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September 19,2012

Dear Customer:

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Recipient:
DAVID STRICKLAND
NHTSA-WEST BLDG
1200 NEW JERSEY SE
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: 3 September 2012 VIA FEDEX AIRBILL 8007 – 9341 - 5860

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

Subject: Chrysler Group LLC Assertions - Karco ZJ-Body Impact Test of 16 May 2011
Reference: EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)

Courtesy Copy List

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

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

Mr. David Kelleher, Chairman **
National Automobile Dealers Association
c/o David Dodge Chrysler Jeep
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Senator John Rockefeller IV **
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* *Available with hyperlinks:* http://links.veronicachapman.com/Sheridan2Strickland-7.pdf
** *By email or USPS (Letter and attachments only)*

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3 September 2012 VIA FEDEX AIRBILL 8007 - 9341 - 5860

Mr. David L. Strickland
Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
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Subject: Chrysler Group LLC Assertions - Karco ZJ-Body Impact Test of 16 May 2011
Reference: EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)

Dear Mr. Strickland:

Given the past relationship between NHTSA and Chrysler (ATTACHMENT 1), I am submitting public rebuttal to ongoing assertions stated by Chrysler Group LLC and Chrysler dealership defense experts. These assertions, touted in various forums, can become imbedded in EA12-005, and therefore must be addressed in the interest of public safety and service.

Once again the assertion excoriates the impact test of 16 May 2011 conducted at Karco Engineering. [i] This letter will concentrate on the danger of fuel tank breach in the Jeep vehicles identified by EA12-005.

Jeep Vehicle Fuel Tank Breach: Source Documents History and Background

Enclosed with my 1 June 2012 letter was the 19 December 2011 report by the Chrysler Group LLC and dealership defense expert firm Kineticorp. [ii] In this and their revised report of 25 May 2012, Kineticorp claims that they reviewed my prior expert reports; both included Attachment R, "*Jeep Grand Cherokee (ZJ) Real-World/Underride Crash Test Report - 16 May 2011 at Karco Engineering, LLC*." Attachment R cover page confirms that I also included a cd containing all video records of the crash test by Karco (ATTACHMENT 3). Screenshots from that cd, relevant to the topic of fuel tank breach, are extensively examined below.

Breaching of the Unprotected, Rear-mounted Polyethylene Fuel Tank of EA12-005 Jeep Vehicles

In addition to the 16 May 2011 test at Karco Engineering, the Chrysler Group LLC, dealership defense lawyers, and their defense expert have also focused their assertions upon an exemplar Jeep Grand Cherokee MHE fire death accident. Given the past relationship mentioned above, it is presumed that assertions regarding this MHE event have also been proffered to EA12-005. [iii]

The Kineticorp report of 19 December 2011 *"Summary of Conclusions"* falsely claims (ATTACHMENT 4):

> ***6. The (Kline) Jeep's fuel system was not breached during the first impact.***

This and other conclusions are exemplary of the behavior called overreaching. At one point in their *"Summary of Conclusions"* Kineticorp declares a high speed impact, as part of their defense strategy, and that the energy of the *"initial impact . . . was 6 times greater than the Federal Motor Vehicle Safety Standard (FMVSS) 301 test."* But then, in the next instant, they tacitly claim that-that high energy was not sufficient to initiate underride and/or overwhelm the flimsy rear structure of the Jeep, and therefore could not have caused breaching of the fuel tank. [iv]

The following detailed analysis of the real-world, 40 mph impact test of 16 May 2011, commissioned by the Center for Auto Safety (CAS) and conducted at Karco Engineering, refutes this ludicrous conclusion. [v]

16 May 2011 Karco Engineering Impact Test: Video Report Format / Background

Three high speed video cameras recorded this test:

Camera 1: Left-side view of Jeep Grand Cherokee (Target) and Ford Taurus (Bullet)
Camera 2: Top-down view over impact pad/collision event position
Camera 3: Front-left three quarters view

These cameras record at a rate of 1000 frames per second. Total/maximum time recorded was approximately 3.050 minutes (Camera 1). All camera data, including the real-time videos, are contained on the enclosed cd. The following analysis relies primarily on the high-speed views of cameras 1 and 2.

Time -0.050 : Pre-Impact Views / Data Initiation (ATTACHMENT 5)

Fifty milliseconds prior to impact the cameras begin recording at 1000 frames per second. These four views provide pre-impact details and information.

Time 0.000 : Pre-Impact Views – General Information (ATTACHMENT 6)

At T = 0.000 contact between the bullet vehicle and the target Jeep Grand Cherokee has occurred. A reference point is indicated for analysis of the post-collision target vehicle movement in the X-axis. The fuel tank stoddard fill (21.39 gallons), and the lack of purple-dyed stoddard staining of the impact pad is emphasized.

Time +0.052 : Post-Impact Views - Maximum Accelerations (ATTACHMENT 7)

This time point was chosen because it represents the approximate mutual maximum *deceleration* of the Ford Taurus bullet vehicle, and the maximum *acceleration* of the Jeep Grand Cherokee target vehicle (ATTACHMENT 8):

- At T = 0.0519 the bullet attained its maximum post-collision deceleration of 16.9 Gs.
- At T = 0.0531 the target attained its maximum post-collision acceleration of 17.4 Gs

T = +0.052 represents the moment when maximum transfer of kinetic energy from the bullet to the target has occurred. The target vehicle has not yet commenced movement in the X-axis. However, it is obvious that the bullet is "underriding" and has completely encroached into the position occupied by the unprotected, rear-mounted polyethylene fuel tank of the Jeep Grand Cherokee. At this very early stage in this low energy test, the ZJ-Body fuel tank has been breached by front components of the bullet. Although not yet visible, those front components have essentially, temporarily "plugged the holes." At this point, in this underride event, leakage of stoddard has already commenced. [vi]

Time +0.073 : Post-Impact Views - Bodyside and Door Frame Deformation (ATTACHMENT 9)

This data point was chosen because it represents the approximate moment when a second major milestone in the victimization of the Jeep Grand Cherokee occupants has occurred:

- Detailed analysis of these views indicates that bodyside and door frame deformation has occurred, and all four ZJ-Body doors are jammed, making ZJ-Body egress nearly impossible (ATTACHMENT 10).
- At T = 0.073 the breaching of the fuel tank by an "underriding" bullet vehicle is ongoing. Whatever claims that could be made about my opinion that breach had already occurred at T = 0.052 are moot at 73 milliseconds.

Also note that, although the fuel tank is breached and now the occupants are trapped, the target vehicle has still not yet commenced movement in the X-axis direction.

Time +0.119 : Post-Impact Views - Bullet/Target Speed Crossover Point (ATTACHMENT 11)

A critical moment in an impact test, which provides raw data which enables calculation of plasticity, elasticity, impulse, restitution, etc., is called the crossover point. At this discrete moment, the accelerating target vehicle has reached the same speed as the decelerating bullet vehicle:

- At the crossover the bullet vehicle kinetic energy, which was available for transfer, has been fully transferred into the target vehicle. A portion of this transfer results in deformation, the other portion causes target vehicle acceleration. The apportioning of the energy transfer is dependent on the specific test combinations. However, at crossover point no further significant deformation (i.e. plasticity) of either vehicle will occur.

- The plasticity portion of the impact has concluded, and the elasticity portion is manifest. That is, separation of the target from the bullet begins . . . the target vehicle begins to 'pull away.'

- At the crossover point the target vehicle will continue to utilize kinetic energy to accelerate further, until it reaches its maximum post-collision speed. This data enables calculation of the maximum change in velocity, called Delta-V. For this test the Delta-V was approximately 21.7 mph.

- In this 16 May 2011 crash test combination (speed, directional vectoring, offset mode, and vehicles types) the crossover occurs at approximately 119.1 milliseconds after the initial impact (T = 0.000).

- In this crash test combination, the crossover speed is approximately 18.46 mph (ATTACHMENT 12).

At T = +0.119, the target vehicle has now commenced appreciable movement in the X-axis direction. This separation sequence, which moves the target/bullet vehicles off the impact pad, exposes the surface, and accommodates viewing of the stoddard evidence of a fuel tank breach which I assert occurred back at T = +0.052.

Near-Instantaneous Jeep Fuel Tank Breach – Purple-Dyed Stoddard Evidence (ATTACHMENT 13**)**

At not later than T = +0.073 (73 milliseconds) all four doors of the ZJ-Body Jeep Grand Cherokee are jammed and inoperative. Prior, at T = +0.052, two breaches had occurred in the unprotected target vehicle fuel tank. But this 'late sequence' series of video screenshots proves the later reality:

- At T = +0.245 the bullet vehicle has begun movement in yaw mode, characteristic of the late sequence in an offset impact test. The "unplugging" of the two fuel tank breaches is ongoing, and the separation sequence which began at T = +0.119 is now visible. However, at T = +0.245 the vehicles have not yet cleared the impact pad, and the Camera 2 view of the stoddard-stained pad is yet visible.

- For the T = +0.315 screenshot I have superimposed the position of the Jeep Grand Cherokee fuel tank relative to the impact pad. As the target and bullet vehicle continue to separate, this X-axis pad position will also be cleared, allowing Camera 2 viewing of the purple-dyed stoddard evidence.

- At T = +0.845 the first viewing of stoddard occurs. At this point it appears that not one, but TWO fuel tank breaches are evidenced by the trails of stoddard wisping from the tailgate area of the target vehicle.

- At T = +1.000 (one second after impact) not one, but TWO fuel tank breaches are evidenced by the purple-dye staining of the impact pad and asphalt run-off areas.

T = +1.598 represents the end of Camera 2 video recorded data. Note that the stoddard staining of the impact pad is near-instantaneous, occurring at a mere 6 feet from the pre-impact location of target vehicle fuel tank.

Pre and Post-Test Photographic Evidence (ATTACHMENT 14**)**

These photographs were/are part of my expert reports to the exemplar accident. The breaches to the unprotected Jeep Grand Cherokee fuel tank did not result in minor leakage; it was so severe that, as the person representing CAS at this test, I recommended that time/resources not be wasted on the FMVSS-301 rollover protocols.

Exemplar Accident – Eyewitness Account of Jeep Grand Cherokee Fuel Tank Breach (ATTACHMENT 15)

Because history includes "litigation in the media," a review of the facts surrounding the exemplar accident are presented. [vii] This review is consistent with the video screenshot analysis and the post-test photographic evidence presented above. The statements made by on-the-scene eyewitnesses to the 24 February 2007 accident include:

"The back of the Jeep immediately burst into flames upon impact. I drove through the debris and fireball caused by the Jeep exploding."

Similar to their claim regarding my expert report(s), defense experts for Chrysler Group LLC and their dealerships claimed in Appendix A that they reviewed the New Jersey Police Crash Investigation Report # B080-2007-00445A. That New Jersey Police Crash Investigation Report included the eyewitness account above. Specifically, the Kineticorp *"Summary of Conclusions"* Item #6:

6. The (Kline) Jeep's fuel system was not breached during the first impact.

was proclaimed after their alleged review of the exemplar accident police crash report.

Conclusion and Requests

1. Because of communications/activities embedded in past Engineering Analysis, this submission is offered as a courtesy. Inputs to EA12-005 from Chrysler Group LLC, derived in-part from their defense experts, is presumed. Recent opinions from Kineticorp motivate this courtesy at this time.

2. Assuming that someone believes Kineticorp conclusion #6, that the exemplar accident involving a 1996 Jeep Grand Cherokee ZJ-Body occurred at an energy level OVER THREE TIMES that of an equivalent 1996 ZJ-Body in the Karco test, and that the former did not suffer instantaneous fuel tank breach, but that the Karco vehicle did, then at the very least conclusion #6 must be viewed with derision. NHTSA should shun such inputs/overreaching.

3. At the Karco test speed of 40 mph, the kinetic impact energy was 0.64 times less than the enhanced FMVSS-301 test speed of 50 mph. Despite this low Karco test energy the ZJ-Body fuel tank was breached 52 milliseconds after impact. All four doors were jammed at 73 milliseconds. I am confident that if a car-to-car test is conducted at the Pinto compliance level of 30 mph the results will be similar.

4. Please take a moment to view the high-speed video rendered by the CAS-commissioned crash test of 16 May 2011 by Karco Engineering, and the screenshot analysis contained in the attachments.

Please do not hesitate to contact me at any time.

Respectfully,

Paul V. Sheridan

Attachments/Enclosure

Endnotes

[i] Because the first topic (underride accident mode) is revisited, I have placed that discussion in ATTACHMENT 2.

[ii] My letter of 1 June was received by your office on 5 June 2012.

[iii] Given the claim by defense experts that my expert reports, including Attachment R discussions/inclusions about the Karco Engineering crash test, were part of their review, their ongoing assertions must be scrutinized. However, because the accident in-question is one of at-least 69 MHE fire deaths in FARS, and is typical, a 'public safety and service' discussion with NHTSA is justified / appropriate. For example, the desire of Chrysler Group LLC to litigate this exemplar accident in the media was demonstrated in their comments to the 21 and 22 June 2012 news broadcasts on Washington, DC based WUAS-9 television. Specifically, my letter to you of 27 August 2012, which discusses the Chrysler Group LLC (litigation defense) posture/rhetoric regarding "skid plates," was received by your office on 29 August 2012.

[iv] Actually the Kineticorp report *"Summary of Conclusions"* Item # 8 fails to specify that (kinetic) energy is what they are referring to, and that-that technical tautology is based on their Item # 2 assertion regarding impact speed. In their overreaching they claim that the initial impact speed was 73 mph, and that such represents a 6x multiplier versus the original FMVSS-301 test speed of 30 mph. Plaintiff's expert Mr. Donald Phillips has testified and reported that the initial impact in this exemplar accident was a underride event, and that the initial impact speed was not more than 51.8 mph. This figure represents a kinetic energy multiplier of 2.98 versus the original FMVSS-301 test speed, and essentially a 1x multiplier versus the later FMVSS-301 test speed of 50 mph.

[v] At the Karco test speed of 40 mph, the kinetic impact energy was 1.78 times greater than the original FMVSS-301 test speed of 30 mph. At the Karco test speed of 40 mph, the kinetic impact energy was 0.64 times less than the enhanced FMVSS-301 test speed of 50 mph. However, in obvious refutation to the "conclusions" asserted by Chrysler Group LLC and its defense experts; assuming that you entertain the overreaching claim that the exemplar accident in-question occurred at 73 mph, then the Karco test speed of 40 mph had 0.30 times less kinetic impact energy. `Less than a third of the Kineticorp claim.

[vi] Given the visuals, it is difficult to image; it strains credibility to propose that the fuel tank has not been breached.

[vii] Please see Endnote iii.

ATTACHMENT 1

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

3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body Impact Test of 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content Four Pages:

Given the past relationship between NHTSA and Chrysler, examples of prior communications and activities that were/are not openly shared.

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.

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,

KN

Kenneth N. Weinstein
Assistant Chief Counsel
for Litigation

Enclosure

ATTACHMENT 2

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

3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content Five Pages:

Revisitation of underride accident mode versus public/private assertions made by Chrysler Group LLC, Chrysler Group LLC defense lawyers and experts, and Chrysler Group LLC dealership defense lawyers and experts.

21Jun2012: **Jeep Grand Cherokee Gas Tank Fires and Deaths Petitioned By Center for Auto Safety**

22Jun2012: **Jeep Gas Tank Fires; Chrysler Whistleblower Speaks Out**

Attachment 2

False Accusation that the Karco Test of 16 May 2011 "skewed" the underride accident mode

I. This topic needs revisitation. My letter of 1 June 2012 rebutted the accusation made by defense experts that, by virtue of tire sizes and alleged inflation pressures, the Karco Engineering test of 16 May 2011, commissioned by the Center for Auto Safety (CAS), was purposely *"skewed"* to provoke the underride accident mode. I do not wish to waste any more time with this accusation, but the underride mode has primary EA12-005 investigatory significance. In the context of EA12-005 the following three additional items are offered for consideration:

A. Enclosed with my 1 June 2012 letter was the 19 December 2011 report by defense expert firm Kineticorp. In that report Kineticorp admits that they reviewed my report of 10 August 2011. We now have their revised report of 25 May 2012, wherein Kineticorp experts again admit that they reviewed my report of 2 January 2012. In both report editions I included Attachment S, "*The Well-Known Issue of the Underride Accident Mode.*"

For emphasis I uploaded a 12-second video, *"Taurus Underrides Jeep at less than 5 MPH."* The emphasis is due to the Chrysler assertions regarding the authenticity and relevance of the Karco test of 16 May 2011, especially defense expert accusations that a Ford Taurus underride of a Jeep Grand Cherokee is "*skewed*." I have attached a screenshot of the Allstate Insurance ad which shows a less-than 5mph underride event:

- To the best of my knowledge, Chrysler Group LLC or its defense experts have never accused Allstate of "*skewing*" the underride of the Ford Taurus to the Jeep Grand Cherokee. More importanlty, I am not aware of any cares or concerns voiced by Chrysler Group LLC or its defense experts, that had that Allstate ad been staged at a slightly higher speed the actors and camera crew would have been endangered by the breaching of the unprotected Jeep Grand Cherokee fuel tank.

B. In my letter to you of 27 August 2012, I discussed the 22 June 2012 broadcast by Washington, DC based WUSA-9. In that broadcast they displayed the front of a Toyota Corolla positioned at the rear of a Jeep Grand Cherokee, clearly revealing the issue of underride and direct collision impact with the Jeep Grand Cherokee fuel tank. I have attached a screenshot of that WUSA-9 depiction of a typical Toyota Corolla to WJ-Body geometry:

- To the best of my knowledge, Chrysler Group LLC or its defense experts have never accused WUSA-9 of "*skewing*" the underride based on the geometry of the Toyota Corolla, its tire size or tire inflation status.

C. The Insurance Institute for Highway Safety (IIHS) conducted a 10 mph bumper test between a 2004 Dodge Stratus and a 2004 Jeep Grand Cherokee. During this low speed test the front bumper of the Dodge Stratus completely missed the rear bumper and structure of the Jeep, and collided directly with the Jeep fuel tank system in an underride mode. The WJ-Body "brush guard" was damaged and had to be replaced. I have attached a screenshot of that IIHS depiction of the typical Dodge Stratus to WJ-Body geometry:

- To the best of my knowledge, Chrysler Group LLC or its defense experts have never accused IIHS of *"skewing"* the well-known underride issue associated with the Jeep vehicles, based on the geometry of their own Dodge Stratus; the latter's tire size or its (alleged) tire inflation status.

I have revisited this underride topic because of false assertions regarding its frequency of occurrence *per se*, the notion of a low frequency in accidents involving the Jeep vehicles under investigation by EA12-005; and the insinuation by Chrysler Group LLC, Chrysler dealership defense lawyers, and defense experts that underride only occurs under limited accident circumstances, occurs only as a result of high speed, or when the event is *"skewed."* The four overleaf screenshots, which are focused on the exemplar Jeep Grand Cherokee, refute all such claims.


ACCIDENT
FORGIVENESS
YOUR CHOICE AUTO
Jeep Grand Cherokee Fuel Tank
Ford Taurus colliding at under 5 mph
in underride of Jeep Grand Cherokee
Tire Size and Inflation does
not "unskew" the underride
of Ford Taurus to the Jeep
Grand Cherokee
CALL AN ALLSTATE AGENT
OR 1-866-601-9500

00:28 / 01:02


2000 Jeep Grand Cherokee (WJ-Body)
Mismatched Bumper Height Between Jeep Grand Cherokee and Passenger Cars was a Well-Known Safety Issue Prior to 1978 Baker Memorandum
Toyota Corolla


INSURANCE INSTITUTE
FOR HIGHWAY SAFETY
VEHICLE RESEARCH CENTER
Dodge Stratus
Jeep Grand Cherokee
WJ-Body


Jeep
4x4
Underride Mode Caused by
10 mph Bumper Test:
Dodge Stratus into rear of Jeep
Grand Cherokee
WJ-Body "Brush Guard"
Damaged, had to be Replaced

ATTACHMENT 3

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

3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body Impact Test of 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content:

Two Pages

Abridged Version of Paul V. Sheridan Expert Report of 2 January 2012, Attachment R.

ATTACHMENT R *

EXPERT WITNESS REPORT - 2 January 2012 REVISION

Kline v. Loman Auto Group, Victoria Morgan-Alcala, et al.

Page Range 68

Pages 637 - 704

* Please also see Video file folder “Attachment R”

Jeep Grand Cherokee (ZJ)
Real-World / Underride Crash Test (and Report) - 16 May 2011

In April 2011 my expertise was solicited by Mr. Clarence Ditlow, Director for the Washington D.C. based Center for Auto Safety (CAS), regarding a planned real world crash test of a 1996 ZJ-Body Jeep Grand Cherokee fuel system. My role as representative for CAS also included confirmation of test vehicle (Jeep Grand Cherokee) condition as competent, representative and authentic for the stated test purpose(s).

The context of this crash test was the ongoing CAS petition, which is requesting a safety defect recall, which was originally submitted to the National Highway Traffic Safety Administration (NHTSA) under Defect Petition DP-09005 (Attachment G), which has been upgraded by NHTSA to Preliminary Evaluation PE-10031. The latter occurred subsequent to my meeting with NHTSA Administrator David L. Strickland in May 2010, and my submission to CAS of June 2010 (Attachment I).

The crash test occurred at the Karco Engineering, LLC facility in Adelanto, California, on Monday 16 May 2011 at approximately 11:30 am.

The crash test "bullet vehicle" was a Ford Taurus four-door sedan. As prior employee at Ford Motor Company, assigned to the Taurus program, I am very familiar with this vehicle configuration, and its ubiquitous real-world highway presence. The speed of the Taurus upon impact was 40mph.

Selected photos of my pre-test participation and post-test vehicle condition are sub-attached. Also sub-attached is the complete and official Karco Engineering test report of 6 June 2011.

As can be rendered from the sub-attachments, the ZJ-Body Jeep Grand Cherokee contains a fuel system that cannot protect passengers, and others, in a foreseeable real world rear crash scenario. This 16 May 2011 crash test demonstrated the well-known underride crash mode, wherein bumper mismatch facilitates direct impact to the unprotected fuel tank (please note my photos). The attached crash test video provides visual confirmation of this simple geometry:

http://www.youtube.com/watch?v=j0b6c-22_FM

The total time, from crash test impact to complete fuel tank emptying of all stoddard fluid (non-flammable liquid commonly used to simulate gasoline by automotive manufacturers and crash test facilities) was approximately/merely 90 seconds. It was at this time that I advised Mr. Ditlow that the customary post-crash rollover sequence required by FMVSS-301 protocol was pointless, therefore none was performed.

The ZJ Jeep Grand Cherokee fuel system failure in this test was utterly catastrophic from a safety point of view.

Memo: Note that Data Sheet 1of the sub-attached Karco Engineering test report describes the post-test condition of all ZJ-Body Jeep Grand Cherokee doors as "Jammed Shut."

ATTACHMENT 4

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

3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content Fifteen Pages:

Kineticorp Expert Report of 19 December 2011.

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Kineticorp™

Forensic Engineering | and Visualization

December 19, 2011

Matthew D. Stockwell
Callahan & Fusco LLC
72 Eagle Rock Avenue, Suite 320
East Hanover, NJ 07936

RE: *Kline et al. v. Loman Auto Group*

Dear Mr. Stockwell,

As requested, Kineticorp investigated and reconstructed a fatal motor vehicle accident that occurred on February 24, 2007 at approximately 8:53 a.m. The crash occurred on southbound Interstate 287 at milepost 42.8 in Parsippany, New Jersey. A 1998 Subaru Outback, driven by Natalie Rawls, slowed or stopped in the right travel lane of southbound I-287. Susan Morris Kline slowed or stopped her 1996 Jeep Cherokee behind the Subaru. The Jeep was then impacted in the rear by a 2004 Toyota Sienna operated by Victoria Morgan-Alcala. As a result of this initial impact the Jeep was pushed into the rear of the Subaru before coming to rest between the right and center lanes of I-287. During the accident sequence a fire erupted. As a result of the crash, Ms. Kline was killed. In the area of the accident, southbound I-287 is an asphalt roadway with three lanes of travel bordered to the right by a gore area separating the through-travel lanes from the exit lane for Parsippany Road. Figure 1, a photograph taken by police, shows the accident scene. At the time of the accident the weather was clear and the roadway was dry, straight and level. Shortly prior to the accident location, the speed limit had changed from 65 mph to 55 mph.

Figure 1

Summary of Conclusions

As a result of our investigation and analysis, Kineticorp reached the following conclusions related to this crash:

1. The Jeep was involved in two impacts. The first occurred when the Jeep was rear ended by the Toyota. The second occurred when the Toyota pushed the Jeep into the Subaru.
2. During the first impact, the Toyota was traveling approximately 73 mph and the Jeep was either stopped or moving slowly.
3. As a result of being impacted by the Toyota, the Jeep experienced a ΔV of approximately 38 mph.
4. During the second impact, the Toyota and Jeep were traveling approximately 33 mph and the Subaru was either stopped or moving slowly.
5. The fire did not occur until the second impact when the Jeep was crushed between the Toyota and the Subaru.
6. The Jeep's fuel system was not breached during the first impact.
7. During the second impact, the Toyota penetrated underneath the Jeep, causing the Jeep to roll towards the passenger's side.
8. The initial impact between the Toyota and the Jeep was approximately 6 times greater than the Federal Motor Vehicle Safety Standard (FMVSS) 301 test for fuel system integrity, in terms of impact energy.
9. The severity of accident was increased substantially due to the Jeep being crushed between the Toyota and the Subaru.

Basis for Conclusions: The remainder of this report describes the basis for these conclusions and outlines the procedure through which they were reached. The procedure described below utilized reliable methods, techniques and processes which conform to standard and accepted practices within the field of motor vehicle accident reconstruction. The above-listed conclusions, to which this procedure led, were reached to a reasonable degree of certainty.

Procedure

- In conducting our investigation and analysis, Kineticorp engineers reviewed and analyzed the documents, photographs and video listed in Appendix A. These materials were provided to Kineticorp.
- Kineticorp obtained technical specifications for the vehicles involved in the crash.
- Kineticorp inspected, documented, photographed and surveyed the accident site on July 7, 2011.
- Kineticorp inspected, documented, photographed and scanned an exemplar 2004 Toyota Sienna on August 5, 2011.
- Kineticorp inspected, documented, photographed and scanned an exemplar 1996 Jeep Grand Cherokee on August 18, 2011.
- Kineticorp inspected, documented, photographed and scanned an exemplar 1998 Subaru Legacy Outback on August 25, 2011.
- Kineticorp inspected, documented, photographed and scanned the subject Jeep Grand Cherokee on December 1, 2011.

- Kineticorp produced computer models of the involved vehicles using data collected from our three-dimensional scans.

- Kineticorp produced a computer model of the crash site. This computer model contains the roadway and shoulder geometries, along with the physical evidence deposited by vehicles during the crash. This computer model was created from data collected during our crash site inspection, photographs and other documents provided to Kineticorp.

- In creating our computer models of the crash site and vehicles, Kineticorp utilized principles and techniques of three-dimensional visualization and photogrammetry to locate and place the physical evidence and vehicle positions, and to document accident related vehicle damage. Photogrammetry encompasses techniques used to obtain measurements and three-dimensional positional data from photographs. The following technical literature describes the photogrammetric principles and techniques employed by Kineticorp. These principles and techniques are widely accepted and used within the field of accident reconstruction.

  - Brach, Raymond M., et al., Vehicle Accident Analysis and Reconstruction Methods, "Chapter 10: Photogrammetry," Society of Automotive Engineers, Warrendale, PA, 2005.

  - Breen, Kevin C, et al., "The Application of Photogrammetry to Accident Reconstruction," Paper Number 861422, Society of Automotive Engineers, Warrendale, PA, 1986.

  - Chou, C., McCoy, R., Fenton, S., Neale, W., Rose, N., "Image Analysis of Rollover Crash Test Using Photogrammetry," Paper Number 2006-01-0723, Society of Automotive Engineers, Warrendale, PA, 2006.

  - Fenton, S., Neale, W., Rose, N., Hughes, C., "Determining Crash Data Using Camera-Matching Photogrammetric Technique," Paper Number 2001-01-3313, Society of Automotive Engineers, Warrendale, PA, 2001.

  - Husher, Stein E., Michael S. Varat, John F. Kerhoff, "Survey of Photogrammetric Methodologies for Accident Reconstruction," Proceedings of the Canadian Multi-Disciplinary Road Safety Conference VII, Vancouver, BC, Canada, June 1991.

  - Neale, W.T.C., Hessel, D., Terpstra, T., "Photogrammetric Measurement Error Associated with Lens Distortion," Paper Number 2011-01-0286, Society of Automotive Engineers, Warrendale, PA, 2011.

  - Neale, W.T.C., Fenton, S., McFadden, S., Rose, N.A., "A Video Tracking Photogrammetry Technique to Survey Roadways for Accident Reconstruction," Paper Number 2004-01-1221, Society of Automotive Engineers, Warrendale, PA, 2004.

  - Pepe, Michael D., et al., "Accuracy of Three-Dimensional Photogrammetry as Established by Controlled Field Tests," Paper Number 930662, Society of Automotive Engineers Warrendale, PA, 1993.

  - Rose, Nathan A., Neale, W.T.C., Fenton, S.J., Hessel, D., McCoy, R.W., Chou, C.C., "A Method to Quantify Vehicle Dynamics and Deformation for Vehicle Rollover Tests Using Camera-Matching Video Analysis," Paper Number 2008-01-0350, Society of Automotive Engineers, Warrendale, PA, 2008.

  - Rucoba, R., Duran, A., Carr, L., Erdeljac, D. "A Three Dimensional Crush Measurement Methodology Using Two-Dimensional Photographs." Paper Number 2008-01-0163, Society of Automotive Engineers, Warrendale, PA, 2008.

- Having created computer models of the crash scene, scene evidence and subject vehicles, Kineticorp engineers then analyzed the motion of the vehicles through the scene evidence. Our analysis of the vehicle motion relied on widely utilized and accepted literature related to the interpretation of physical evidence from vehicular crashes. A sampling of this literature is listed below:

  - Baker, Kenneth S., "Traffic Collision Investigation." Northwestern University Center for Public Safety, 2001.

  - Beauchamp, Gray, Hessel, David, Rose, Nathan A., Fenton, Stephen J., "Determining Steering and Braking Levels from Yaw Mark Striations," Paper Number 2009-01-0092, Society of Automotive Engineers, Warrendale, PA, 2009.

  - Daily, John, et al., Fundamentals of Traffic Crash Reconstruction, Institute of Police Technology and Management, 2nd Printing, June 2006.

  - Fricke, Lynn B., Traffic Accident Reconstruction, Northwestern University Center for Public Safety, First Edition, 1990.

- Kineticorp reconstructed the crash utilizing principles of Conservation of Energy and Conservation of Momentum. These principles are described and validated extensively in the literature pertaining to vehicular accident reconstruction. The follow list is a sampling of that literature.

- Brach, Raymond M., et al., Vehicle Accident Analysis and Reconstruction Methods, Society of Automotive Engineers, Warrendale, PA, 2005.
- Daily, John, et al., Fundamentals of Traffic Crash Reconstruction, Chapter 13 – Critical Speed Yaw, Institute of Police Technology and Management, 2006.

- Kineticorp also utilized crush analysis in reconstructing the crash. The principles and techniques of crush analysis are described and validated extensively in the literature pertaining to vehicular accident reconstruction. The following list is a sampling of that literature:
  - Campbell, K.L., "Energy As A Basis For Accident Severity – A Preliminary Study," Doctoral Thesis, University of Wisconsin, 1972.
  - Emori, Richard I., "Analytical Approach to Automobile Collisions," 680016, Society of Automotive Engineers, Warrendale, PA, 1968.
  - Neptune, James A., Flynn, James E., "A Method of Determining Accident Specific Crush Stiffness Coefficients," 940913, Society of Automotive Engineers, Warrendale, PA, 1994.
  - Rose, Nathan A., Fenton, Stephen J., Ziernicki, Richard M., "An Examination of the CRASH3 Effective Mass Concept," 2004-01-1181, Society of Automotive Engineers, Warrendale, PA, 2004.
  - Rose, Nathan A., Fenton, Stephen J., Ziernicki, Richard M., "Crush and Conservation of Energy Analysis: Toward a Consistent Methodology," 2005-01-1200, Society of Automotive Engineers, Warrendale, PA, 2005.
  - Rose, Nathan A., Fenton, Stephen J., Beauchamp, Gray A., "Restitution Modeling for Crush Analysis: Theory and Validation," 2006-01-0908, Society of Automotive Engineers, Warrendale, PA, 2006.
  - Warner, Charles Y. et al., "A repeated-Crash Test Technique for Assessment of Structural Impact Behavior," 860208, Society of Automotive Engineers, Warrendale, PA, 1986.

2004 Toyota: The Toyota involved in this crash was a 2004 model year Sienna XLE (VIN - 5TDZA22C34S052135). This vehicle was equipped with a 3.3-liter 6-cylinder gasoline engine and an automatic transmission. Figure 2 shows the Toyota at the accident scene. As can be seen in the figure, the Toyota shows signs of frontal impact and fire damage. The Toyota was not available for Kineticorp's inspection.

Figure 2

1996 Jeep: The Jeep involved in this crash was a 1996 model year Grand Cherokee Laredo (VIN- 1J4GZ58S9TC401311) equipped with a 4.0-liter 6-cylinder gasoline engine and an automatic transmission. Figure 3 shows the Jeep at the time of our inspection. As can be seen in the figure, the Jeep exhibits signs of impact damage to both the front and rear of the vehicle as well as fire damage.

Figure 3

Kineticorp determined that the maximum static crush to the rear of the Jeep was approximately 37 inches. The forces of the collision caused the rear axle of the Jeep to move forward.

1998 Subaru: The Subaru involved in this accident was a 1998 model year Legacy, Outback Edition (VIN - 4S3BG6852W7610862). This 4-door wagon was equipped with a 2.5-liter, 4-cylinder gasoline engine and an automatic transmission. Figure 4 shows the Subaru at the time of the accident. As can be seen in the figure, the Subaru sustained damage to the rear of the vehicle. The Subaru was not available for Kineticorp's inspection.

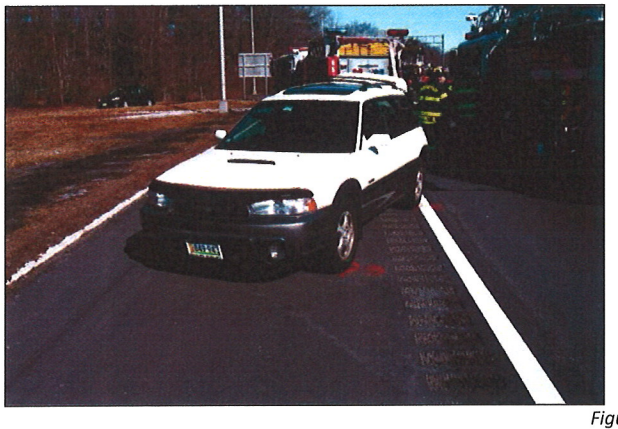

Figure42

Accident Scene Diagram: At the time of Kineticorp's scene inspection, gouging and burn mark evidence were still present on the roadway. Kineticorp surveyed this evidence and the site geometry and created a three dimensional model of the accident scene. Using this three dimensional model, Kineticorp located additional physical evidence and positions of involved vehicles by conducting photogrammetric analysis on photographs provided to Kineticorp.

Photogrammetry is the process of obtaining three-dimensional measurements and positional data from photographs. The photogrammetric technique that Kineticorp used on this case is referred to as camera-matching photogrammetry. This technique involves the following steps:

(1) Computer-modeling software is used to create a three-dimensional computer model of the crash scene from data that was collected at the scene with surveying equipment. This computer model includes features of the environment that were

present at the time of the accident such as road boundaries, roadway stripes and other unique aspects of the roadway environment.

(2) The computer-modeled environment is then imported into a modeling software package and a number of computer-modeled cameras are setup to view the computer environment from perspectives that are similar to the perspectives characterized in the photographs taken shortly after the accident.

(3) Each of the accident scene photographs that are to be analyzed are imported into the modeling software and is designated as a background image for the corresponding computer-modeled camera with the same perspective.

(4) Adjustments to the location, focal length and target location of the computer-modeled camera are made until there is an overlay between the computer-generated environment model and the environment shown in the photograph.

(5) Once the camera location and characteristics are determined and the overlay between the environment model and the photograph is obtained, non-permanent features, such as physical evidence on a roadway and vehicle positions can be mapped from the photograph onto the environment model. Computer models of non-permanent features, such as vehicle rest positions can also be added to the environment through this same process. Once these non-permanent features are transferred to the environment model, they can be measured relative to the known dimensions of the environment model.

Figure 5 depicts a sampling of our photogrammetry analysis. The first image of the figure is a photograph taken by police. In the second image of the figure, the accident scene photograph has been aligned with the computer model which is visible as an overlay of lines. The third image of Figure 5 ((continued on following page), shows the aligned computer model with the physical evidence traced. Additionally, vehicle models have been positioned to locate the involved vehicles points of rest. In the bottom image of Figure 5-continued, the photograph has been removed leaving the geometry from the computer model.

Figure 5

Figure 5-continued

Figure 6 depicts our accident scene diagram, including the rest positions of the vehicles that were located using photogrammetry. Glass, gouge marks and tire marks are indicated in blue. Fluid and burn areas are shown in orange.

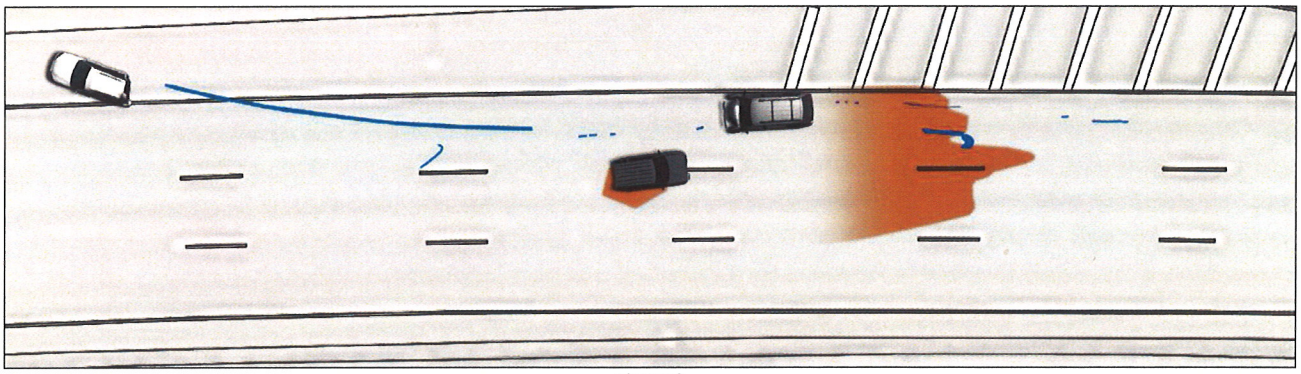

Figure 6

Analysis: Gouge and tire mark evidence were used to locate the points of impact on the roadway. Figure 7 depicts the location of the vehicles at first impact as dictated by the physical evidence.

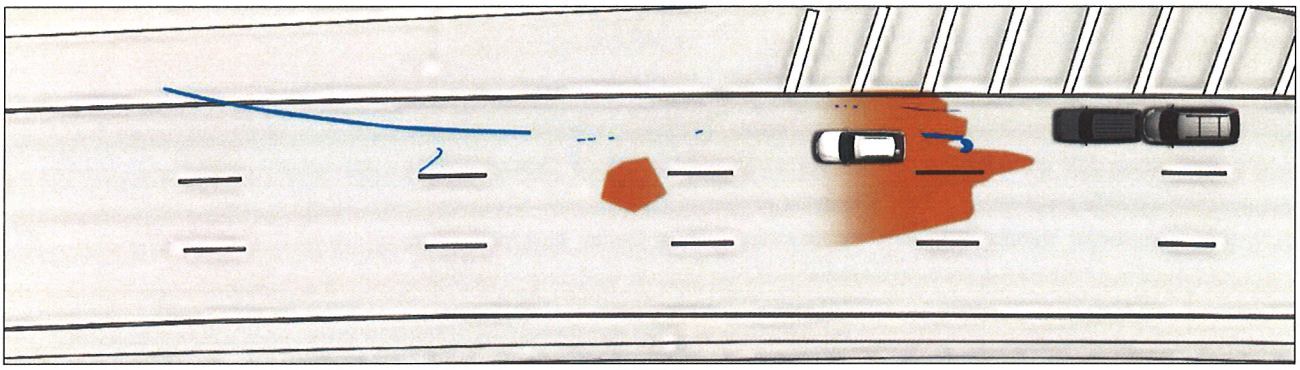

Figure 7

After the initial impact, the Jeep and Toyota traveled approximately 30 feet before impacting the rear of the Subaru. Figure 8 depicts the position of the vehicles at the second impact. As seen in the figure, the Jeep is crushed between the Toyota and Subaru. During impact two, the Jeep and Toyota were both damaged more extensively, as evidenced by the glass deposit at the location of the impact. As the Jeep was crushed, it rolled towards the passenger side and the Toyota under-rode the rear of the Jeep as depicted in Figure 9. The Jeep rolled approximately 25 degrees based on the damage pattern to the rear lift gates of the Jeep and the Subaru. Specifically, the window opening of the Jeep's rear lift gate exhibits more damage to the right side than the left, consistent with the Jeep being rolled to the right as the Toyota penetrated underneath the rear on the Jeep. Also, the rear lift gate of the Subaru exhibits damage consistent with the front of the Jeep being lifted up above the Subaru's rear bumper. Additionally, the right rear wheel of the Jeep gouged the pavement as it rolled to the right.

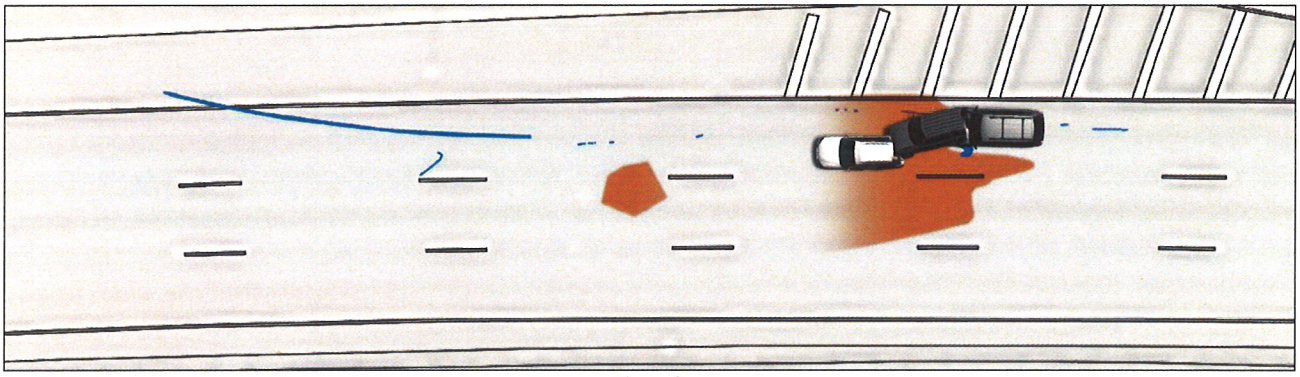

Figure 8

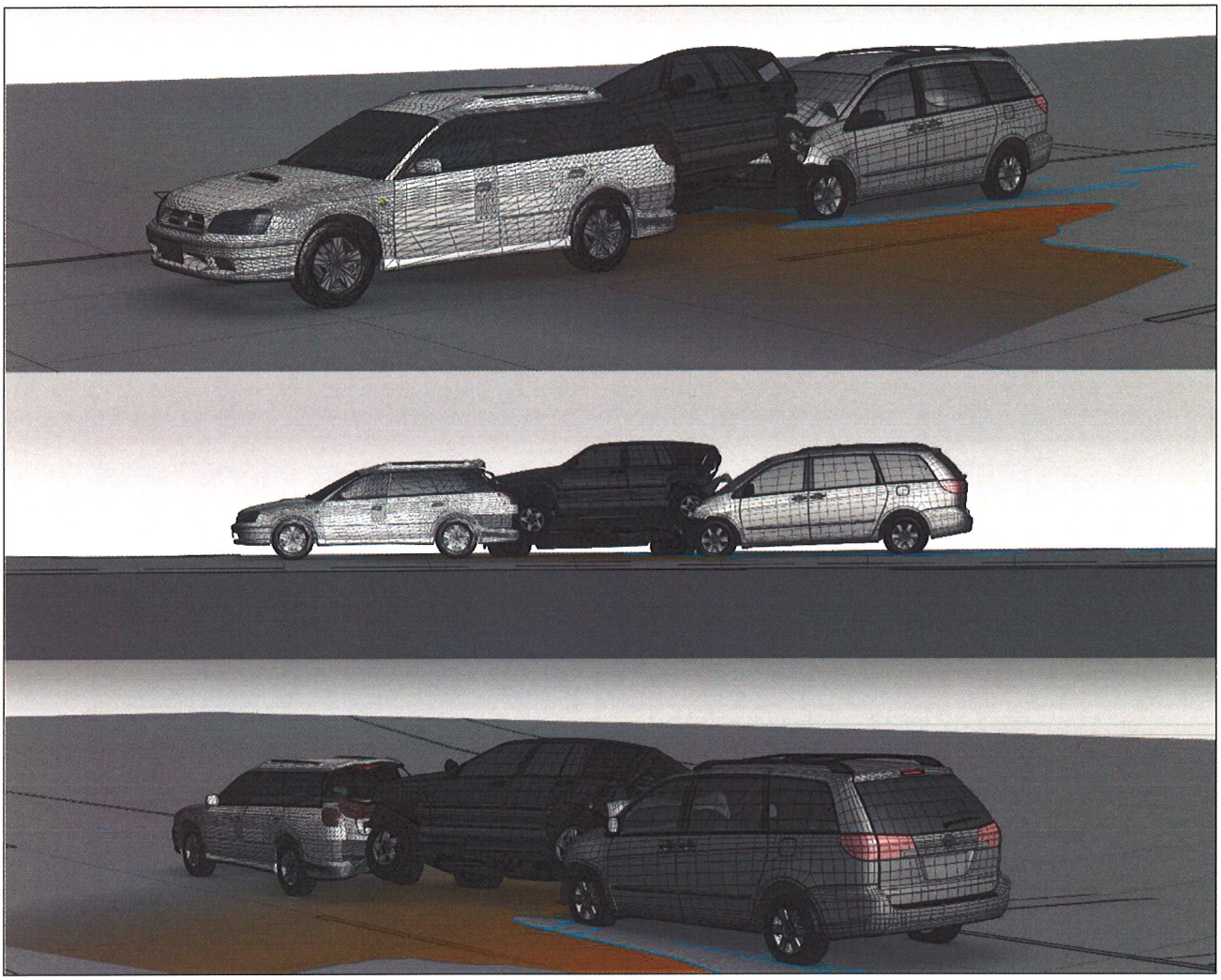

Figure 9

The vehicles then traveled to rest. The collision locked the rear right tire of the Subaru, causing it to leave a dark tire mark that led to its rest position. The Subaru traveled approximately 130 feet after the impact and came to rest on the shoulder. The Toyota traveled approximately 40 feet before coming to rest in the right lane. As the Jeep was crushed between the Subaru and the Toyota, it began to rotate counter-clockwise. The Jeep traveled approximately 50 feet, and rotated approximately 180 degrees before coming to rest straddling the right and middle lanes. The motion of the Jeep as it traveled to rest is depicted in Figure 10.

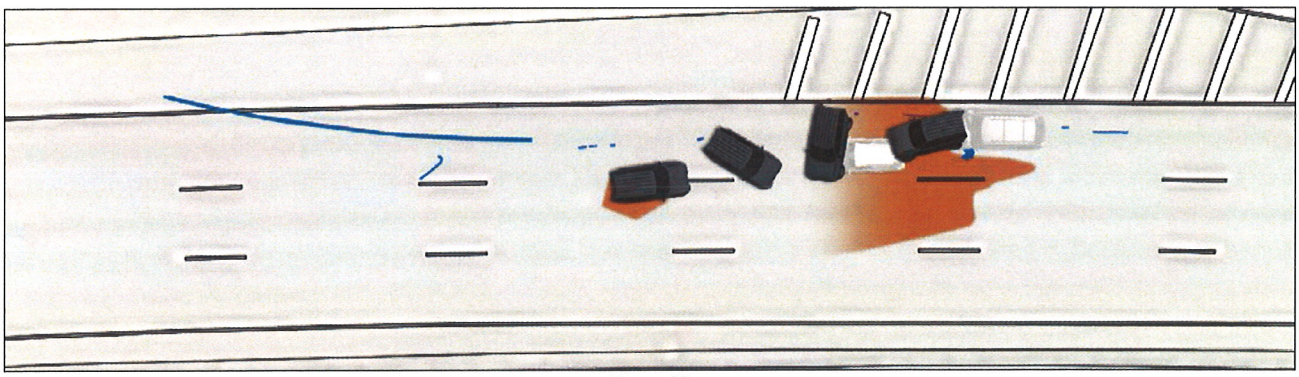

Figure 10

Through analysis of the accident sequence, Kineticorp determined that the Toyota impacted the Jeep at a speed of approximately 73 mph. There was no evidence of braking prior to the point of initial impact. Both the Jeep and Subaru were stopped or moving slowly when they were impacted. As a result of being impacted by the Toyota, the Jeep experienced a ΔV of approximately 38 mph.

Figure 11 below shows a gouge mark created during impact one when the Toyota first impacted the rear of the Jeep. The gouge mark was likely created when the Jeep's undercarriage made contact with the pavement. Analysis of the vehicle's bumper structures shows that the height of the Toyota's front bumper is in line with the Jeep's rear bumper and that there was good engagement between the bumper structures. As mentioned earlier, the Toyota pushed the Jeep ahead approximately 30 feet into the rear of the Subaru. During this second impact, the Jeep was crushed between the two vehicles and the rear structure of the Jeep, which had already been damaged, was crushed additionally. As seen in Figure 11, the fire pattern on the ground is located in the area of impact two. As depicted in Figure 9, the Toyota penetrated underneath the left side of the Jeep causing it to roll towards its right side. It is during this second impact where there is evidence of a fire pattern on the ground due to the Jeep's fuel system being breached.

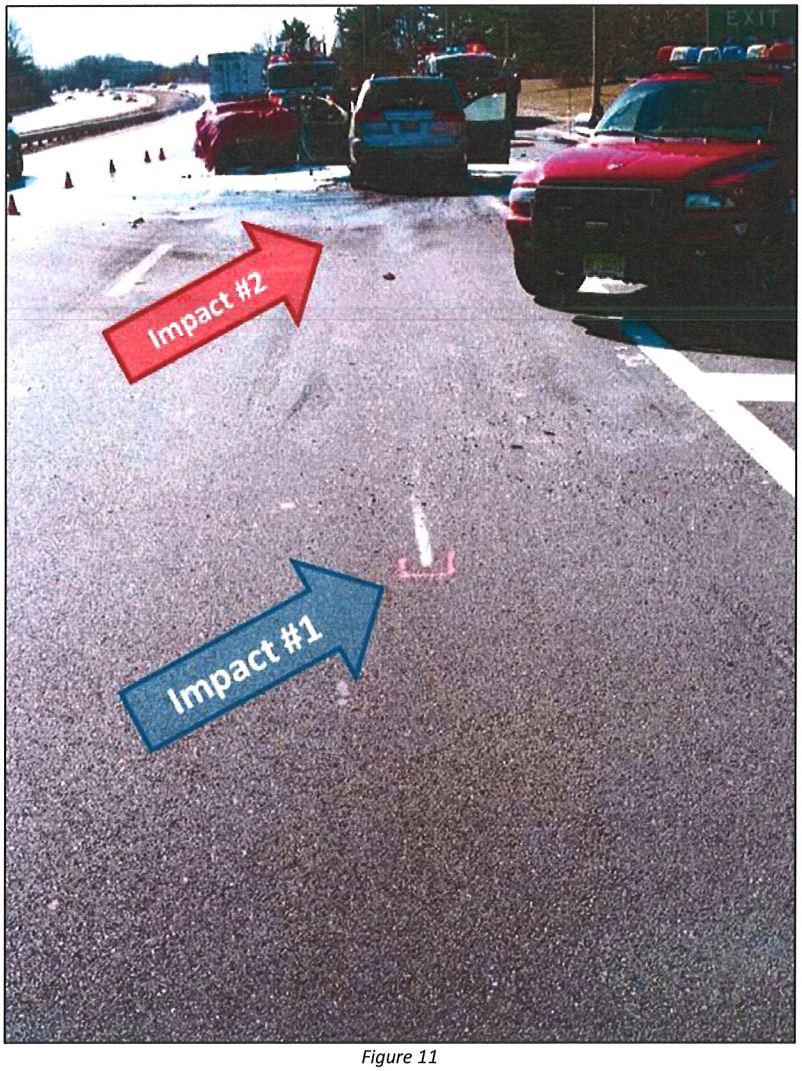

Figure 11

The top image in Figure 12 depicts the damage to the Jeep, as documented with our three-dimensional scan. The rear axle is highlighted in blue in Figure 12. The bottom image of Figure 12 depicts the relative movement of the rear axle compared to its original undamaged position. The axle would have moved further forward dynamically during the crash.

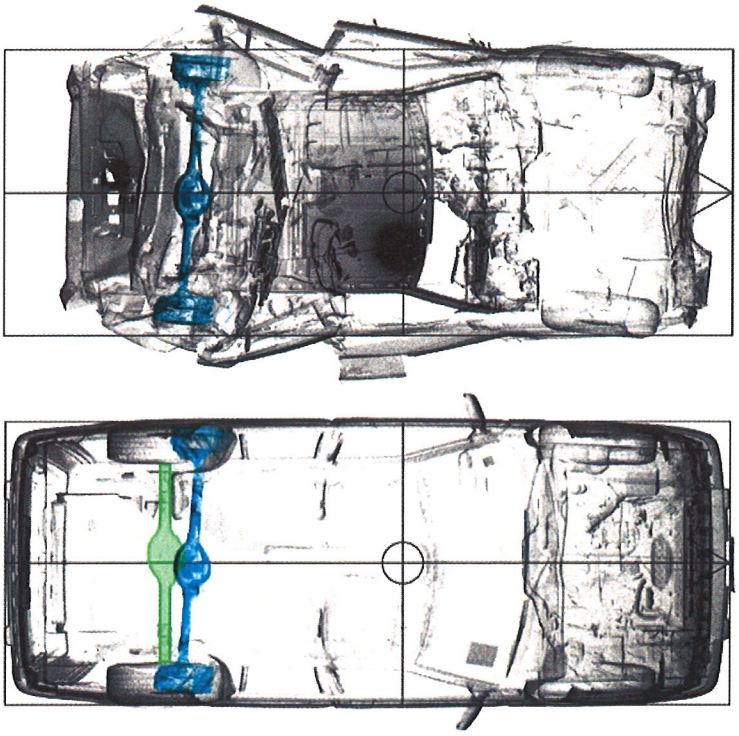

Figure 12

Discussion: Kineticorp compared the severity of the initial impact to the Jeep to the FMVSS 301 fuel system integrity test. In the FMVSS 301 test, a four-thousand-pound, rigid barrier impacts the rear of the vehicle at 30 mph. Kineticorp determined that the first impact between the Toyota and Jeep was approximately 6 times more severe than the FMVSS test conditions.

Kineticorp also examined crash test reports produced for the Center for Auto Safety (CAS) by KARCO[1]. These tests involved 1999 and 1996 Jeep Grand Cherokee vehicles being impacted by Ford Taurus'. Kineticorp determined that the energy involved in the initial impact between the Toyota and Jeep in the subject accident was approximately 2 times greater than the 1999 Jeep test, and approximately 4 times greater than the 1996 Jeep test.

The subject accident was significantly different than the KARCO tests in terms of the lateral and vertical alignment of the vehicles. The top image in Figure 13 depicts the initial impact alignment between the Toyota and the Jeep. The image below shows the alignment between the Taurus and Jeep from test TR-P31070-01-NC. The top of the bumper of each vehicle has been indicated, the Jeep in red and the impacting vehicle in yellow. As depicted, there was good bumper alignment in the subject accident. However, in the KARCO test, the entire bumper of the Taurus was beneath the bumper of the Jeep. The test setup is conducive to vehicle under-ride, the subject accident was not. In both KARCO tests, the tires on the Jeep were significantly larger than the tires on the subject Jeep at the time of the accident. Also, the tires on the test Taurus were significantly smaller than the recommended tire size for that vehicle in test TR-P31070-01-NC. These tire differences make it easier for the Taurus to under-ride the rear of the Jeep in the tests. Further, the test tire pressures were not listed in the test reports and it appears that the tires of the Taurus were underinflated for the test. This would lower front of the Taurus and make it easier for the tires of the Taurus to compress during the impact. Low tire pressure would also make it easier for the Taurus to under-ride the Jeep. The alignment between the test vehicles was drastically different than the alignment during the accident. In terms of under-ride propensity, the vehicle and tire selections in the test are skewed towards a worst case scenario for the Jeep's structural ability to absorb the crash energy. These conditions did not exist in the subject accident.

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[1] Test numbers TR-P31070-01-NC and TR-P31015-01-A

Figure 13

In the subject accident, the Toyota impacted squarely into the entire rear of the Jeep. In the KARCO tests, the collision was offset, such that the entire rear of the Jeep was not directly involved in the collision. This offset in the test is significant because less of the vehicle's width is available to absorb the impact energy. In other words, offset collisions are more severe in terms of energy absorption demands placed on the impacted vehicle. Since the subject accident was a full overlap collision, the offset tests are misrepresentative of the subject accident. The top image in Figure 14 depicts the lateral alignment of the vehicles in the subject accident. The red line indicates the center of the Jeep, the yellow line indicates the center of the Toyota. The KARCO test is depicted below.[2] In the KARCO test, the Taurus is offset significantly to the left at impact. Due the lateral and vertical alignment differences, no meaningful comparisons can be made between the subject accident and the KARCO test results. It should also be noted that components in the test Jeeps were removed, such as the spare tire, door panels and the rear side windows. At this time Kineticorp has not made a determination as to the effect of removing these items in the tests.

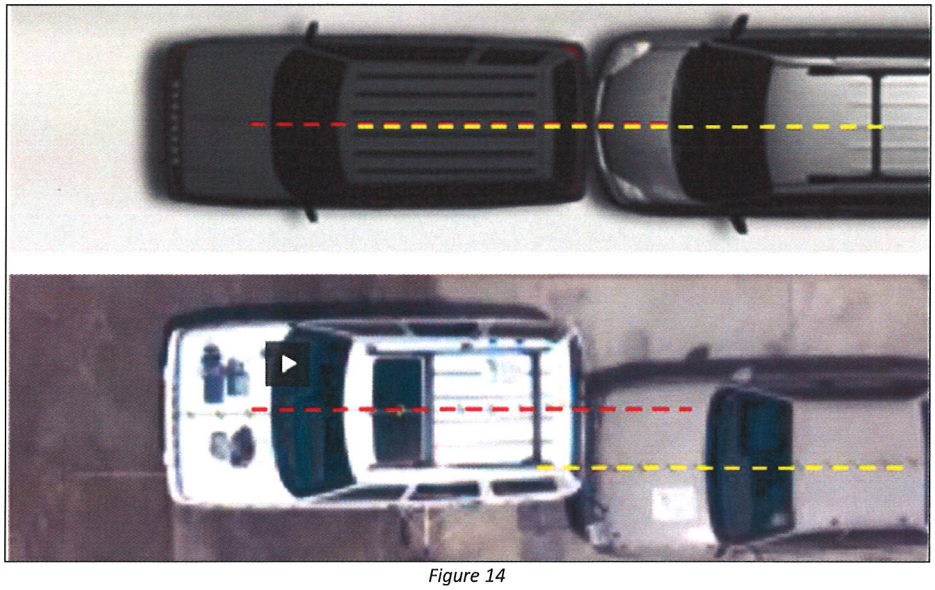


Figure 14

[2] Note the distortion from the KARCO video makes the Jeep appear wider than it is.

Both the FMVSS and KARCO tests are single impact tests and do not involve a secondary impact as occurred in the subject accident. These tests do not take into account the additional severity introduced by a second loading event or under-ride to an already damaged vehicle.

Closing: The opinions and conclusions expressed in this report were reached to a reasonable degree of engineering certainty based on our investigation and analysis to date. We reserve the right to critique opposing experts after having the opportunity to review their file materials and testimony. Further information, data, investigation or analysis may lead us to revise or supplement these opinions and conclusions. Kineticorp may produce additional graphics and animations for use at trial.

Sincerely,

Stephen J. Fenton, P.E.
Principal Engineer

COLORADO LICENSED
STEPHEN J. FENTON
30920
PROFESSIONAL ENGINEER

Gray Beauchamp, P.E.
Senior Engineer

COLORADO LICENSED
ARTHUR GRAY BEAUCHAMP
43741
PROFESSIONAL ENGINEER

Appendix A
List of Provided Materials

New Jersey Police Crash Investigation Report; Case No. B080-2007-00445A dated 02/24/2007
State of New Jersey Division of Fire Safety Incident Report dated 02/24/2007

- **Digital Photographs**
  - PDF containing 41 police photos
  - PDF containing 420 photos of Vehicle Inspection taken by Dynamic Analysis Group
  - PDF containing 16 photos of Scene Inspection taken by Dynamic Analysis Group
  - PDF containing 81 black and white photos taken by Mr. Alcala
  - 41 8x10 police photos

- **Digital Video**
  - Video provided by Paul Sheridan

- **Deposition Transcripts** *(with Exhibits*)*
  - Victoria Morgan-Alcala*
  - Detective Kevin Bartles
  - Natalie Rawls
  - Phillip Kaeser
  - Paul Sheridan*
  - Trooper Elkin Orellano*

- **Expert Reports**
  - Donald Phillips Initial Report (National Forensic Engineers, Inc.) dated 04/22/09
  - Donald Phillips Supplemental Report (National Forensic Engineers, Inc.) dated 07/25/2011
  - Neal Hanneman Preliminary Report (Forensic Automotive Consulting Team) dated 12/04/2009
  - Neal Hanneman Supplemental Report (Forensic Automotive Consulting Team) dated 08/03/2011
  - William Bush Report (Bush Investigative Services, LLC) dated 12/03/09
  - Paul Sheridan Report – Second Revision dated 08/10/2011
  - Ross IS Zbar Report (Plastic and Reconstructive Surgery) dated 08/09/10
  - Nicholas Durisek Report (Dynamic Analysis Group, LLC) dated 03/14/11
  - Robert Banta Report (Banta Technical Services, LLC) dated 03/24/11
  - Robert Banta Supplemental Report (Banta Technical Services, LLC) dated 12/12/11
  - Carl Nash Report dated 08/11/2011
  - Thomas Bennent Report (Forensic Medicine and Pathology) dated 09/09/11
  - Rose Ray Report (Exponent Failure Analysis Associates, Inc.) "Analysis of the Real-World Crash Performance of 1993-1998 Jeep Grand Cherokees dated 12/15/11

- **Legal Documents**
  - Second Amended Complaint
  - Natalie Rawls Answers
  - Deposition Notices for Plaintiff's Experts
  - Deposition Subpoena Notices
  - Answers to Form C Interrogatories

- **Other Documents**
  - Natalie Rawls Statement of Order
  - ZJ Real World Crash Study

- ZJ Frames and Bumpers Manual
- ZJ Fuel System Manual

ATTACHMENT 5

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

3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body Impact Test of 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content Five Pages:

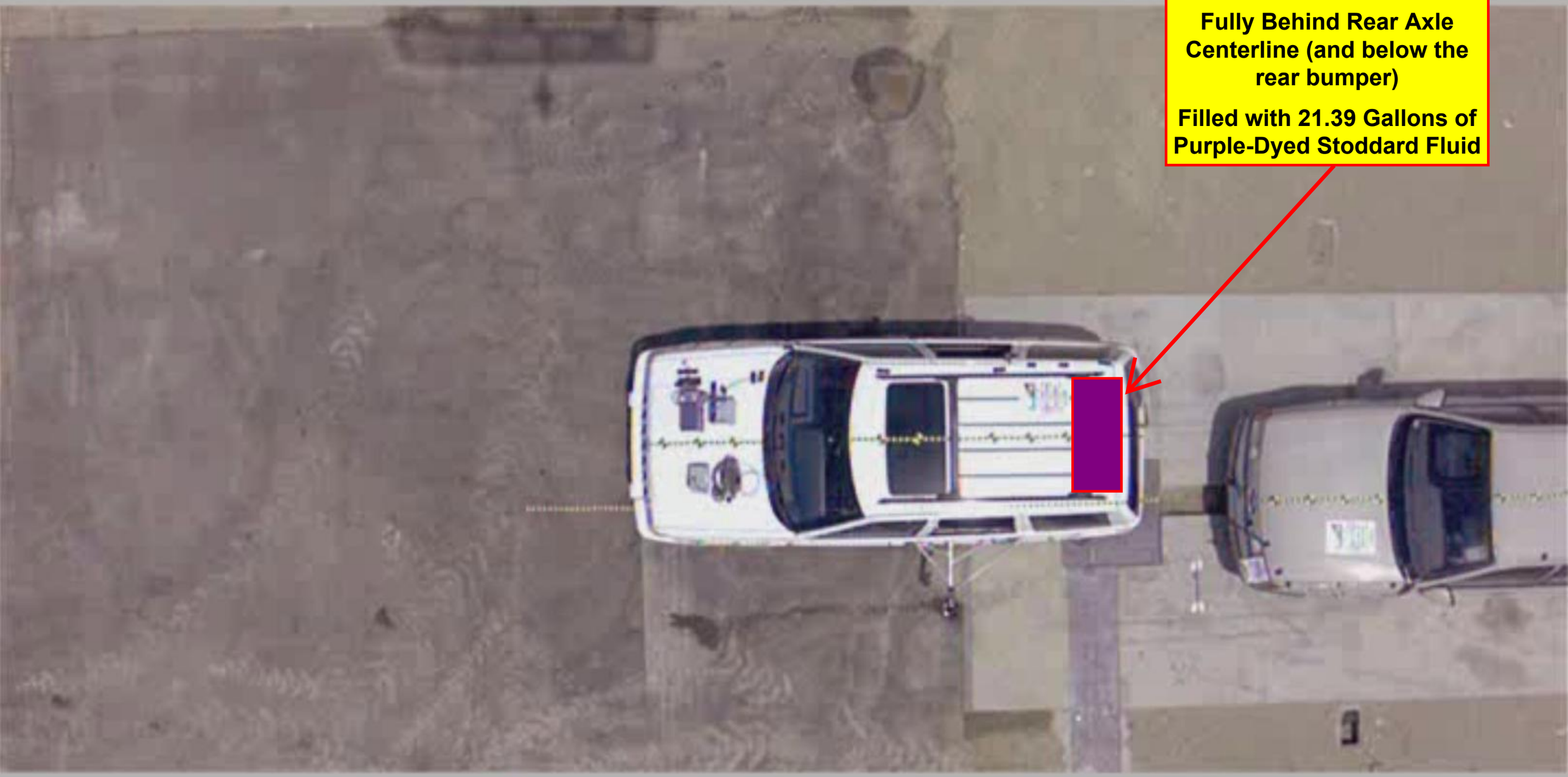
Time -0.050 : Pre-Impact Views / Data Initiation

Fifty milliseconds prior to impact the cameras begin recording at 1000 frames per second. Four views here provide pre-impact details and information.

Camera View-01

Frame # -50 Time -0 .050

Camera View-02



Frame # -50 Time -0.050

Camera View-02

Frame # -50 Time -0.050

Camera View-03

Frame # -50 Time -0 .050


4x4
Solvent Added: 21.39 gals.

ATTACHMENT 6

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

3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content: Four Pages

Time 0.000 : Pre-Impact Views

At T = 0.000 contact between the bullet vehicle and the target Jeep Grand Cherokee has occurred. A reference point is indicated for analysis of the post-collision target vehicle movement in the X-axis. The fuel tank stoddard fill (21.39 gallons), and the lack of purple-dyed stoddard staining of the impact pad is emphasized.

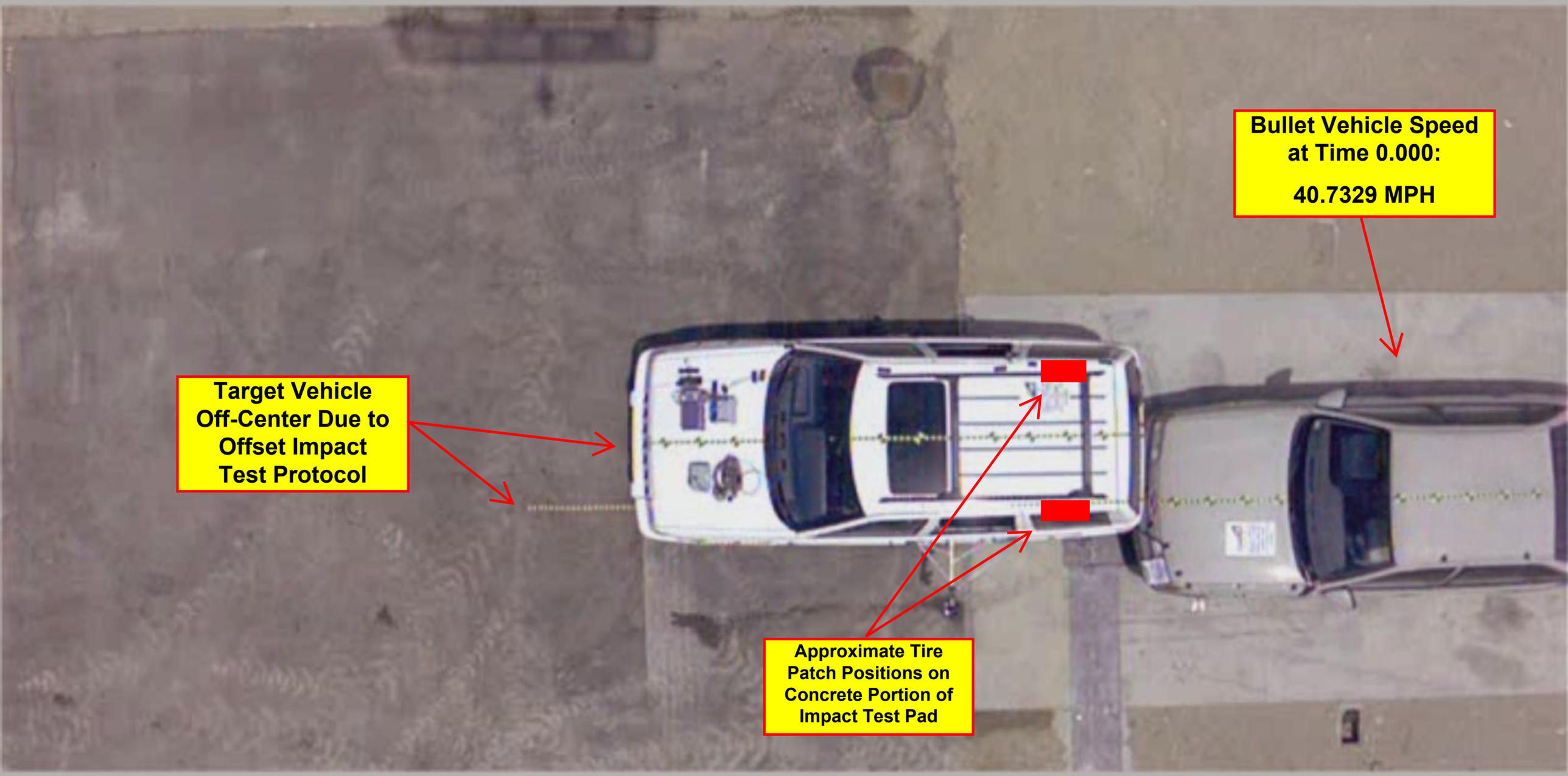
Camera View-01

Frame # 0 Time 0.000

Camera View-02

Frame # 0 Time 0.000

Camera View-02



Frame # 0 Time 0.000

Camera View-03

Frame # 0 Time 0.000

ATTACHMENT 7

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

3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body Impact Test of 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content Three Pages:

Time +0.052 : Post-Impact Views - Maximum Accelerations

This time point was chosen because it represents approximately the mutual maximum deceleration of the Ford Taurus bullet vehicle, and the maximum acceleration of the Jeep Grand Cherokee target vehicle (ATTACHMENT 8):

- At T = 0.0519 the bullet attained its maximum post-collision deceleration of 16.9 Gs.
- At T = 0.0531 the target attained its maximum post-collision acceleration of 17.4 Gs

This time point represents the moment when maximum transfer of kinetic energy from the bullet to the target has occurred. Note that the target vehicle has not yet commenced movement in the X-axis. However, despite this fact, it is obvious is that the bullet is “underriding” and has completely encroached into the position occupied by the unprotected, rear-mounted polyethylene fuel tank of the Jeep Grand Cherokee. Even at this very early stage in this low energy impact test, the fuel tank has been breached by front components of the Ford Taurus. Although not yet visible, those front components have essentially “plugged the holes” made during impact. At this point, in this underride event, leakage of stoddard has commenced.

Camera View-01

Frame # 52 Time 0.052

Camera View-02

Frame # 52 Time 0.052

Camera View-03

T = 0.052 Represents Maximum Deceleration and Acceleration of Bullet and Target Vehicles Respectively. However, Target Vehicle Movement in X-axis direction has not yet commenced.

Frame # 52 Time 0.052

ATTACHMENT 8

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Administrator
NHTSA Headquarters
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body Impact Test of 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content Six Pages.

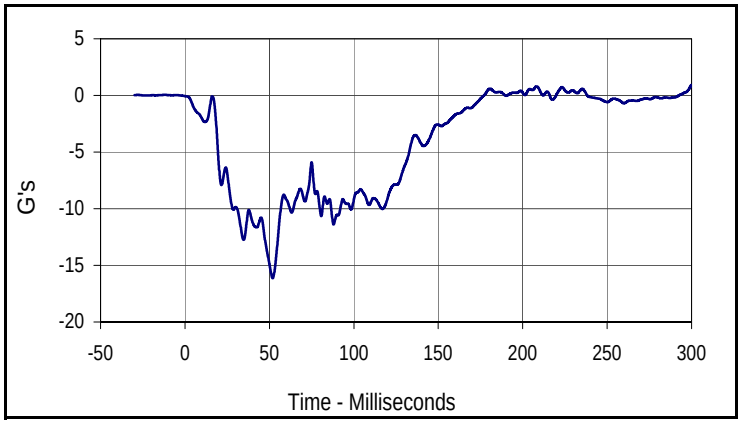
Appendix B: Instrumentation Data Traces

Karco Engineering Report of 7 June 2011 for Test # TR-P31070-01 of 16 May 2011

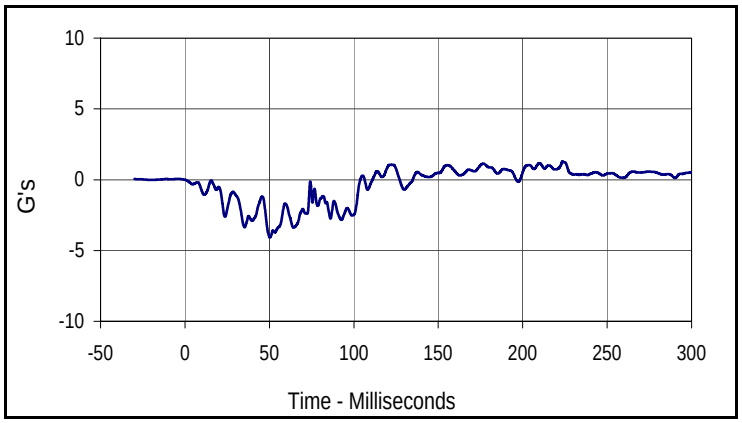
APPENDIX B
INSTRUMENTATION DATA TRACES

TABLE OF DATA PLOTS

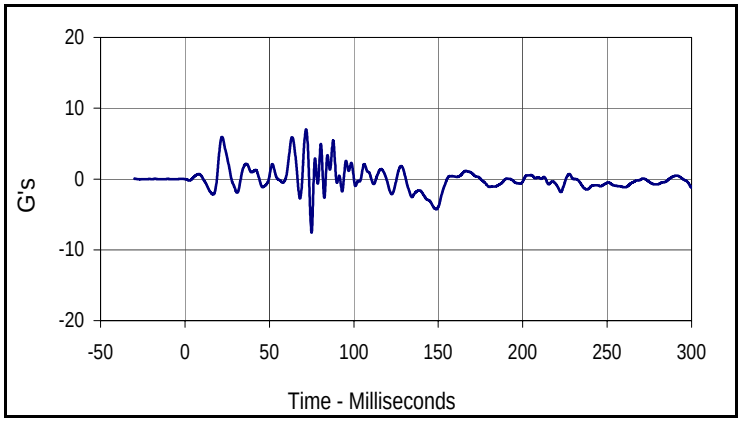
Test Vehicle:	1988 Ford Taurus 4-Dr Sedan	Project No.:	P31070-01
Test Program:	40 MPH Rear Impact 30% Offset	Test Date:	5/16/11



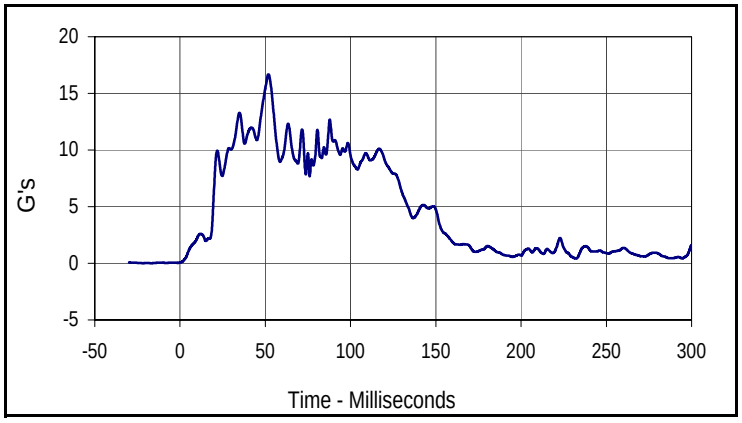
Curve Description			
Bullet Vehicle Center Tunnel X			
Plot	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
0.9	299.9	-16.1	51.9



Curve Description			
Bullet Vehicle Center Tunnel Y			
Plot	Type	SAE Class	Units
002	FIL	60	G's
Max	Time	Min	Time
1.3	223.7	-4.1	50.3

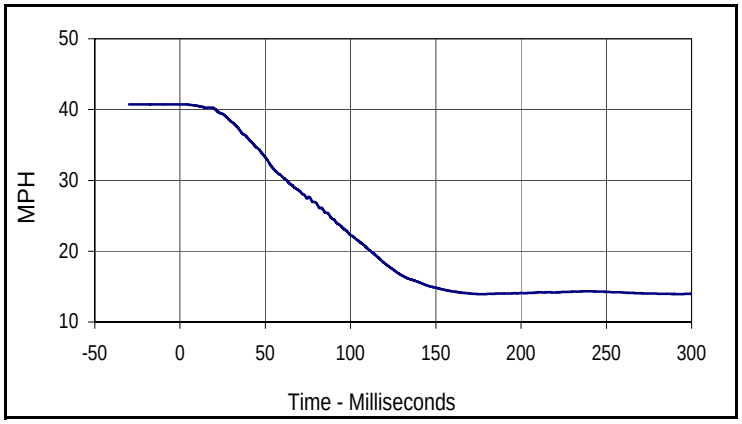


Curve Description			
Bullet Vehicle Center Tunnel Z			
Plot	Type	SAE Class	Units
003	FIL	60	G's
Max	Time	Min	Time
7.0	71.7	-7.6	75.0



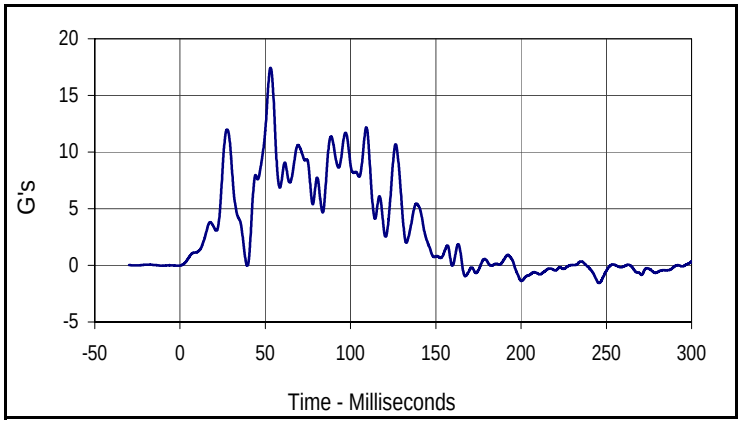
Curve Description			
Bullet Vehicle Center Tunnel Resultant			
Plot	Type	SAE Class	Units
004	RES	60	G's
Max	Time	Min	Time
16.7	51.9	0.1	0.0

Test Vehicle:	1988 Ford Taurus 4-Dr Sedan	Project No.:	P31070-01
Test Program:	40 MPH Rear Impact 30% Offset	Test Date:	5/16/11

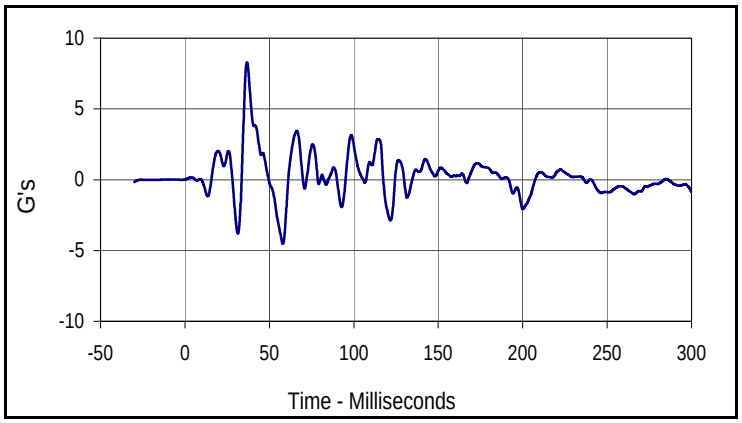


Curve Description			
Bullet Vehicle Center Tunnel X Velocity			
Plot	Type	SAE Class	Units
005	IN1	180	MPH
Max	Time	Min	Time
40.7	0.0	13.9	178.9

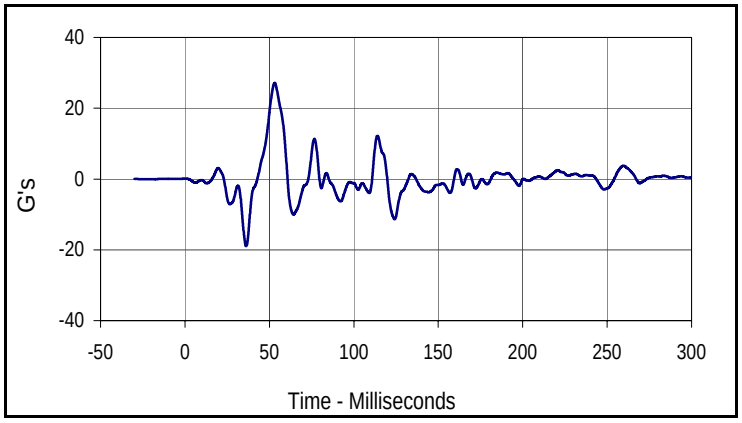
Test Vehicle:	1996 Jeep Grand Cherokee 5-Dr MPV	Project No.:	P31070-01
Test Program:	40 MPH Rear Impact 30% Offset	Test Date:	5/16/11



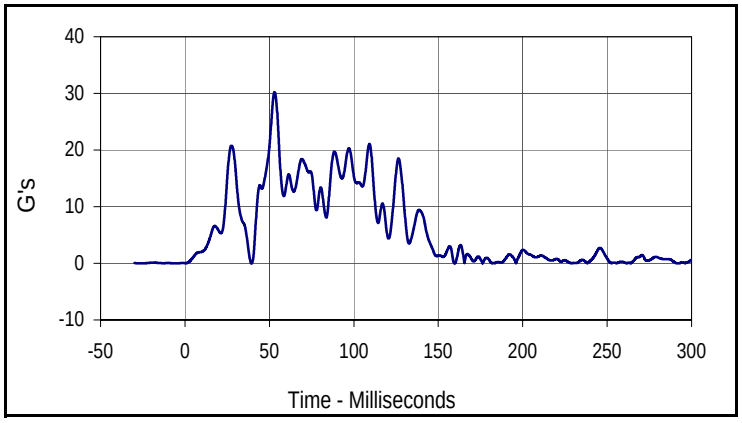
Curve Description			
Target Vehicle Center Tunnel X			
Plot	Type	SAE Class	Units
006	FIL	60	G's
Max	Time	Min	Time
17.4	53.1	-1.6	245.8



Curve Description			
Target Vehicle Center Tunnel Y			
Plot	Type	SAE Class	Units
007	FIL	60	G's
Max	Time	Min	Time
8.3	36.7	-4.5	58.0

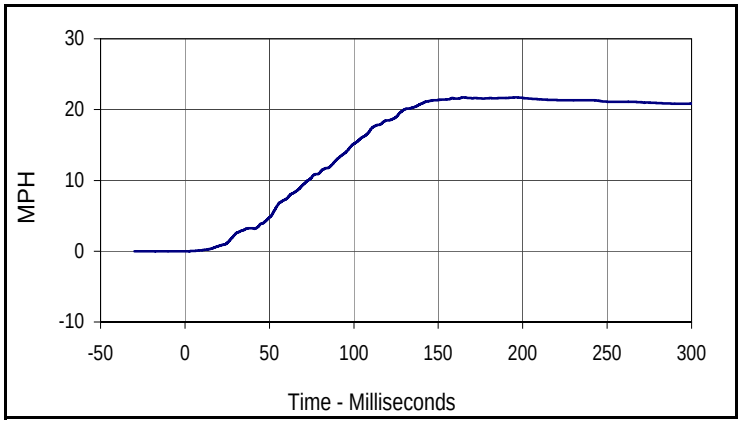


Curve Description			
Target Vehicle Center Tunnel Z			
Plot	Type	SAE Class	Units
008	FIL	60	G's
Max	Time	Min	Time
27.1	53.1	-18.9	36.3



Curve Description			
Target Vehicle Center Tunnel Resultant			
Plot	Type	SAE Class	Units
009	RES	60	G's
Max	Time	Min	Time
30.2	53.1	0.0	291.3

Test Vehicle:	1996 Jeep Grand Cherokee 5-Dr MPV	Project No.:	P31070-01
Test Program:	40 MPH Rear Impact 30% Offset	Test Date:	5/16/11



Curve Description			
Target Vehicle Center Tunnel X Velocity			
Plot	Type	SAE Class	Units
010	IN1	180	MPH
Max	Time	Min	Time
21.7	196.0	0.0	1.0

ATTACHMENT 9

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202-366-4000

3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body Impact Test of 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content Three Pages:

Time +0.073 : Post-Impact Views - Bodyside and Door Frame Deformation

This data point was chosen because it represents approximately the moment when a second major milestone in the victimization of the Jeep Grand Cherokee occupants has occurred:

- Detailed analysis of these views indicates that bodyside and door frame deformation has occurred, and all four ZJ-Body doors are jammed, making egress nearly impossible (ATTACHMENT 10).

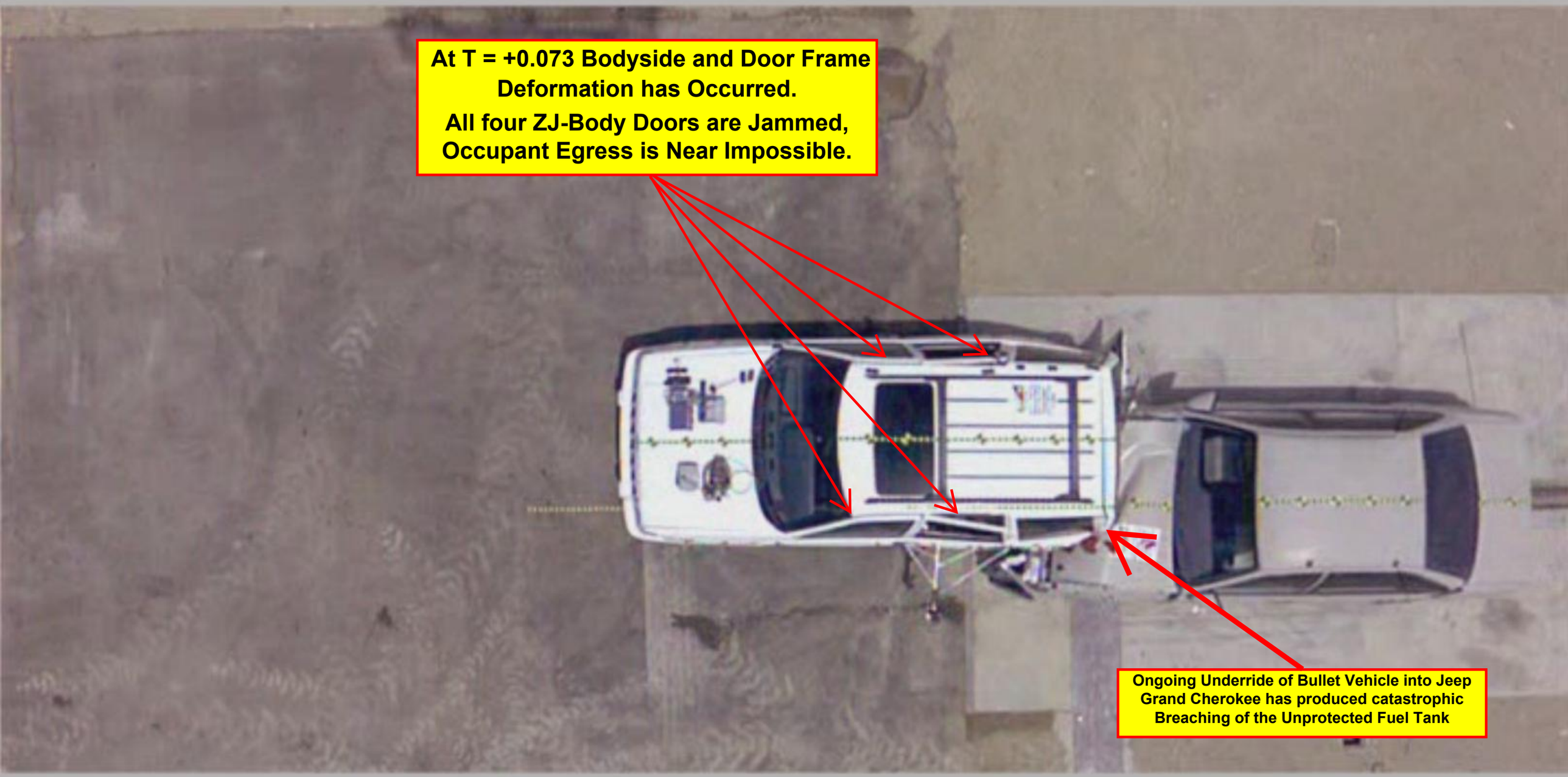
- At T = +0.073 the breaching of the fuel tank by an "underriding" bullet vehicle is ongoing. Whatever claims that could be made about my opinion that breach had already occurred at T = +0.052 are moot at this point.

Also note that the target vehicle has still not yet commenced movement in the X-axis direction.

Camera View-01

Frame # 73 Time 0.073

Camera View-02



Frame # 73 Time 0.073

Camera View-03

Even in this Low Speed Impact Test, Underride of Bullet Vehicle into Jeep Grand Cherokee has produced catastrophic Breaching of the Unprotected Fuel Tank

Frame # 73 Time 0.073

ATTACHMENT 10

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3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body Impact Test of 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content One Page:

Karco Engineering Test Report Page 4,

BULLET VEHICLE DOOR OPENING DATA (Ford Taurus)

TARGET VEHICLE DOOR OPENING DATA (Jeep Grand Cherokee)

DATA SHEET NO. 1

CRASH TEST SUMMARY

Bullet Vehicle: 1988 Ford Taurus 4-Door Sedan Project No.: P31070-01

Target Vehicle: 1996 Jeep Grand Cherokee Limited 5-Door MPV Test Date: 05/16/11

PRIMARY IMPACT DATA

Parameter	Units	Value
Bullet Vehicle Velocity at Impact	km/h	65.53
Bullet Vehicle Test Weight	kg	1529.0
Bullet Vehicle Maximum Static Crush	mm	370
Target Vehicle Test Weight	kg	1899.0
Target Vehicle Maximum Static Crush	mm	580
Impact Point (From Centerline)	mm	560

BULLET VEHICLE DOOR OPENING AND SEAT TRACK DATA

Description	Driver	Passenger
Front Door Opening	Remained closed and operational	Remained closed and operational
Rear Door Opening	Remained closed and operational	Remained closed and operational
Seat Track Shift	Unknown	Unknown
Seat Back Failure	No	No

TARGET VEHICLE DOOR OPENING AND SEAT TRACK DATA

Description	Driver	Passenger
Front Door Opening	Jammed shut	Jammed shut
Rear Door Opening	Jammed shut	Jammed shut
Seat Track Shift	Unknown	Unknown
Seat Back Failure	Yes	Yes

VIDEO COVERAGE

Description	Number
High Speed Video Cameras	3
Real Time Video Cameras	2
Total	5

INSTRUMENTATION SUMMARY

Description	Number
Driver ATD Sensors	
Passenger ATD Sensors	
Bullet Vehicle Structure Accelerometers	3
Target Vehicle Structure Accelerometers	3
Total	6

ATTACHMENT 11

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3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body Impact Test of 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content Three Pages:

Time +0.119 : Post-Impact Views - Bullet/Target Speed Crossover Point

A critical moment in an impact test, which provides raw data which enables calculation of plasticity, elasticity, impulse, restitution, etc., is called the crossover point. At this discrete moment, the accelerating target vehicle has reached the same speed as the decelerating bullet vehicle:

- At the crossover point the bullet vehicle kinetic energy, which was available for transfer, has been fully transferred into the target vehicle. The maximum transfer is dependent on the specific test combinations, but at this point no further significant deformation (i.e. plasticity) of either vehicle will occur.

- The plasticity portion of the impact has concluded, and the elasticity portion is manifest. That is, separation of the target from the bullet begins . . . the target vehicle begins to 'pull away.'

- At this point the target vehicle will continue to utilize kinetic energy (which had been transferred from the bullet) to accelerate further until its reaches it maximum post-collision speed; this data of the target vehicle represents its maximum change in velocity, called Delta-V: 21.7 mph.

- In this 16 May 2011 crash test combination (speed, directional vectoring, offset mode, and vehicles types) the crossover occurs at approximately 119.1 milliseconds after the initial impact (T = 0.000).

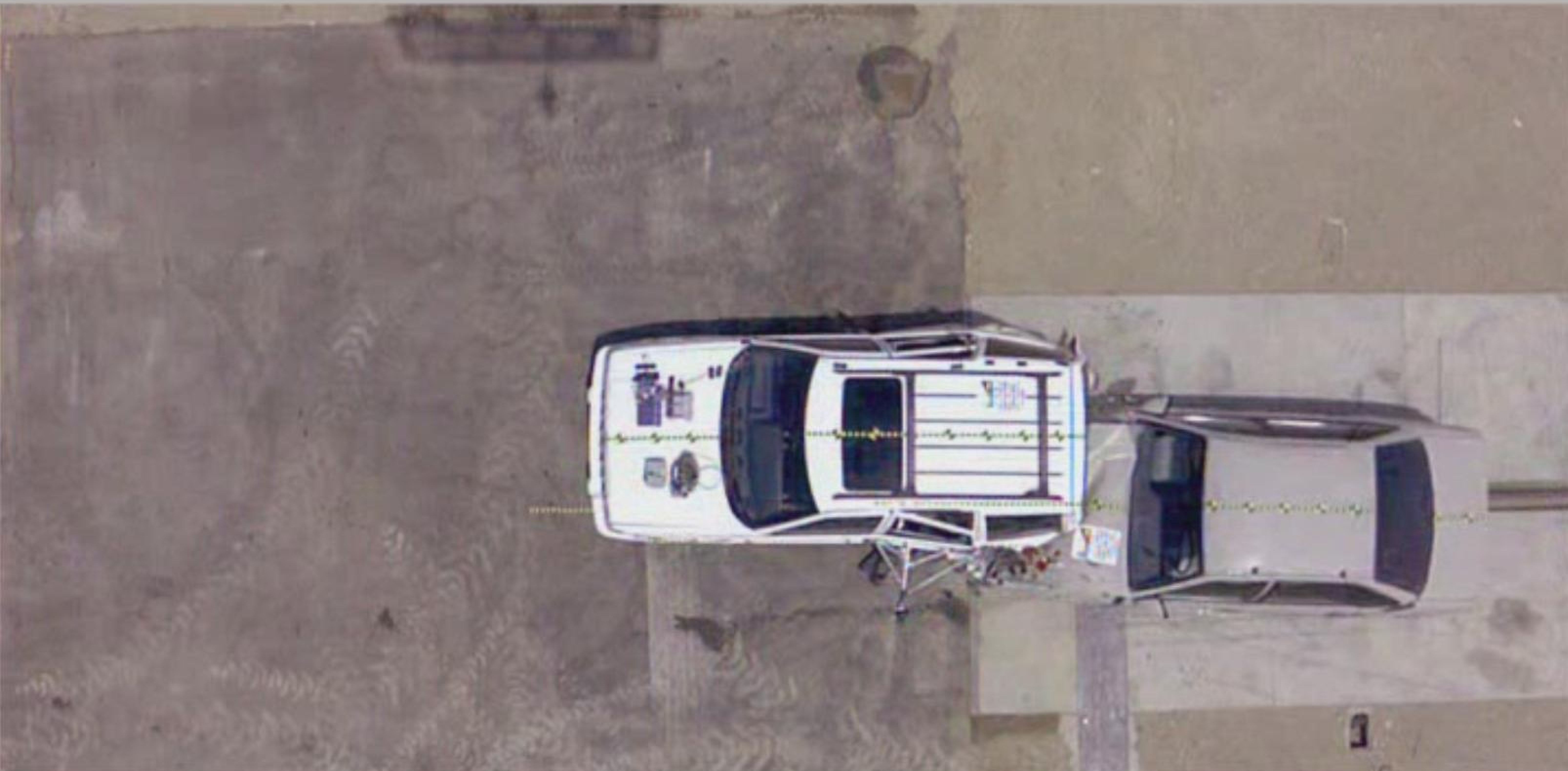
- In this crash test combination, the crossover speed is approximately 18.46 mph (ATTACHMENT 12).

At T = +0.119, the target vehicle has commenced appreciable movement in the X-axis direction. This separation sequence, which moves the target /bullet vehicles off the impact pad, exposes the surface, and accommodates viewing of the stoddard evidence of a fuel tank breach which I assert occurred back at T = +0.052.

Camera View-01

Frame # 119 Time 0.119

Camera View-02



Frame # 119 Time 0.119

Camera View-03

Frame # 119 Time 0.119

ATTACHMENT 12

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3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body Impact Test of 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content One Page.

Time +0.119 : Post-Impact Views - Bullet/Target Speed Crossover Point

A critical moment in an impact test is called the crossover point. At this discrete moment, the accelerating target vehicle has reached the same speed as the decelerating bullet vehicle:

- In this 16 May 2011 crash test the crossover occurs at approximately 119.1 milliseconds after the initial impact.

- In this crash test combination, the crossover speed is approximately 18.46 mph.

Time +0.119 : Post-Impact Views - Bullet/Target Speed Equalization
"Crossover" Point Data Set *

Bullet Vehicle 1988 Ford Taurus (Taurus Platform)		Target Vehicle 1996 Jeep Grand Cherokee (ZJ-Body)	
Velocity in MPH (*Decreasing*)	Impact Duration: Event Time in Milliseconds	Velocity in MPH (*Increasing*)	Impact Duration: Event Time in Milliseconds
18.7533	117.8	18.2917	117.8
18.7323	117.9	18.3082	117.9
18.7113	118	18.3252	118
18.6902	118.1	18.3426	118.1
18.6689	118.2	18.36	118.2
18.6473	118.3	18.3771	118.3
18.6254	118.4	18.3935	118.4
18.6032	118.5	18.4088	118.5
18.5808	118.6	18.4226	118.6
18.5582	118.7	18.4346	118.7
18.5356	118.8	18.4445	118.8
18.5129	118.9	18.4522	118.9
18.4904	119	18.4578	119
18.4681	119.1	18.4616	119.1
18.4461	119.2	18.4638	119.2
18.4244	119.3	18.4648	119.3
18.403	119.4	18.465	119.4
18.382	119.5	18.4648	119.5
18.3613	119.6	18.4647	119.6
18.341	119.7	18.4646	119.7
18.3208	119.8	18.465	119.8
18.3009	119.9	18.4656	119.9
18.2811	120	18.4666	120
18.2615	120.1	18.468	120.1
18.2421	120.2	18.4697	120.2
18.2229	120.3	18.4718	120.3
18.2039	120.4	18.4742	120.4
18.1852	120.5	18.477	120.5

* Source: Karco Engineering tabulated data from 16 May 2011 Impact Test Report Number TR-P31070-01-A

ATTACHMENT 13

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3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body Impact Test of 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content Five Pages:

Near-Instantaneous Jeep Fuel Tank Breach – Purple-Dyed Stoddard Evidence

At not later than T = +0.073 (73 milliseconds) all four doors of the ZJ-Body Jeep Grand Cherokee are jammed and inoperative. Prior, at T = +0.052, two breaches had occurred in the unprotected target vehicle fuel tank. But this 'late sequence' series of video screenshots proves the later reality:

- At T = +0.245 the bullet vehicle has begun movement in yaw mode, characteristic of the late sequence in an offset impact test. The "unplugging" of the two fuel tank breaches is ongoing, and the separation sequence which began at T = +0.119 is now visible. However, at T = +0.245 the vehicles have not yet cleared the impact pad, and the Camera 2 view of the stoddard-stained pad is yet visible.

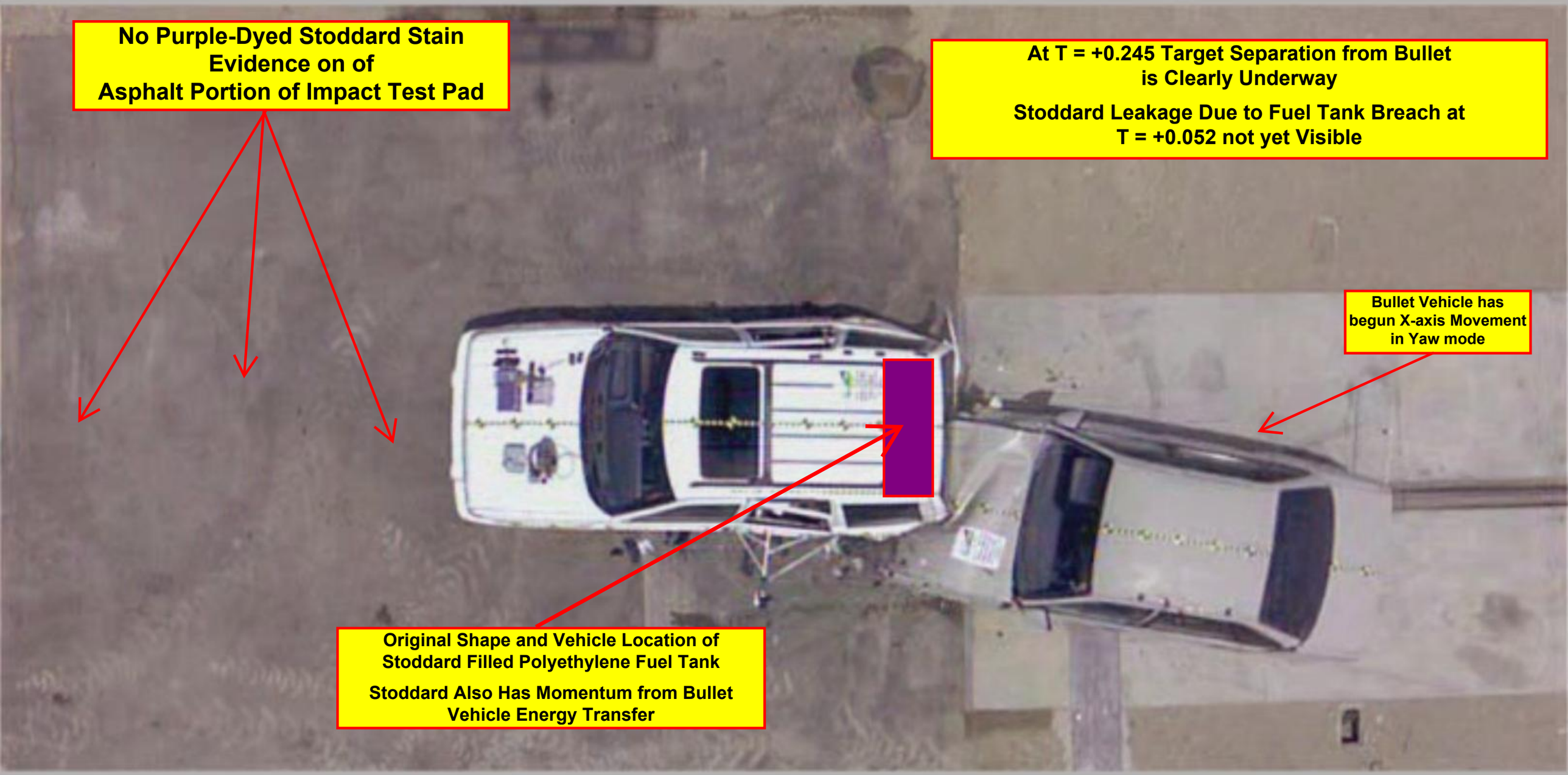
- For the T = +0.315 screenshot I have superimposed the position of the Jeep Grand Cherokee fuel tank relative to the impact pad. As the target and bullet vehicle continue the separation sequence and clear this X-axis position, Camera 2 viewing of the purple-dyed stoddard evidence will occur.

- At T = +0.845 this first viewing of stoddard occurs. At this point it appears that not one, but TWO fuel tank breaches are evidenced by the trails of stoddard wisping from the tailgate area of the target vehicle.

- At T = +1.000 (one second after impact) not one, but TWO fuel tank breaches are evidenced by the purple-dye staining of the impact pad and asphalt run-off areas.

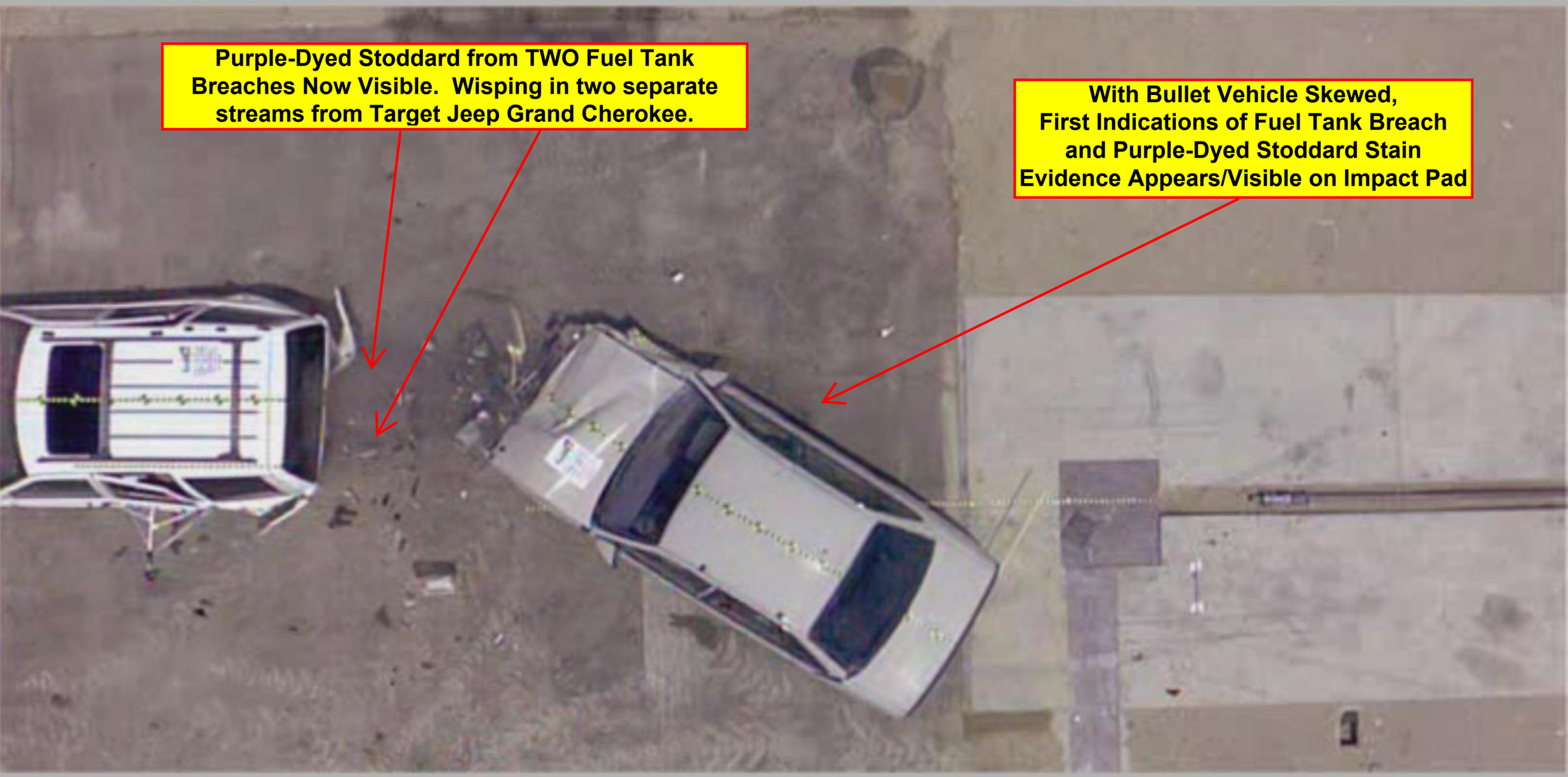
The T = +1.598 represents the end of Camera 2 recorded data. Note that the stoddard staining of the impact pad is near-instantaneous, occurring at a mere 6 feet from the pre-impact location of target vehicle fuel tank.

Camera View-02



Frame # 245 Time 0 .245

Camera View-02

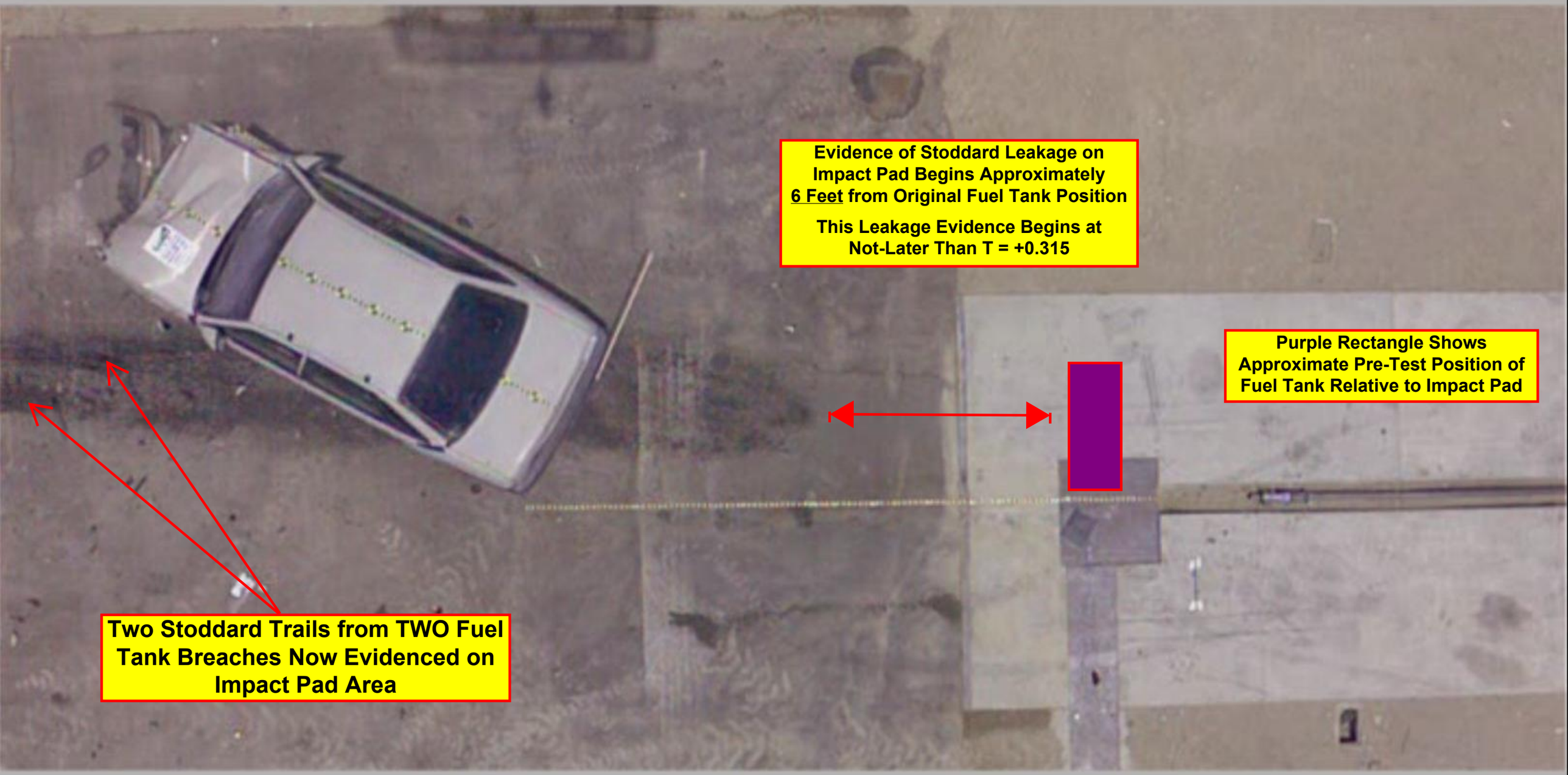


Frame # 845 Time 0.845

Camera View-02

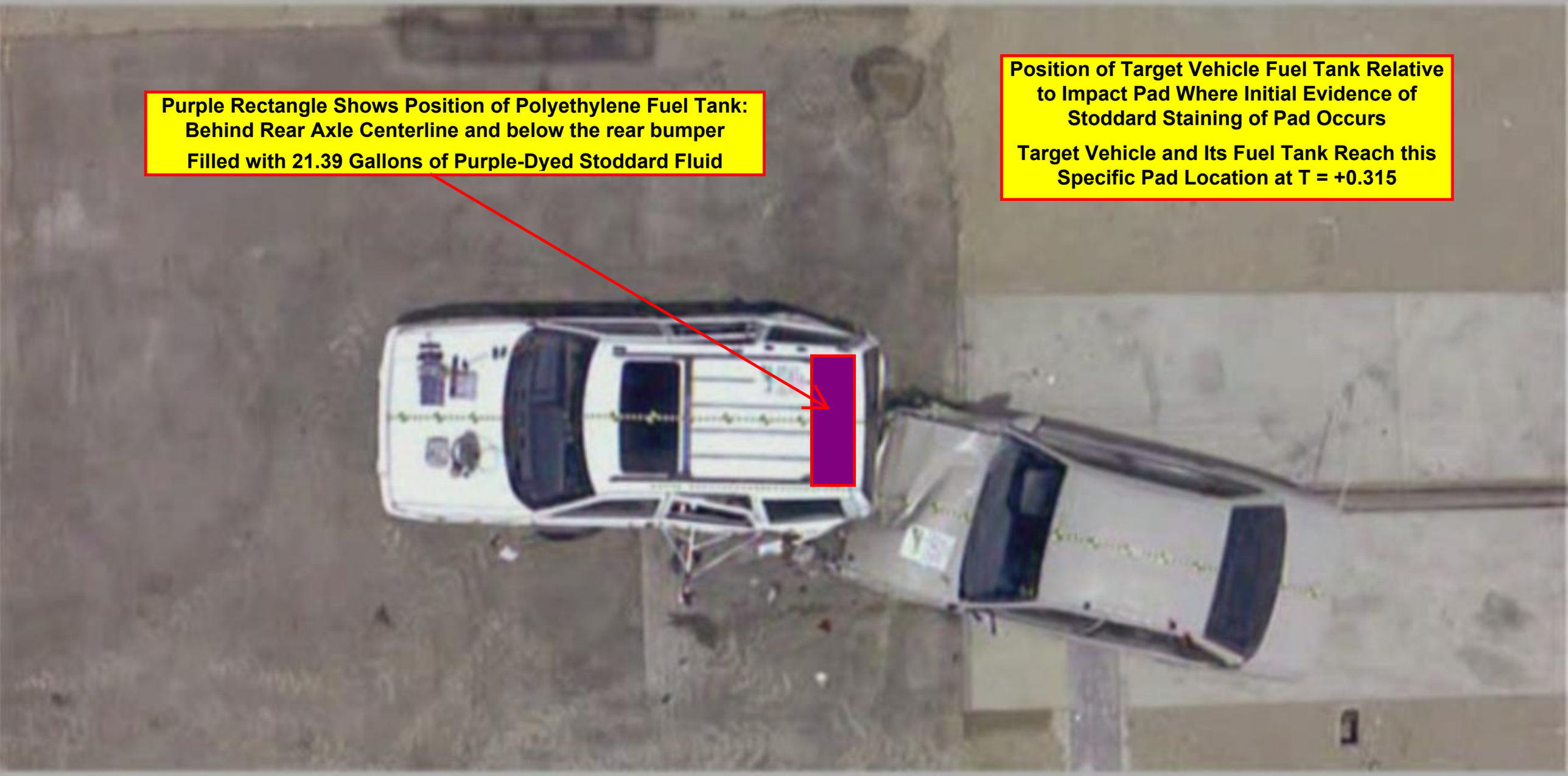
Frame # 1000 Time 1.000

Camera View-02



Frame # 1598 Time 1.598

Camera View-02



Frame # 315 Time 0.315

ATTACHMENT 14

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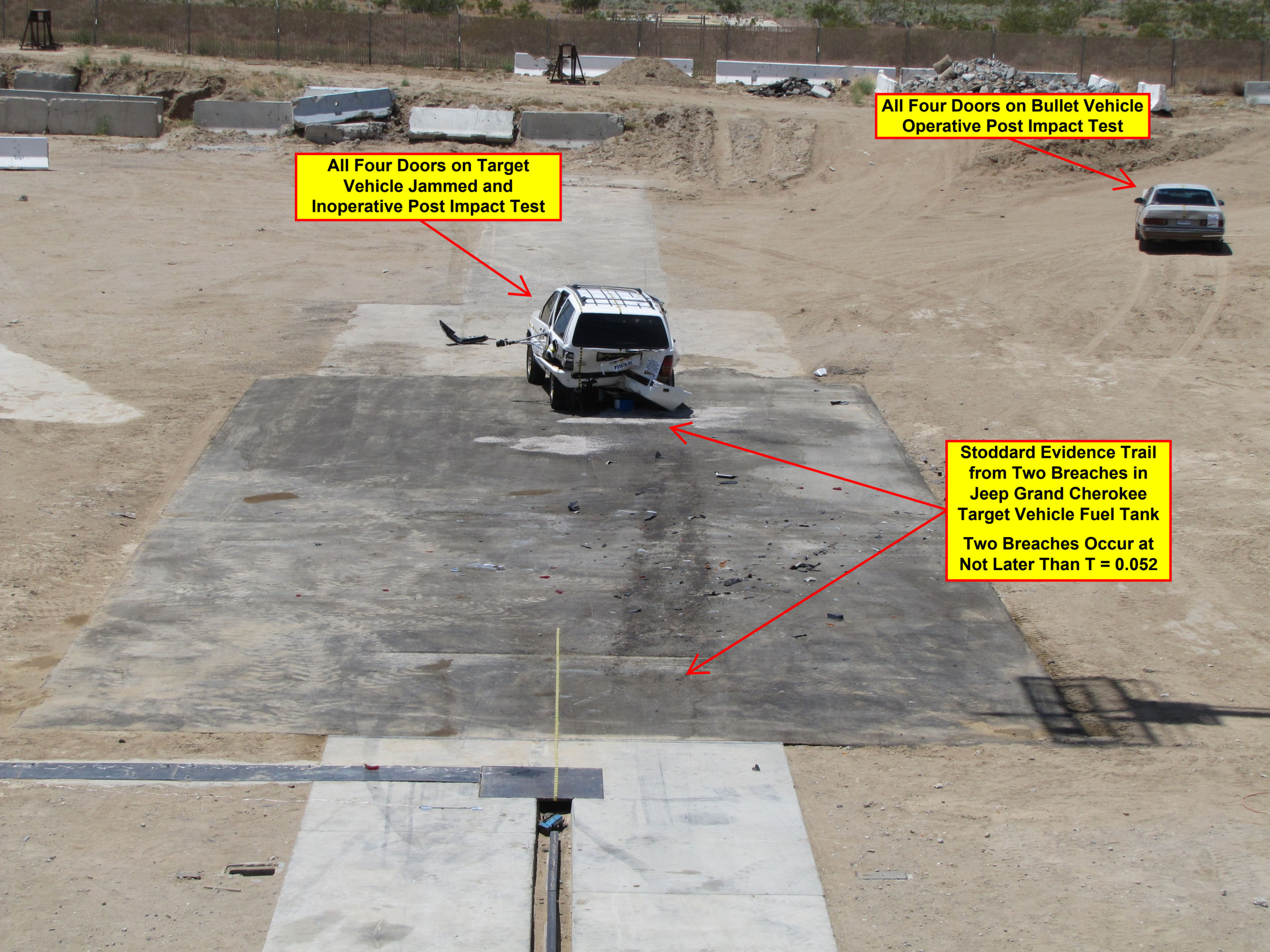
3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body Impact Test of 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content Five Pages:

Pre and Post-Test Photographic Evidence

These photographs are part of my expert reports to the exemplar accident. The breaches to the unprotected Jeep Grand Cherokee fuel tank did not result in minor leakage; it was so severe that, as the person representing CAS at this test, I recommended that time/resources not be wasted on the FMVSS-301 rollover protocols (last page).


All Four Doors on Target Vehicle Jammed and Inoperative Post Impact Test
All Four Doors on Bullet Vehicle Operative Post Impact Test
Stoddard Evidence Trail from Two Breaches in Jeep Grand Cherokee Target Vehicle Fuel Tank
Two Breaches Occur at Not Later Than T = 0.052


Stoddard


EOS


P31079-01

ATTACHMENT 15

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202-366-4000

3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body Impact Test of 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**

Content Two Pages:

Because history includes litigation of liability claims with use of public relations claims in the media, a review of the facts surrounding the exemplar accident are presented. As you will see, this review is consistent with the video screenshot analysis and the post-test photographic evidence presented above. The statements made by on-the-scene eyewitnesses to the 24 February 2007 accident include:

"The back of the Jeep immediately burst into flames upon impact. I drove through the debris and fireball caused by the Jeep exploding."

Similar to their claim regarding my expert report(s), defense experts for Chrysler Group LLC and Chrysler Group LLC dealerships claimed in their Appendix A that they also reviewed the New Jersey Police Crash Investigation Report # B080-2007-00445A, which included the above eyewitness account.

6. The (Kline) Jeep's fuel system was not breached during the first impact.

Kineticorp proclaimed "*Summary of Conclusions*" Item #6 after their alleged review of the NJP crash report.

ATTACHMENT # 2

NEW JERSEY STATE POLICE
VOLUNTARY STATEMENT

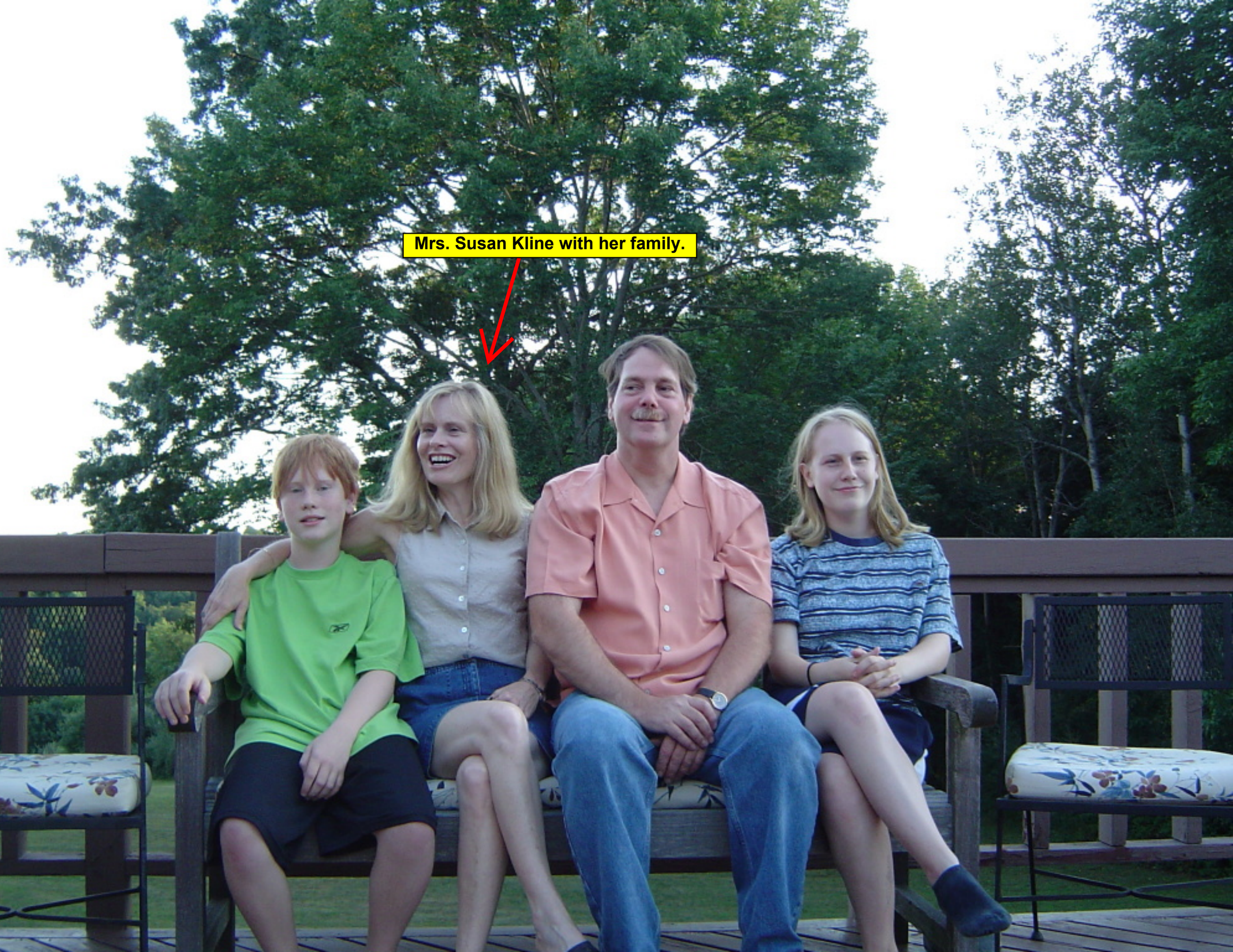
Case # B080 2007 00445A

Redacted

I was driving down 287 S when I noted 2 vehicles, a Jeep and a Subaru, stopped in the right hand lane ≈ 600-800 ft in front of me. There was a Toyota mini van traveling in the right hand lane ≈ 100 ft in front of me. I slowed down and started to move out into the left lane. I witnessed the mini van run into the back of the Jeep. The driver of the mini van never put on their brakes or made any evasive maneuver. The back of the Jeep immediately burst into flames upon impact. I drove through the debris and the fireball caused by the Jeep exploding.

DATE & TIME: 2/28/07 1330 SIGNATURE: [signature]

WITNESS: Tpr. M. [illegible] # 6771


Mrs. Susan Kline with her family.

END OF DOCUMENT

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3 September 2012

Subject: **Chrysler Group LLC Assertions - Karco ZJ-Body 16 May 2011**
Reference: **EA12-005 File Update (Chrysler Jeep Fuel Tank System Defect)**
