REPORT NUMBER: 301-CAL-09-03

SAFETY COMPLIANCE TESTING FOR FMVSS 301
FUEL SYSTEM INTEGRITY – REAR IMPACT

FORD MOTOR COMPANY
2009 FORD F150
2-DOOR PICKUP

NHTSA NUMBER: C90206

CALSPAN
TRANSPORTATION SCIENCES CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225

April 14,2009

FINAL REPORT

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance (NVS-224)
1200 New Jersey Avenue, SE
Washington, DC 20590

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Prepared By: Vincent Paolini, Project Engineer

Approved By: David J. Travale, Program Manager
Transportation Sciences Center

APPROVED
By james.czarnecki at 3:51 pm, 4/30/09

Approval Date:

FINAL REPORT ACCEPTANCE BY:

Edward E. Chan

Digitally signed by Edward E. Chan
DN: CN = Edward E. Chan, C = US, O = National Highway Traffic Safety Administration, OU = Office of Vehicle Safety Compliance
Date: 2009.05.06 13:53:04 -04'00'

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16. Abstract

Compliance tests were conducted on the subject 2009 Ford F150 2-door Pickup in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-301R-02 for the determination of FMVSS 301 compliance. Test failures identified were as follows:

The test vehicle appeared to comply with all requirements of FMVSS 301R-02 "Fuel System Integrity – Rear Impact."

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SECTION 1

PURPOSE AND TEST PROCEDURE

This rear impact test is part of the FMVSS 301 Compliance Test Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-06-C-00031. The purpose of this test was to determine if the subject vehicle, a 2009 Ford F150 2-door Pickup, meets the performance requirements of FMVSS No. 301R-02 "Fuel System Integrity – Rear Impact." The test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-301R-02, dated January 17, 2007).

SECTION 2

COMPLIANCE TEST RESULTS SUMMARY

A 2408.5 kg 2009 Ford F150 2-door Pickup was impacted from the rear by an 1362.5 kg moving barrier at a velocity of 79.3 kph (49.25 mph). The test was performed by Calspan Corporation on April 14,2009.

The test vehicle was equipped with a 98.42 liter fuel tank which was filled to 92 percent capacity with stoddard fluid prior to impact. Additional ballast (148 kg) was secured in the vehicle cargo area. Two ballast Part 572E 50th percentile male Anthropomorphic Test Device (ATD) were placed in the front occupant seating positions.

The crash event was recorded by three high-speed cameras and one real-time camera. High-speed camera locations and other pertinent camera information are found on page 3-6 of this report. Pre- and post-test photographs of the vehicle can be found in Appendix A.

There was no fuel system fluid spillage following the impact or during any portion of the static rollover test. The average vehicle longitudinal crush was 535 millimeters. The vehicle appeared to comply with all the requirements of FMVSS No. 301 "Fuel System Integrity."

SECTION 3

SUMMARY OF TEST RESULTS

DATA SHEET 1

TEST VEHICLE SPECIFICATIONS

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2009 Ford F150 2-door Pickup

Vehicle Body Color: Black NHTSA Number: C90206

Engine Data: 8 Cylinders; - CID; 4.6 Liters; - cc

Transmission: 4 Speed; - Manual; x Automatic; x Overdrive

Final Drive: x Rear Wheel Drive; - Front Wheel Drive; - Four Wheel Drive

MAJOR TEST VEHICLE OPTIONS:

x AC; x Pwr Steering; x Power Brakes; - Power Locks; - Power Seats

x ABS; x Tilt Wheel; x Stab Control x Traction Control x Anti-Theft

DEALER AND DELIVERY INFORMATION:

Date Received: 2/16/09 ; Odometer Reading N/A km

Selling Dealer: Basil Ford

Dealer Address: 1540 Walden Ave Cheektowaga NY 14225

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufacturer: Ford Motor Co.

Vehicle Build Date: 01/09

VIN:: 1FTRF12W19KB43084

GVWR: 2926 kg; GAWR: 1361 kg FRONT; 1588 kg REAR

DATA FROM VEHICLE'S TIRE LABEL AND SIDEWALL:

Location of Tire Placard: B-pillar

Type of Spare Tire: Full Size

	Front	Rear
Maximum Tire Pressure (sidewall - kPa)	280	280
Cold Pressure (tire placard - kPa) – test pressure	260	260
Recommended Tire Size (tire placard)	P235/70R17	P235/70R17
Vehicle Tire Size with load index & speed symbol	108S	108S
Tire Manufacturer	Hankook	Hankook
Tire Name	Dynapro AS	Dynapro AS
Treadwear, Traction, Temperature	440 B A	440 B A

VEHICLE CAPACITY DATA:

Type of Front Seats: - Bench; - Bucket; x Split Bench

Number of Occupants: 3 Front; 0 Rear; 3 Total

Vehicle Capacity Weight (VCW) = 746 kg

No. of Occupants x 68.04 kg = 204.1 kg

Rated Cargo/Luggage Weight (RCLW) = 541.9 kg

DATA SHEET 2

PRE-TEST DATA

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with maximum fluids)= UDW:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	608.0	599.5	56.8	1207.5
Rear =	464.5	453.5	43.2	918.0
			Total Delivered Weight (UDW) =	2125.5

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight (UDW) =	2125.5	kg
Rated Cargo/Luggage Weight (RCLW) =	136	kg
Weight of 2 p.572E Dummies @ 78 each =	156	kg
TARGET TEST WEIGHT =	2417.5	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 127.0 KG OF CARGO WEIGHT:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	668.0	673.0	55.7	1341.0
Rear =	534.0	533.5	44.3	1067.5
			Total Vehicle Test Weight (ATW) =	2408.5

Weight of Ballast Secured in Vehicle[1] = 148 kg Ballast Type Lead Shot and Weights

Method of securing Ballast: Compartment Placement

Components Removed for Weight Reduction: None

VEHICLE ATTITUDE (all dimension in millimeters):

	Left Front	Right Front	Left Rear	Right Rear	CG[2]
AS DELIVERED:	922	918	990	990	1380
AS TESTED:	895	891	977	973	1417

Vehicle's Wheel Base: 3196 mm

[1]Ballast weight does not include the weight of instrumentation, on-board cameras and data acquisition system

[2]Rearward of the front axle centerline.

VEHICLE PRE-TEST WIDTH AND IMPACT OFFSET MEASUREMENT:

Vehicle Width at Widest Point: 2020 mm Location: Rear Axle

Centerline offset for impact line: 404 / 1616 mm

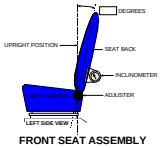
Filler neck side (left/right) Left

DATA SHEET 2 (continued)

PRE-TEST DATA

Vehicle: 2009 Ford F150 2-door Pickup NHTSA No. C90206

Nominal Design Riding Position for adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable.



FRONT SEAT ASSEMBLY

Seat back angle for driver's seat: -

Measurement instructions: N/A

Seat back angle for passenger's seat: -

Measurement instructions: N/A

2. SEAT FORE AND AFT POSITIONING:

Positioning of the driver's seat: Seat travel was 234 mm – seat was centered at 117 mm

Positioning of the passenger's seat: Seat travel was 234 mm – seat was centered at 117 mm

3. FUEL TANK CAPACITY DATA:

3.1 A. "Usable Capacity" of the standard equipment fuel tank is 98.42 liters

B. "Usable Capacity" of the optional equipment fuel tank is - liters

C. "Usable Capacity" of the vehicle(s) used for certification testing to requirements of FMVSS 301 = 90.47 to 92.52 liters

3.2 Actual Amount of Stoddard solvent added to vehicle for test = 90.5 liters

Stoddard Fluid: specific gravity: 0.764 ; kinematic viscosity: 0.96 centistokes; color: Red

3.3 Is vehicle equipped with electric fuel pump? Yes- x ; No- -

If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.

With ignition turned "ON"

4. STEERING COLUMN ADJUSTMENTS:

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.

Operational Instructions: Detents 0-8 found – placed at notch 4

5. SEAT BELT UPPER ANCHORAGE:

Nominal design riding position:

No seat belt anchorage info provided – placed in full up position

6. COMMENTS:

None

DATA SHEET 3

MOVING DEFORMABLE BARRIER (MDB) DATA

Vehicle: 2009 Ford F150 2-door Pickup NHTSA No. C90206

MDB FACE MANUFACTURER AND SERIAL NUMBER:

N/A

MDB DETAILS:

Overall Width of Framework Carriage	=	1250	millimeters
Overall Length of MDB (incl. honeycomb impact face)	=	4120	millimeters
Wheelbase of Framework Carriage	=	2591	millimeters
Tread of Framework Carriage (Front & Rear)	=	1875	millimeters
C.G. Location Rearward of Front Axle	=	1139	millimeters

MDB WEIGHT:

Left Front	=	357.0	kg	Left Rear	=	323.0	kg
Right Front	=	404.0	kg	Right Rear	=	273.5	kg
TOTAL FRONT =		761.0	kg	TOTAL REAR	=	596.5	kg
TOTAL MDB WEIGHT =		1357.5	kg				

Tires (Mfr, line, size):

TIRE PRESSURE:

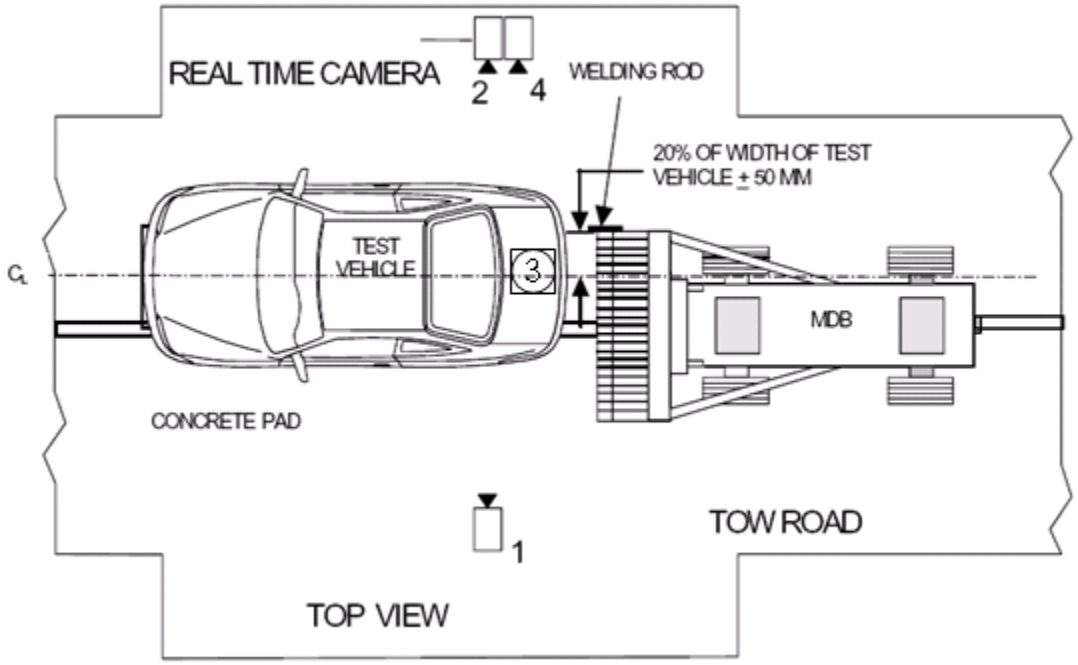
Left Front	=	207	kPa	Left Rear	=	207	kPa
Right Front	=	207	kPa	Right Rear	=	207	kPa

Brake Abort System? (Yes/No)	Yes
Date of Last Calibration:	06/07

DATA SHEET 4

HIGH SPEED CAMERA LOCATIONS AND DATA SUMMARY

Vehicle: 2009 Ford F150 2-door Pickup NHTSA No. C90206



Camera No.	View	Coordinates (millimeters)			Angle (deg.)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Left Side View	7117	1805	1094	3.6	25	1000
2	Real-Time Camera	-	-	-	-	-	30
3	Overhead View	0	0	4880	90	12.5	1000
4	Right Side View	7764	1423	954	1.1	25	1000

* Reference (from point of impact); all measurements accurate to within ±6 mm.

X = (Impact Point) + Forward
Y = (Impact Point) + To Right
Z = (Ground Level) + Down

DATA SHEET 5

POST-TEST DATA

Vehicle: 2009 Ford F150 2-door Pickup NHTSA No. C90206

REQUIRED IMPACT VELOCITY RANGE:: 78.5 to 80.1 km/h

ACTUAL IMPACT VELOCITY WITHIN 1.5 M OF IMPACT PLANE:

Trap No. 1 = 79.26 km/h Trap No. 2 = 79.26 km/h

Average Impact Speed = 79.26 km/h

WELDING ROD IMPACT POINT:

-12 Vertical distance from target center (+ is above) Tolerance: ±40 mm

-38 Horizontal distance from target center (+ is right) Tolerance: ±50 mm

STODDARD SOLVENT SPILLAGE MEASUREMENT:

A. Front impact until vehicle motion ceases -

Actual = 0 g Maximum Allowable = 28 g

B. For 5 minute period after vehicle motion ceases -

Actual = 0 g Maximum Allowable = 28 g

C. For next 25 minutes -

Actual = 0 g/minute Maximum Allowable = 28 g/minute

D. Provide Spillage Details:

None

DATA SHEET 5

POST-TEST DATA (Continued)

Vehicle: 2009 Ford F150 2-door Pickup NHTSA No. C90206

POST TEST SEAT DATA

LOCATION	SEAT MOVEMENT (mm)	SEAT BACK FAILURE
P1 (Left Front)	8 forward	Rearward
P2 (Right Front)	10 forward	Rearward

POST TEST ATD CONTACT DATA

LOCATION	Position 1 (Driver)	Position 2 (Passenger)
Head	Back of head to head restraint	Back of head to head restraint
Chest	None	None
Abdomen	None	None
Left Knee	None	None
Right Knee	None	None

VEHICLE DIMENSIONS:

Vehicle length:

	Left Side	Centerline	Right Side
Pre-Test	5353	5405	5352
Post-Test	4829	4870	5060
Crush	524	535	292

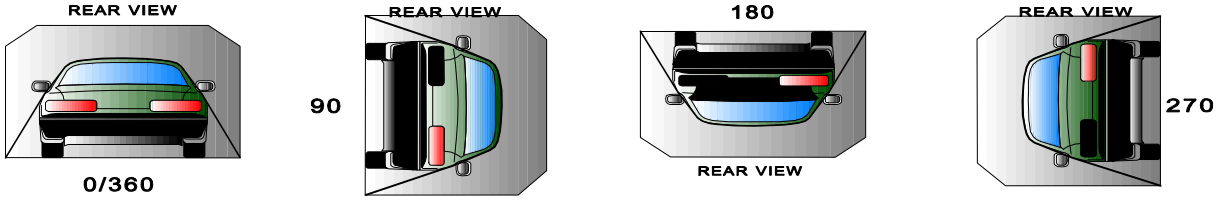
Vehicle Wheel Base:

	Left Side	Right Side
Pre-Test	3198	3192
Post-Test	3155	3229
Crush	43	-37

DATA SHEET 6

FMVSS 301 ROLLOVER DATA

Vehicle: 2009 Ford F150 2-door Pickup NHTSA No.: C90206



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Stage	Rotation Time (spec. 1 -3 min)				FMVSS 301 Hold Time		Total Time				Next Whole Minute Interval	
0º - 90º	1	minutes	08	seconds	5	minutes	6	minutes	8	seconds	7	minutes
90º - 180º	1	minutes	08	seconds	5	minutes	6	minutes	8	seconds	7	minutes
180º-270º	1	minutes	06	seconds	5	minutes	6	minutes	6	seconds	7	minutes
270º-360º	1	minutes	09	seconds	5	minutes	6	minutes	9	seconds	7	minutes

II. FMVSS 301 REQUIREMENTS: (Maximum allowable solvent spillage):

First 5 minutes from onset of rotation	6th min.	7th min.	8th min. (if required)
142 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

Rollover Stage	First 5 minutes from onset of rotation (g)	6th min. (g)	7th min. (g)	8th min. (if required) (g)
0º - 90º	0	0	0	N/A
90º - 180º	0	0	0	N/A
180º-270º	0	0	0	N/A
270º-360º	0	0	0	N/A

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S):

Rollover Stage	Spillage Location
0º - 90º	None
90º - 180º	None
180º-270º	None
270º-360º	None

APPENDIX A

PHOTOGRAPHS

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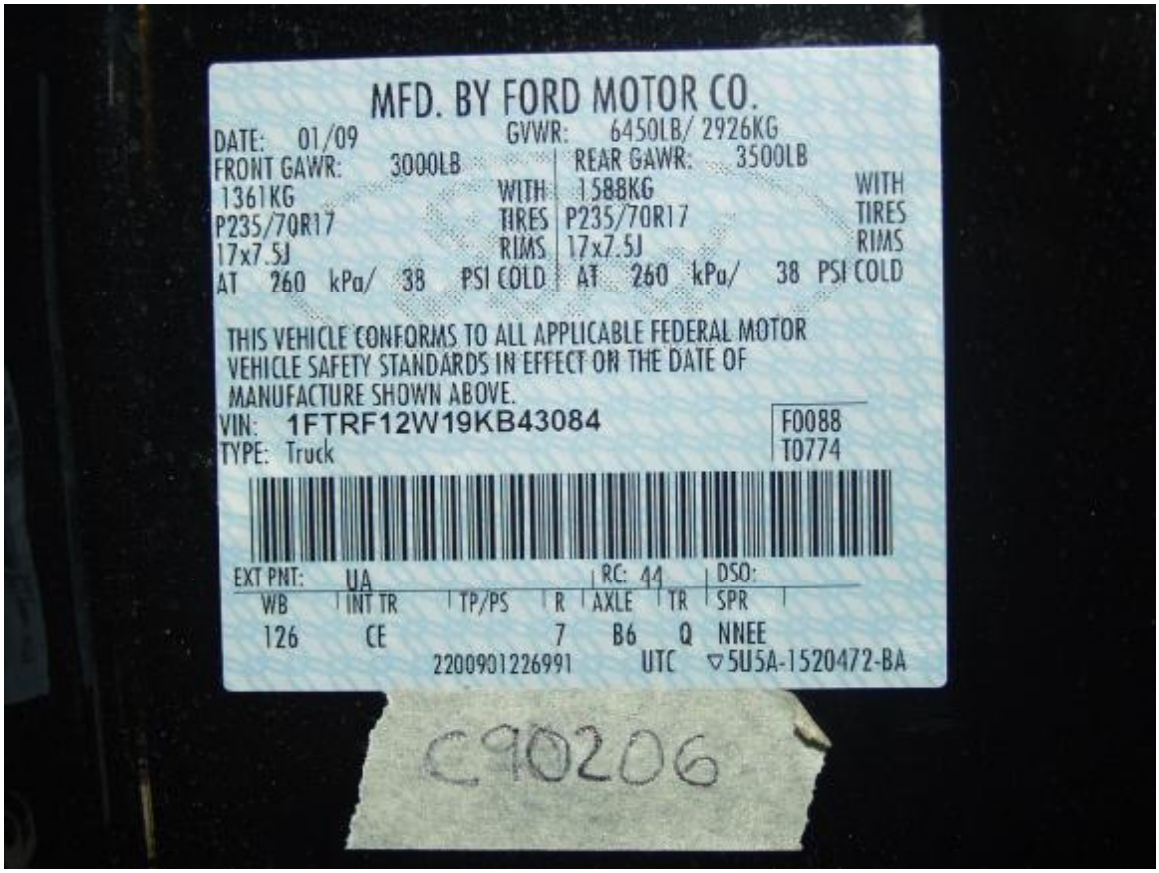

Figure A-1: Vehicle Certification Placard

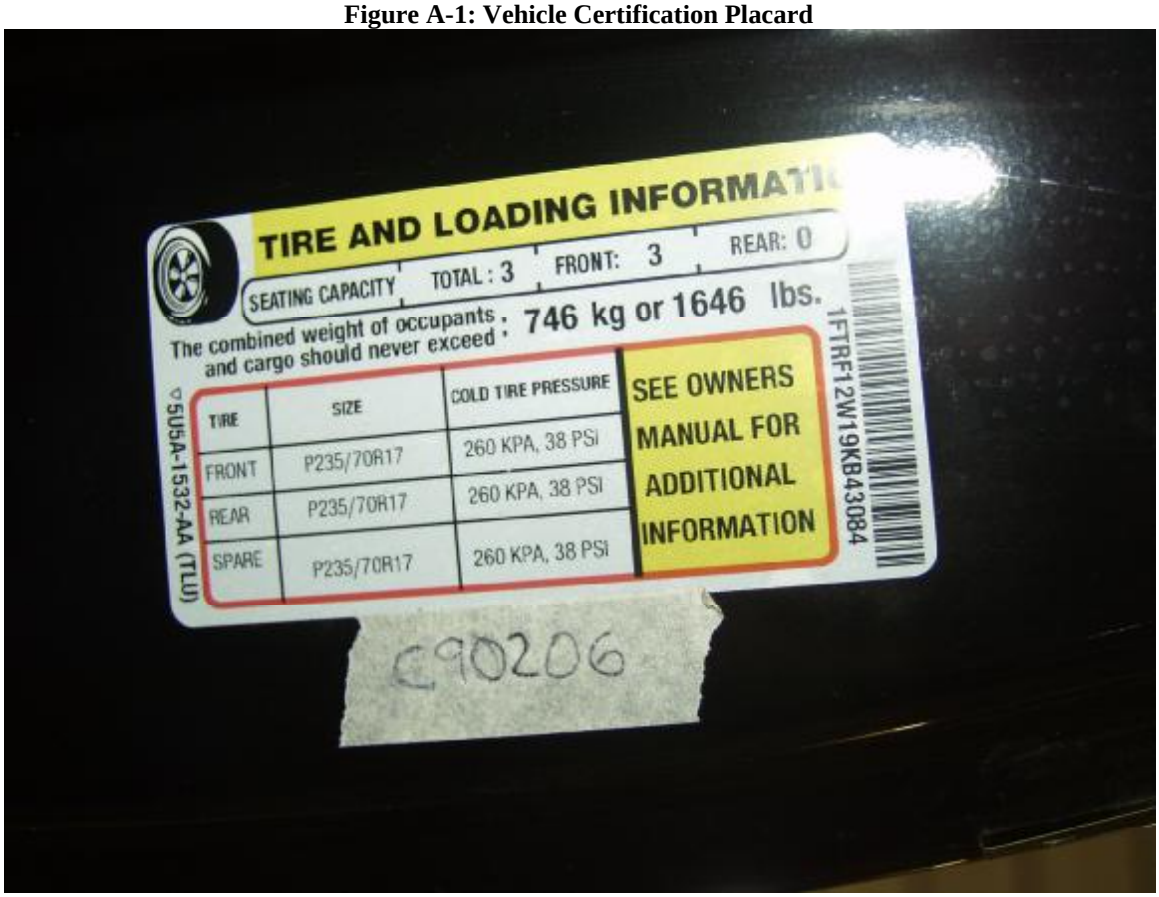

Figure A-2: Vehicle Tire Placard

Figure A-3: Pre-Test Front View

Figure A-4: Post-Test Front View

Figure A-5: Pre-Test Left Side View

Figure A-6: Post-Test Left Side View

Figure A-7: Pre-Test Right Side View

Figure A-8: Post-Test Right Side View

Figure A-9: Pre-Test Left Front Three-Quarter View

Figure A-10: Post-Test Left Front Three-Quarter View

Figure A-11: Pre-Test Right Front Three-Quarter View

Figure A-12: Post-Test Right Front Three-Quarter View

Figure A-13: Pre-Test Left Rear Three-Quarter View

Figure A-14: Post-Test Left Rear Three-Quarter View

Figure A-15: Pre-Test Right Rear Three-Quarter View

Figure A-16: Pre-Test Right Rear Three-Quarter View

Figure A-17: Pre-Test Rear View

Figure A-18: Post-Test Rear View

Figure A-19: Pre-Test MDB Front View

Figure A-20: Post-Test MDB Front View

Figure A-21: Pre-Test MDB Left Side View

Figure A-22: Post-Test MDB Left Side View

Figure A-23: Pre-Test MDB Right Side View

Figure A-24: Post-Test MDB Right Side View

Figure A-25: Pre-Test MDB Top View

Figure A-26: Post-Test MDB Top View

Figure A-27: Pre-Test Overhead Vehicle and MDB View

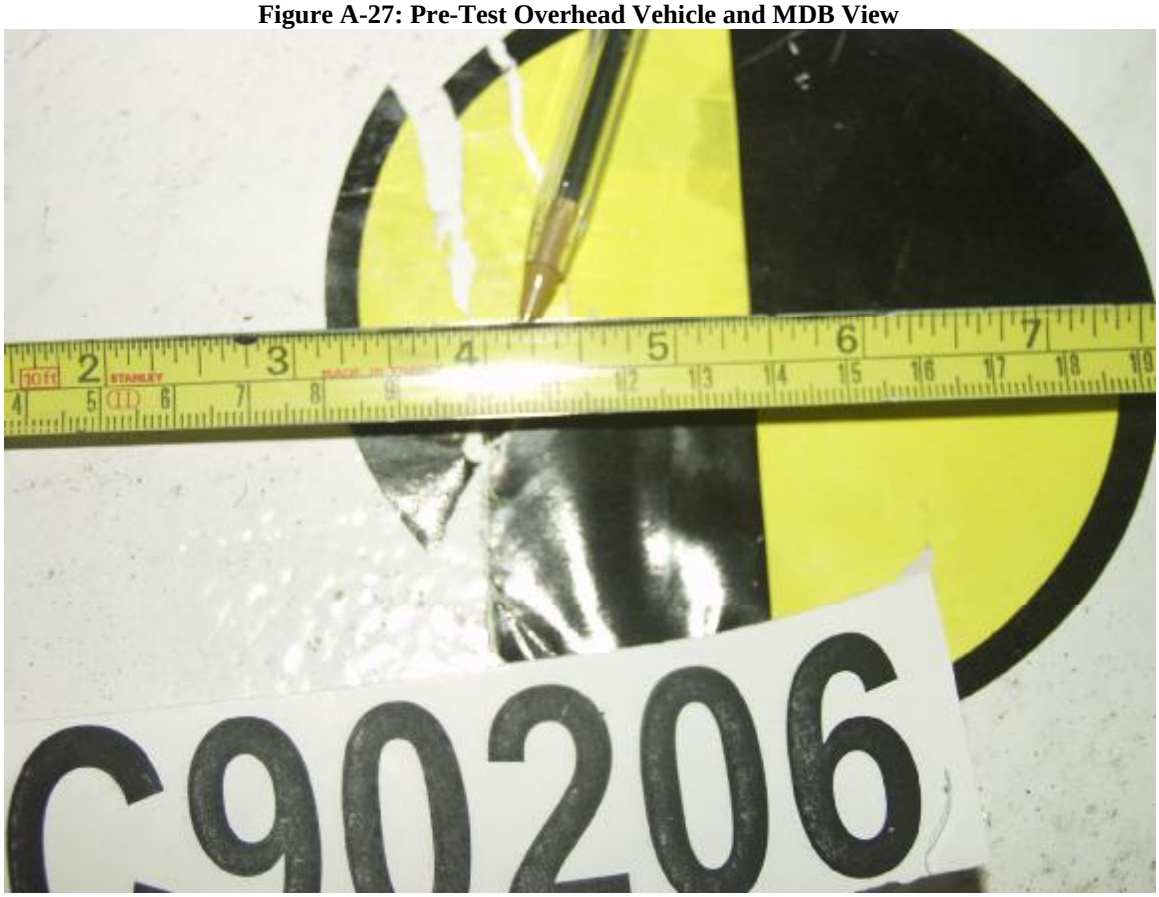

Figure A-28: Post-Test Impact Target View

Figure A-29: Pre-Test Front Underbody View

Figure A-30: Post-Test Front Underbody View

Figure A-31: Pre-Test Mid Underbody View

Figure A-32: Post-Test Mid Underbody View

Figure A-33:Pre-Test Rear Underbody View

Figure A-34: Post-Test Rear Underbody View

Figure A-35: Pre-Test Fuel Filler Cap View

Figure A-36: Post-Test Fuel Filler Cap View

Figure A-37: Impact View

Figure A-38: Rollover 90° View

Figure A-39: Rollover 180° View

Figure A-40: Rollover 270° View

Figure A-41: Rollover 360° View