordance with the relatively simple concepts used by packaging engineers.

In the first bi-planes built by the Wright Brothers and early airplanes built by Glenn Curtis, pilots had virtually no protection in an accident. You remember that in most of the early machines the propeller was at the back and pushed the airplane through the air. The pilot sat in front - ahead of the engine and wings. As a result, in any accident which caused material damage of forward structures, the pilot was tremendously exposed to injury.

Fortunately, tractor types soon were found to be more efficient than pusher types - and many pilots lived to be thankful for the major increase of safety which resulted simply from putting the engine in the nose of the plane instead of the pilot. This change in design which increased the crash safety of airplanes was a happenstance rather than a deliberate engineering effort to alter a common cause of needless and excessive injuries in moderate accidents.

During the long period between World War I and World War II, almost no deliberate engineering consideration was given to crashworthiness as a safety factor in aircraft design. Early in World War II, however, study of human survival in falls from heights of a hundred or more feet, and research on the nature and cause of injuries in aircraft accidents, showed that human structure, if properly protected, could tolerate extremely severe conditions of crash force. As a result, during the last ten years there has been a slow but steady increase in the deliberate use of aircraft configuration as well as in the design, engineering and arrangement of basic structures and cabin installations to protect pilots and passengers in accidents.

A good many of the developments now being used to increase crash safety in aviation should be useful to cut the rate of crash-injuries in passenger cars. In order to judge the potential value of engineering efforts to cut causes of injury in the automotive field, we should consider what a packaging engineer probably would call "the spoilage and damage of people in transit" as represented by deaths and injuries in passenger cars last year. Despite everything that has been done to prevent accidents, a total of 35,000 people were killed in motor vehicle accidents in 1950; this includes pedestrians as well as people killed in busses, taxis, trucks, etc. Of the 35,000 killed, the National Safety Council estimates that 17,600 were killed in passenger cars alone. In addition to the 17,600 persons killed, approximately 685,000 persons sustained crash-injuries in passenger automobiles. The National Safety Council estimates that the total cost of crash-injuries in all motor vehicles last year ran close to $1,850,000,000 and proportional estimated cost of persons killed and injured in passenger cars last year ran close to one billion, one hundred million dollars for medical payments, insurance costs and the value of services lost to the nation.

Some of the 17,600 persons killed and 685,000 persons injured sustained their injuries in passenger car accidents which were so severe that no reasonable alteration of automobile structures would have modified the seriousness of injuries. However, according to studies by the Crash Injury Research Division of the Indiana State Police, only 16% of fatal passenger car accidents in rural districts of Indiana were so hopelessly severe as to justify classification as "non-survivable;" 18% were sufficiently severe to make such classification debatable. 66% of the fatal Indiana accidents in rural districts where speeds usually are high were classed by experienced accident investigators as survivable. In many of the fatal cases, other people in the same car either escaped uninjured or sustained injuries which normally would not endanger their lives. Obviously crash force alone was not the killer.

Further analysis of Indiana State Police data discloses that 21% of the fatal rural accidents occurred at estimated speeds of 30 mph or less; 45% occurred at less than 40 miles per hour. In considering the 66% of fatal cases which the Indiana State Police classed as survivable and the 45% of fatal accidents which occurred at 40 mph or less, we should remember that stunt drivers frequently crash cars head on at 35 mph without any injury. Actually without knowing it, these professional drivers who elect to earn their living by avoiding injury in daily crashes apply practical principles which are used by every packaging engineer to insure a high degree of protection for goods in transit.

The stunt driver, of course, does not design or specially rework the car in order to give himself safety in a 35 mile an hour impact. However, like a packaging engineer who is creating or selecting a package, he calculates predetermined conditions for which the package is suitable. Like dropping a packing case a few inches - he knows that a 10 mph impact test of a passenger car would not be a sensational stunt and would not fully utilize the protective qualities of the structure. Also, he estimates that the structure would not assure protection in a head-on impact at 60 mph. As a result of long experience gained in previous crashes, he estimates that the passenger compartment will remain substantially intact in a 35 mph head-on impact.

In reaching this conclusion a stunt driver fulfills the first principle followed by packaging engineers; this principle states that the package should not open up and spill its contents and should not collapse under expected conditions of force and thereby expose objects inside it to damage.

The second principle is closely related to the first, it states that packaging structures which shield the inner container must not be made of brittle or frail materials; they should resist force by yielding and absorbing energy applied to the outer container so as to cushion and distribute impact forces and thereby protect the inner container. Either by good fortune or good design this second packaging principle is represented in most of the protective structures ahead of and behind passenger compartments in automobiles as well as in small airplanes.

The third principle of good packaging states that articles contained in the package should be held and immobilized inside the outer structure by what packaging engineers call interior packaging. This interior packaging is an extremely important part of the overall design, for it prevents movement and resultant damage from impact against the inside of the package itself. Usually excelsior, paper wadding, padding or blocks are used inside the package to prevent movement of contained units. The stunt driver fulfills this principle by crawling over the front seat and steering the car from this position until just before the head-on impact. At the last instant he ducks behind the front seat and braces his body against the seatback, putting his head in contact with it during the abrupt slowdown of the car. He thereby avoids being thrown against dangerous structures inside the car and simultaneously he takes full advantage of the

deceleration provided by collapse of forward structures. In effect the stunt driver creates for himself the type of protection now being provided for personnel in large military transport planes in which the seats are faced rearward so as to fully support the head and body. Further, while thus protecting himself, the stunt driver is also avoiding dangers combatted by the fourth packaging principle.

This fourth packaging principle says that the wadding, blocks or means for holding an object inside a shipping container must transmit the forces applied to the container to the strongest parts of the contained objects. This principle is not as complicated as it sounds; it simply means that packaging engineers would not ship a valuable piece of furniture inside a crate and try to hold it only by the legs or by an ornament at the top. It would be held in a way that would assure that unusual loads are transmitted to the strongest part of the framework. This principle in effect is used in transmitting crash loads to strong skeletal structures in the body by safety belts in aircraft.

These four basic packaging concepts amount, in fact, to a statement of practicalities, although we do not ordinarily think about them. Most of us, however - even though we are not packaging engineers - apply them to the best of our ability when we pack or ship things. We would not, for example, ship a fragile object loose inside a barrel. Naturally, if an object was fragile and easily damaged, we would endeavor to provide some arrangement to hold it from moving and smashing itself against the inside of the shipping container, either by packing something around it or by supplying some other means of protection.

In spite of the utter simplicity of this basic packaging principle, which we all understand, most of us definitely ignore its importance to our personal safety: we will get into anybody's automobile, go any desired distance at dangerous speeds without safety belts, without shoulder harness and with a very minimum of padding or other protection to prevent our heads from smashing against the inside of the car in an accident. The level of safety which we accept for ourselves, our wives and our children is, therefore, on a par with shipping fragile, valuable objects loose inside a container. The results each year are exceedingly costly to thousands of people who are injured, disfigured or disabled in accidents which, with safer arrangements, should cause no serious injury.

As might be expected, the most frequent types of excessive injury in survivable aircraft and automobile accidents are fractures of the skull, lesions of the brain, smashing of facial bones and other dangerous or disabling injuries of the head. It is difficult for engineers and laymen to fully appreciate the fact that the head weighs as much as a ten pound sludge hammer and packs the same terrific energy when it strikes a dangerous object at 40-50 mph. If the head hits a solid structure which will not dent or yield at such speeds, the head itself must yield; crushing injuries of the skull and brain cannot be avoided. But if the head hits a light ductile surface at such speeds, even a fairly strong metal surface will dent and bend and absorb the energy of the blow, thereby modifying the danger of skull fracture and concussion.

The ability of common structures to protect the head at impact velocities of 40-50 mph was observed and reported in 1942 in analyzing survivals after free falls from heights of 50 to 150 feet; in these cases various types of structure - automobiles, metal ventilators, wooden roof-tops and hard ground - were struck by the head and body at speeds of 40-50 mph without causing skull fracture, brain damage or internal injuries; in most cases there was no evidence of concussion or loss of consciousness. The physical principles of force distribution behind this protection are relatively simple and were first demonstrated at Cornell University Medical College in 1946 when eggs were dropped 150 feet onto an energy absorbing pad only 1 1/2 inches thick - without breaking. These observations, in conjunction with medical data from

aircraft accidents, have led to studies supported by the Office of Naval Research aimed at providing design criteria for modifying the blow-dealing characteristics and injury potential of objects commonly struck by the head in aircraft and automobile accidents. Though delayed by the current cold war and related defense activities, this Cornell-ONR Head Impact Investigation, when completed, should provide engineers with working data for cutting the present high rate of dangerous head injuries in survivable crashes.

Even in airplanes, where safety belts and shoulder harness are used, safer design of interiors must be provided to minimize the frequency of head injuries. For, unfortunately, although use of the safety belt is remarkably effective in protecting those immediate portions of the body immobilized by it, the head and upper portions of the body, which are not held by belts, usually fly forward with the full velocity of the crash and ultimately smash into adjacent structures. Shoulder harness used by fighter pilots does an amazing job of protecting the head by restraining the upper torso and head from extreme forward movement, but use of shoulder harness - and safety belts - in automobiles, because of psychological problems, is not even on the horizon as a means of increasing automotive safety. Therefore the chief hope of reducing the high incidence of head injuries in crashes becomes a problem of engineering and redesigning dangerous structures so as to offset the severity of head impacts.

In attacking typical causes of excessive head injuries, aeronautical engineers are working with a definite advantage over safety engineers in the automotive field because people in aircraft usually are wearing their safety belts when accidents occur. Although a safety belt does not effectively check the velocity of the head, it contributes to safety by limiting the range of the head and therefore defining to a large extent the area which the head is most likely to strike. This permits definite modification of the injury potentials of the principal target areas. For example, the seat backs in early transport planes like the DC-3 had a steel tubing almost directly in front of each passenger's head, and the adjusting mechanism for the seat back held this structure firmly in a dangerous position. This arrangement permitted little chance of avoiding injuries of the skull, face or neck when passengers were flung forward against it. The same type of danger also was a frequent cause of injury in small planes. A marked reduction of this danger has been achieved in many modern aircraft, first by designing a metal seat back which has, in substance, the injury potential of a rattan or wicker structure; second, by padding this structure; and third, by arranging the adjusting mechanism so that the light seat-back can pivot forward in an abrupt deceleration, thereby moving beyond range of the head, or - if the head strikes it - virtually assuring a light, glancing, non-dangerous blow.

A very similar technique has been applied to the heavy gyros and instruments in small planes. Crash Injury Research showed that injuries of a very severe nature were sustained when the head smashed into the instrument panel and struck a solid instrument casing; on the other hand, pilots walked away when they were lucky enough to hit the soft metal areas between instruments. As a result, at least one instrument panel has now been designed for small planes in which instruments are mounted with shear pins which free the instruments from the panel structure and allow them to fly out of the way, thereby cutting the danger of heavy lethal blows. In other small planes instrument panels of malleable ductile metal with soft rounded contours have been produced to replace sharper and more solid structures. Knobs, projections and many other dangerous objects have either been modified in design or moved out of striking range of the head.

Also, crash-injury studies show that either because of the stretching of safety belts under heavy loads - or because safety belts often are not pulled up snugly - occupants of the front seats in small planes frequently struck and broke windshields, suffering extensive lacerations of the face with tearing and penetrating wounds. By mounting the windshield in rubber, one small plane now features a safety effect in windshield design; when struck a moderate and non-dangerous blow by the head, the windshield pops out of the frame in one piece, thereby offsetting the extreme danger of solid blows and disfiguring injuries implied by windshields which are rigidly held in place.

Control wheels in small planes were found to set up other needless and excessive dangers. In some planes fatal injuries were caused in moderate accidents when rims of control wheels bent down under heavy loads, localizing the pressure of the chest on a small, pointed ornamental area over the end of the control column. In other cases the wheel was cast of brittle material and was set in a lower position which applied crash force to vulnerable areas of the lower ribs and upper abdomen; in a few cases control wheels broke from the control column, impaling the pilot in crashes in which others were not dangerously hurt.

Notice the design of the control wheels the next time you are in a small modern plane. The chances are it will not be a thing of beauty - although beauty also can be designed. In most planes what you will see will be a rugged control wheel with an arrangement like a broad palm or pad over the end of the control column and a rim so attached to this pad as to assure distribution of crash force and protection - rather than danger - for the chest under thousand pound loads.

This same application of protective principles extends to flooring, rudder pedals, turnover structures, the configuration of the firewall and, of course, to seats, safety belts and shoulder harness.

These details, which are designed to provide optimum protection inside the passenger compartment can, of course, provide protection only in accidents which leave cabin structures substantially intact. In six new planes for general and private flying, crash safety engineering has been extended to the cabin and its adjacent structures so that the airplane as a whole fulfills all four principles of safe packaging. Six of these new planes feature: (1) a passenger compartment that is exceptionally rugged; (2) strong energy absorbing nose sections which are designed to absorb crash energy and protect the cabin; (3) the wings, engine mounts, landing gear and turnover structure arranged to utilize their maximum inherent protective qualities, (4) special design in control wheels, instrument panels and seats. In addition each of these modern planes features shoulder harness. No one expects that these improvements are going to assure safety for pilots and passengers in high speed weather accidents where the pilot loses control or runs into a mountain at 100 or more miles per hour. However, in accidents at takeoff and landing speeds of from 40 to 60 mph - and at minimum flight speeds - the danger of serious injury in crackups should be offset to a very important degree.

Not all the improvements for increasing safety in crashes have been achieved without penalties in weight or cost; most, however, have come almost "for free" as the result of knowing what caused danger and tackling known problems with ingenuity and good engineering.

The use of structures for protecting the human body in aircraft and automobile accidents is still a very young engineering art. A great deal of research will be necessary before we know what types and arrangements of structure are best for absorbing the energy of crashes. With crashworthiness at special premiums in the design of small planes for inexperienced pilots, engineers still do not know whether

metal monocoque or welded steel tube structures gives more safety on a weight-cost basis. Only a beginning has been made in studies for moderating the blow-dealing qualities of structures which surround all of us in aircraft and automobiles.

If progress in the protection of people has been slow, the fault does not lie entirely with engineers; it lies chiefly with medical groups who have accepted any and all injuries - without endeavoring to understand their causes. Without medical data engineers have been completely in the dark as to what the body can and cannot stand. Engineers have not known what force the head and body can tolerate - or how often people are dangerously hurt - and by what.

Part of this lack of information has stemmed from inadequate investigation and reporting of accidents. Until Cornell's Crash Injury Research project was initiated in 1942 accident investigators studied airplane crashes chiefly to determine accident causes; actual causes of injury were not considered or reported. As a result, efforts were made to prevent accidents by eliminating their causes, but engineers had no data to use for preventing common and unnecessary causes of injury. Except for the recent studies undertaken by the Indiana State Police, this blind spot in safety data still applies in the investigation of automobile accidents. For example, take an accident such as a car skidding off the road and hitting a tree head-on at 40 mph; let us suppose that the driver is killed and a passenger seriously injured. The report on such an accident normally would state the facts but would leave the causes of injury unreported. If, on the other hand, this accident was studied and reported from a crash-injury point of view, it might provide essential safety data, for the chief and sole cause of the driver's death might be a crushing injury of the chest due to collapse of the steering wheel. The passenger's chief injury might be severe lacerations of the face and concussion caused by striking the windshield and dashboard. Obviously, if such injuries occur frequently under conditions of force which do not justify such results, and, if accident-injury data showed a sufficient frequency of this result to indicate an improvement need of greater safety, automotive engineers would not hesitate to bend every effort to redesign dashboards, windshields and steering wheels which would provide greater protection. However, without specific crash-injury data, engineers cannot be expected to know mechanical factors responsible for common and needless dangers and can have no sound basis for judging either the desirability or need of undertaking safer design.

The importance of including reports on causes of injury in the investigation of automobile accidents is suggested by an early trend in the data on traffic casualty studies undertaken by the Crash Injury Research Division of the Indiana State Police; this trend indicates that at least one out of ten, and possibly one out of five persons, are killed in survivable passenger car accidents because the door latches are inadequate. The sequence of events appears to be that cars swerve, roll over, or are struck sufficiently hard to distort the frames of one or more of the doors; people spill out and are either run over by other cars, or strike their heads on the curbstone or are rolled on by the car itself and crushed in accidents which leave passenger compartments virtually intact. It will take a considerable volume of statistical material to determine whether this condition occurs only in a few makes and models of cars - or whether it is common to many. The point is that, when sufficient crash injury data are accumulated, judgment of the danger can be made and safer design then can be considered.

Possibly the need of latches and hinges which will hold doors closed during reasonable stresses and strains on a car is not as important as early trends indicate. But possibly this one detail of automotive design will prove to be of great importance to public safety on the highways - and perhaps this may be only one of many small details which contribute to the annual toll of unnecessary traffic casualties.

The only way to find out is to extend the scope of present accident investigations in the automotive field and, in addition to getting reports on typical causes of accidents, get reports on typical and repeated causes of injury. This has been the basis for many of the developments for improving crashworthiness and crash safety in aircraft.

As an art, the engineering of structures to absorb crash energy and protect people in aviation is young - but it is progressing rapidly. Unquestionably much of the research and many of the engineering methods now being developed will be found useful in future automotive design to moderate known causes of needless and excessive injuries in survivable automobile accidents.

U.S. Department of Transportation
Office of the Secretary of Transportation

Assistant Secretary

1200 New Jersey Ave., S.E.
Washington, DC 20590

March 18, 2009

MEMORANDUM TO: SECRETARIAL OFFICERS
MODAL ADMINISTRATORS

From: Joel Szabat, Deputy Assistant Secretary for Transportation Policy
x60301

Lindy Knapp, Acting General Counsel
x64702

Re: Treatment of the Economic Value of a Statistical Life in Departmental Analyses – 2009 Annual Revision

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On February 5, 2008, we published a guidance memorandum on Treatment of the Economic Value of a Statistical Life in Departmental Analyses. In that memorandum, attached for reference, we stated our intention to issue annual revisions. As the first such revision, the value of a statistical life (VSL) is now increased from $5.8 million to $6.0 million, based on the Wages and Salaries component of the Employment Cost Index, in constant dollars, and the Consumer Price Index (CPI-U). No change is yet adopted in the relative values of injuries.

It is not necessary to modify analyses already prepared if doing so would be time-consuming and if the change would have no significant impact on the cost-benefit comparison.

Questions concerning this guidance should be addressed to Peter Belenky, (202) 366-5421 or peter.belenky@dot.gov in the Office of Transportation Policy.

Attachment

cc: Regulations officers and liaison officers

U.S. Department of Transportation

Office of the Secretary of Transportation

1200 New Jersey Ave. S.E.
Washington, D.C. 20590

February 5, 2008

MEMORANDUM TO: SECRETARIAL OFFICERS
MODAL ADMINISTRATORS

From: Tyler D. Duvall, Assistant Secretary for Transportation Policy
x60582

D. J. Gribbin, General Counsel
x64702

Re: Treatment of the Economic Value of a Statistical Life in Departmental Analyses

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In January 1993, the Department adopted a guidance memorandum, "Treatment of Value of Life and Injuries in Preparing Economic Evaluations," which set forth recommended economic values to be used in Departmental regulatory and investment analyses. The same memorandum established the basis on which the values would be adjusted for inflation. The initial value was set at $2.5 million and we have directed periodic adjustments since then. The last adjustment to $3.0 million was made on January 29, 2002. Departmental officials need current estimates of the economic benefits of their decisions, however, while recent scholarship and a comparison with the practices of other Federal agencies have demonstrated that the previously recommended value is seriously out of date. That research is described in the attached guidance document.

Based on our improved understanding of the academic research literature, we have determined that the best present estimate of the economic value of preventing a human fatality is $5.8 million. This value should be used, effective immediately, for analyses performed by DOT analysts. In addition, we will, for the first time, require supplementary analyses at values for a statistical life higher and lower than $5.8 million. Specifically, analysts will prepare estimates based on assumptions of $3.2 million and $8.4 million for the value associated with each life saved. These additional estimates will assist decision-makers in recognizing the necessary imprecision of any assumption of the value of a statistical life, as well as the sensitivity of a cost-benefit calculation to changes in that value. We are also adding a third crucial element to Department analyses, namely that

analysts will be expected to disaggregate the major elements of each regulatory or other action. We understand that this will add complexity to the analyses, but it is necessary to enable decision-makers to appreciate the arguments for including or excluding each item.

It is not necessary to change analyses already prepared, if doing so would be time consuming and if the change would have no significant effect on the cost-benefit comparison. However, any future document that will be published or released with unmodified economic values should note that the Department is changing its analytical premises.

Under the 1993 memorandum, the relative values of injuries of varying severity were set as a percentage of the economic value of a life. We are still reviewing those percentages and may modify them in the future. For now, however, the 1993 percentages remain unchanged.

Questions concerning this guidance, should be addressed to Peter Belenky, (202) 366-5421 or peter.belenky@dot.gov in the Office of Transportation Policy.

Attachment

cc: Regulations officers and liaison officers

Revised Departmental Guidance:

Treatment of the Value of Preventing Fatalities and Injuries in Preparing Economic Analyses

This guidance raises to $5.8 million the value of a statistical life to be used by analysts in the Department of Transportation when assessing the benefit of preventing fatalities.

Background

Executive Order 12866 requires agencies to examine the costs and benefits of both proposed and final regulatory actions. DOT administrations promulgate rules to enhance safety and protect the environment, for which the monetary value of preventing injuries and loss of life must be estimated among the benefits. Administrations also undertake investments and administrative actions that must be evaluated in terms of their safety benefits.

The benefit of preventing a fatality is measured by the Value of a Statistical Life (VSL), defined as the value of improvements in safety that result in a reduction by one in the expected number of fatalities. Estimates of VSL are derived from the concept of individual willingness to pay (WTP) for small reductions in risk. Several alternative techniques are available to estimate VSL, including both stated preference (based on verbal responses) and revealed preference (based on observed employment or consumption decisions). Economists surveying the research literature have been compelled to synthesize individual studies from different locations and time periods that have yielded divergent results. Recently, the secondary statistical technique of meta-analysis has supplemented primary research, replacing expert judgment or simple averages to derive most likely parameters from earlier studies that differ in methodology, date, and location. Synthesis of primary studies by any method requires the use of scaling parameters to allow for differences in original incomes and price levels.

Research into these values has been pursued for a generation, and estimating techniques, model specifications, and sources of data have continued to evolve. Nevertheless the uncertainty of estimates has not been substantially reduced. Although it is important for agencies to adopt consistent policies, officials should recognize the essentially subjective quality of VSL and of the decisions for which it is employed. The standard we are adopting may be seen as a central tendency, but there can be no assurance that the assumption of higher or lower values would not improve the net benefits of decisions. Therefore, examination of a range of alternative values must be regarded as an essential component of the analytical process.

The Office of Management and Budget in Circular A-4, issued on September 17, 2003, endorses values between $1 million and $10 million, drawing on two journal articles and the analysis of EPA's Science Advisory Board. Other studies that have been published in peer-reviewed journals tend to fall within this range, but the probability of higher or lower values is not negligible. Since its 2002 annual Report to Congress on the Costs and

Benefits of Federal Regulations, OMB has used a standard of $5 million as the benefit of a fatality averted, when agencies have not supplied a different measure.[1] FDA and CPSC have long used this value. OMB has advised us, however, that the practices of other Federal agencies are consistent with higher values. According to OMB, the Food and Drug Administration "tends to use $5 million or $6.5 million, usually both," when conducting a sensitivity or uncertainty analysis. EPA has used values as high as $7 million in some analyses, and OMB states that the Department of Labor, including OSHA and the Mine Safety Health Administration, "follows the lead of EPA. Two of their recent analyses used $6.8 million." More recently, in its "Regulatory Impact Analysis for the Final Clean Air Visibility Rule" of June 2005, EPA employed a standard of $5.5 million in 1999 dollars, the mid-point of the range recognized by OMB.[2] The Department of Agriculture has recently used a range of $5 - $6.5 million in rulemaking, and OMB expects it to use this range in future analyses.

On January 8, 1993, we published a VSL of $2.5 million as guidance to the operating administrations for estimating the benefits of regulations and investments in safety.[3] This estimate has been adjusted for inflation by the implicit price deflator for GDP, most recently on January 29, 2002, yielding the current recommended value of $3.0 million in 2001 dollars. Its principal empirical basis, a survey by Ted R. Miller, which yielded a likely VSL of $2.2 million in 1988 dollars, has not been revised.[4] Additional information was obtained from a study by W. Kip Viscusi, who found most estimates to be clustered in the range of $3 million to $7 million.[5] The body of research surveyed was essentially identical to that reviewed by Miller. While Miller excluded 18 studies he considered methodologically invalid (out of 65) and attempted to correct for biases in an additional 15, Viscusi made no such adjustments and did not recommend a single value.

A major meta-analytical study was published by Viscusi with Joseph E. Aldy in 2003 estimating a median value of about $7 million 2000 dollars.[6] Mrozek and Taylor obtained lower VSL estimates of $1.5 to $2.5 million in 1998 dollars.[7] The range of $1 to $10 million cited by OMB was derived by EPA from these studies.[8] In 2000, Miller

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[1] See http://www.whitehouse.gov/omb/inforeg/regpol-reports_congress.html .

[2] See http://www.epa.gov/oar/visibility/pdfs/bart_ria_2005_6_15.pdf

[3] See http://ostpxweb.dot.gov/policy/Data/VSL93guid.pdf .

[4] Miller, T. R. (1990): "The Plausible Range for the Value of Life – Red Herrings among the Mackerel." *Journal of Forensic Economics*, 3, 17-40.

[5] Viscusi, W. Kip (1993): "The Value of Risks to Life and Health." *Journal of Economic Literature*, 31, 1912-46.

[6] Viscusi, W. Kip, and Joseph E. Aldy (2003): "The Value of a Statistical Life: A Critical Review of Market Estimates Throughout the World." *Journal of Risk and Uncertainty*, 27.1, 5 – 76. Draft at: http://yosemite.epa.gov/ee/epa/eermfile.nsf/vwAN/EE-0483-09.pdf/$File/EE-0483-09.pdf.

[7] Mrozek, Janusz R. and Laura O. Taylor (2002): "What Determines the Value of Life? A Meta-Analysis." *Journal of Policy Analysis and Management*, 21.2 253-270. Draft at: http://www2.gsu.edu/~ecolot/docs/meta.pdf.

[8] "The distribution of VSL is characterized by a confidence interval from $1 to $10 million, based on two meta-analyses of the wage-risk VSL literature. The $1 million lower confidence limit represents the lower end of the interquartile range from the Mrozek and Taylor (2002) meta-analysis. The $10 million upper confidence limit represents the upper end of the interquartile range from the Viscusi and Aldy (2003)

published a meta-analysis drawing on 68 studies he considered sound, including the original 47.[9] Miller's best estimate for VSL in the United States is $3.67 million in 1995 dollars. In 2004, Viscusi published a primary research study, based on wage premiums for increased job risks. This work, which used data from the BLS Census of Fatal Occupational Injuries, generated a VSL estimate for the full sample of $5.0 million in 2000 dollars.[10] A 2003 meta-analysis by Kochi *et al.* produced a mean estimate of $5.4 million in 2000 dollars.[11] (Studies by Bowland and Beghin[12] and Liu, Hammitt, and Liu[13] focused primarily on other countries.)

Revision of DOT VSL Standard

DOT's previous method of updating VSL has imparted a downward bias over time for two reasons. First, the implicit GDP price deflator, an index of costs throughout the economy, has been used to adjust for inflation, while the Consumer Price Index more appropriately reflects individuals' standard for comparing values corresponding to WTP.[14] Second, there has been no adjustment for growth in real incomes, but research indicates that as people grow richer they are willing to pay more for safety. Estimates of income elasticity are based on studies conducted in several countries at different times, so that the incomes reflected in meta-analyses have multiple sources. The impact of differences between countries in per-capita income levels may not be identical to that of income growth over time in a single country. Although Miller (2000) focuses his meta-analysis on international comparisons (estimating a range of income elasticity from 0.92 to 1.00), he notes that three within-country studies yielded respective income elasticities of: near unity, 0.37 to 0.46, and 0.3 to 0.6. He suggests that the income elasticity of VSL between countries may be larger than within countries because the same cultural norms affect both rich and poor in a given community. Viscusi and Aldy obtain point estimates between 0.5

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meta-analysis." *Benefits of the Proposed Inter-State Air Quality Rule*, EPA 452-03-001, January 2004, cited in "Value of Statistical Life Analysis and Environmental Policy: A White Paper" (April 21, 2004) http://yosemite.epa.gov/ee/epa/eermfile.nsf/vwAN/EE-0483-01.pdf/$File/EE-0483-01.pdf.

[9] Miller, T. R. (2000): "Variations between Countries in Values of Statistical Life." *Journal of Transport Economics and Policy*, 34, 169-188.

[10] Viscusi, W. Kip (2004): "The Value of Life: Estimates with Risks by Occupation and Industry." *Economic Inquiry*, 42.1, 29-48. http://www.law.harvard.edu/faculty/viscusi/pubs/245_2004_EI-42-1.pdf.

[11] Kochi, Ikuho, Bryan Hubbell, and Randall Kramer (2003): "An Empirical Bayes Approach to Combining and Comparing Estimates of the Value of a Statistical Life for Environmental Policy Analysis." *Environmental and Resource Economics*, 34.3, July 2006. Draft at: http://www.epa.gov/air/sect812/appendixh51203.pdf.

[12] Bowland, B. J. and J. C. Beghin (2001): "Robust Estimates of Value of a Statistical Life for Developing Economies: An Application to Pollution and Mortality in Santiago." *Journal of Policy Modeling*, 23, 385-396.

[13] Liu, J., J.K. Hammitt, and J. Liu (1997): "Estimated Hedonic Wage Function and Value of Life in a Developing Country." *Economic Letters*, 57: 353-358.

[14] Thus, for example, in Circular A-4, OMB instructs analysts to use the GDP deflator to express monetized social benefits and costs in dollars of the same year. In deriving the social rate of time preference from the behavior of the average individual saver, however, it compares the rate of return on treasury notes with the annual growth in the CPI.

and 0.6 in a more comprehensive review of models and data sources. We will adopt the mean income elasticity of 0.55 from Viscusi and Aldy as both supported by research and consistent with the rationale Miller suggests.

We measure per-capita real income growth by the Wages and Salaries component of the Employment Cost Index, in constant dollars[15] deflated by the CPI-U, and derive its effect on VSL by the stated elasticity. The dollar values so estimated correspond to the price levels of the data used in the major studies cited. These VSLs are adjusted to 2007 prices by the CPI-U:

Mrozek and Taylor (2001)	$2.6 million
Miller (2000)	$5.2 million
Viscusi (2004)	$6.1 million
Kochi *et al.* (2003)	$6.6 million
Viscusi and Aldy (2003)	$8.5 million

The mean of these five values is $5.8 million, which we believe would appropriately reflect the conclusions of recent studies as well as the practice of other agencies. This figure should now be used in all Departmental analyses as the central value for estimating the monetary benefit of a unit reduction in the number of expected fatalities. Analyses should also recognize uncertainty by considering the impact of assuming alternative values, as discussed below. We intend to publish annual revisions to this guidance, based on recorded changes in wages and prices. These adjusted values will be rounded to the nearest $0.1 million.

Value of Preventing Injuries

Nonfatal injuries are far more common than fatalities, and safety measures affect the probability of these outcomes as well. In principle, the resulting losses in quality of life, including both pain and suffering and reduced income, should be estimated by potential victims' WTP for personal safety. Because detailed WTP estimates covering the entire range of potential disabilities are unobtainable, a standardized method is used to interpolate values of expected outcomes, scaled in proportion to VSL.
Relative value coefficients for preventing injuries of varying severity and duration are based on the Abbreviated Injury Scale (AIS), which categorizes injuries into levels ranging from AIS 1—minor to AIS 5—critical[16]. Research to determine these values is described in reports, by Miller, Brinkman, and Luchter[17] and by Rice, MacKenzie &

[15] See http://www.bls.gov/web/ecconst.pdf. A new basis for the Employment Cost Index was introduced in 2001, and the old index was discontinued in 2005. This guidance uses the former SIC-based index for 1988-2005 and projects the 2006 index by the 2006/2005 growth in the new NAICS-based index.

[16] Factors derived for the AIS are typically applied at the injured person level based on the maximum AIS level injury sustained in an accident. The factors recommended here represent the average value for the universe of injuries that fall within each injury category under AIS.

[17] Miller, Ted R., C. Philip Brinkman, and Stephen Luchter (1988): "Crash Costs and Safety Investment," Proceedings of the 32nd Annual Conference, Association for the Advancement of Automotive Medicine, Des Plaines, IL.

Associates.[18] The technique relies on a panel of experienced physicians to relate injuries in each AIS level to the loss of quality and quantity of life involved, a scaling termed Quality-Adjusted Life-Years, or QALYs. In Circular A-4, OMB discusses the possible use of integrated measures such as QALYs to aggregate disabilities for cost-effectiveness analysis. Besides the psychic disutility represented by lost QALYs, lost market earnings and household productivity have been estimated and assigned to AIS categories.

The Department's 1993 guidance memorandum, following Miller, Brinkman, and Luchter, recommended the following schedule of coefficients for each category of injuries. NHTSA has conducted research to revise these estimates. We will review new values when they become available and publish them for use throughout the Department. In the interim, these values may be used. They are to be multiplied by the current value of preventing a fatality to obtain the values of preventing injuries of the relevant types.

Relative Disutility Factors by Injury Severity level (MAIS)[19]

MAIS Level	Severity	Fraction of VSL
MAIS 1	Minor	0.0020
MAIS 2	Moderate	0.0155
MAIS 3	Serious	0.0575
MAIS 4	Severe	0.1875
MAIS 5	Critical	0.7625
MAIS 6	Fatal	1.0000

These factors have two direct applications in analyses. The first is as a basis for establishing the value of nonfatal injury prevention in benefit/cost analysis. The total value of preventing injuries and fatalities can be combined with the value of other economic benefits not measured by VSLs and compared to costs to determine either a benefit/cost ratio or an estimate of net benefits or costs, the method recommended by OMB.

OMB circular A-4 also requires that evaluations of major regulations include cost-effectiveness analysis, in which the cost of a government action is compared with a non-monetary measure of benefit. The values in the above table may be used to translate nonfatal injuries into fatality equivalents which, when added to fatalities, can be divided into costs to determine the cost per equivalent fatality. This ratio may also be seen as a

[18] Rice, Dorothy P., and Ellen J. MacKenzie & Associates (1989): *Cost of Injury in the United States: A Report to Congress.* San Francisco: Institute for Health and Aging, University of California, and Injury Prevention Center, the Johns Hopkins University.

[19] MAIS (Maximum Abbreviated Injury Scale) refers to the highest level injury received by an accident victim.

"break-even" VSL, the value that would have to be assumed if benefits of a proposed action were to equal its costs. It would illustrate whether the costs of the action can be justified by a VSL that is well within the accepted range or, instead, would require a VSL that approaches the upper limit of plausibility. Because the values assigned to prevention of injuries and fatalities are derived in part by different methodologies, it may be useful to understand their relative importance in drawing conclusions. Consequently, we recommend that in analyses where both types of benefit are present, the estimated values of injuries and fatalities prevented be stated separately, as well as in the aggregate.

Implementation of this Guidance

As directed in Circular A-4, future benefits, including the benefits of preventing fatalities and injuries, are to be discounted to present values using alternative discount rates of 3 percent and 7 percent. These discounted values are to be compared with the costs of Departmental actions, discounted at the same rates. All costs and benefits should be expressed in dollars of a common base year.

The potential damage associated with accidents includes both the personal disutility of death or injury and a variety of purely economic losses (to both the victims and others), including property damage, traffic delay, lost productivity, and the costs of police, investigation, medical, legal, and insurance services. In general, the benefit of preventing economic losses to society, apart from victims and their families, should also be accounted for in analyses.

The literature is relatively unambiguous that VSL includes lost after-tax earnings,[20] as do values derived for QALYs.[21] Although VSL and related injury values based on QALYs already incorporate productivity losses, for presentation purposes, it is permissible to decompose these values into a component related to pain, suffering and lost quality of life and a separate productivity component. Avoiding these losses, whether aggregated or decomposed, should be treated as the entire benefit to potential victims of accidents and their families. In contrast, reductions in property damage, medical expenses,[22] traffic delay, and other costs associated with fatal accidents should be treated as added social benefits not included in the potential victims' benefits measured by VSL.

While we use a single VSL for all fatalities, our QALY methodology for aggregating the benefits of preventing injuries reflects the relative valuation of all injury types that occur within each specific MAIS category. In some cases, prevention of transportation accidents will benefit travelers with narrowly defined injury types that are a subset of the overall MAIS category to which they belong. If special studies or analyses become available

[20] After-tax earnings represent roughly 85 percent of total earnings.

[21] Gold, M. R., J. E. Siegel, L. B. Russell, M. C. Weinstein (1996): *Cost-effectiveness in Health and Medicine*. Oxford University Press, New York.

[22] Technically a small portion of medical expense – that paid for by the individual – is also included in VSL estimates. NHTSA estimates that about 15% of these costs are paid by individuals, leaving the far greater portion, 85%, paid through societal mechanisms such as insurance, tax supported welfare programs, and charity.

which indicate that these specific types of injuries have consequences that differ markedly from the average injury in that category, analysts may rely on these studies to determine an injury-specific factor and substitute this for the average MAIS factor in the table.

Recognizing Uncertainty

It must be emphasized that the value we adopt here does not establish a threshold dividing justifiable from unjustifiable actions. Any estimate of the cost of preventing a fatality that lies within the plausible range of VSL can only suggest greater or lesser degrees of confidence in regulatory or investment decisions. Such decisions must be taken by duly empowered officials informed of the limitations of the knowledge available to them.

To assist decision-makers in understanding the sensitivity of their conclusions to uncertainty and changes in underlying assumptions, analysts should present supplementary calculations using alternative VSLs both higher and lower than $5.8 million. Although VSLs within the range of $1 million to $10 million (or even more extreme values) can not be ruled out, it would be preferable to show values that are more likely to be accepted as realistic. Therefore, we are instructing analysts to provide supplementary benefit calculations based on VSLs of $3.2 and $8.4 million.

OMB has announced that for major rules involving annual economic effects of $1 billion or more, a formal quantitative analysis of the relevant uncertainties should be provided. This can be accomplished by a Monte Carlo simulation model that estimates the probabilities of randomly selected hypothetical outcomes, using empirically or judgmentally estimated probability distributions for uncertain parameters. Even for actions involving smaller impacts, it may be useful to estimate the probability that a given decision will be justified by its net benefits. Whether Monte Carlo techniques or discrete high and low values are employed, it is essential to consider the range of uncertainty in all determinants of costs and benefits, not just in VSL.

Information on the probability distribution of VSL is very limited, but all sources acknowledge that estimates are widely scattered. The range of $1 million to $10 million discussed in footnote 8 comprises only the half of observations closest to the median in two separate studies. Kochi *et al.* estimate a standard deviation of VSL of $2.4 million, but this range should expand with the passage of time and the growing values of the determinants of VSL. We are now recommending that analysts use a standard deviation of $2.6 million in mathematical uncertainty analysis, together with the mean VSL of $5.8 million. Since the bell-shaped normal distribution includes both positive and unrealistically negative values, we also recommend the use of distributions restricted to a positive range, such as the Weibull or lognormal distribution.

Policy Statements

The argument is sometimes advanced that reliance on WTP estimates to guide regulatory policy may produce inequitable outcomes by justifying more effective and costly protection for the wealthy. This possibility, which may be condemned by some on moral grounds, may also tempt others to introduce scientific evidence of greater or lesser validity to support a higher level of safety in special cases. We must emphasize that, in accepting

WTP as a theoretical basis for VSL, the Department is not approving different treatment of groups affected by its safety policies. The same standard is to be applied to all individuals at risk, regardless of age, location, income, or mode of travel. In many cases, prevention of transportation accidents will benefit travelers in randomly distributed groups, but some Departmental actions may be designed specifically to protect infants, disabled passengers, or the elderly. In these cases, no adjustment is to be made to the values used to estimate benefits, but analysts should call the attention of decision-makers to the special character of the beneficiaries.

More generally, science can do no more in this area than inform policy judgments; it can not dictate the correct conclusions. Analysts must be prepared to assist decision-makers in understanding the risks associated with both action and inaction and in assigning probabilities to these risks if possible. Where arguments can be made that an action should be taken, even if it can be justified only by the high benefits associated with a VSL in the upper part of the range, or conversely, that an action should be rejected, even if apparently justified by a low VSL, these arguments are not properly within the realm of economics. Nevertheless, analysts must also be prepared to assist decision-makers in stating reasons for their decisions that are consistent with the principles developed here.

Finally, responsible analysis requires that regulations and other actions be disaggregated into their major elements so that the net benefits of including each in the final decision can be weighed. Circular A-4 explicitly mandates evaluation of regulations with and without separable provisions. DOT analysts are therefore instructed to present the costs and benefits of rules in each practically feasible configuration, so that decision-makers will be aware of the options available to them and of the potential consequences.

END OF DOCUMENT

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24 September 2012

Subject: **Chrysler Defense Expert Testimony of 7Sep2012: *"The tank's on its own."***
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**
