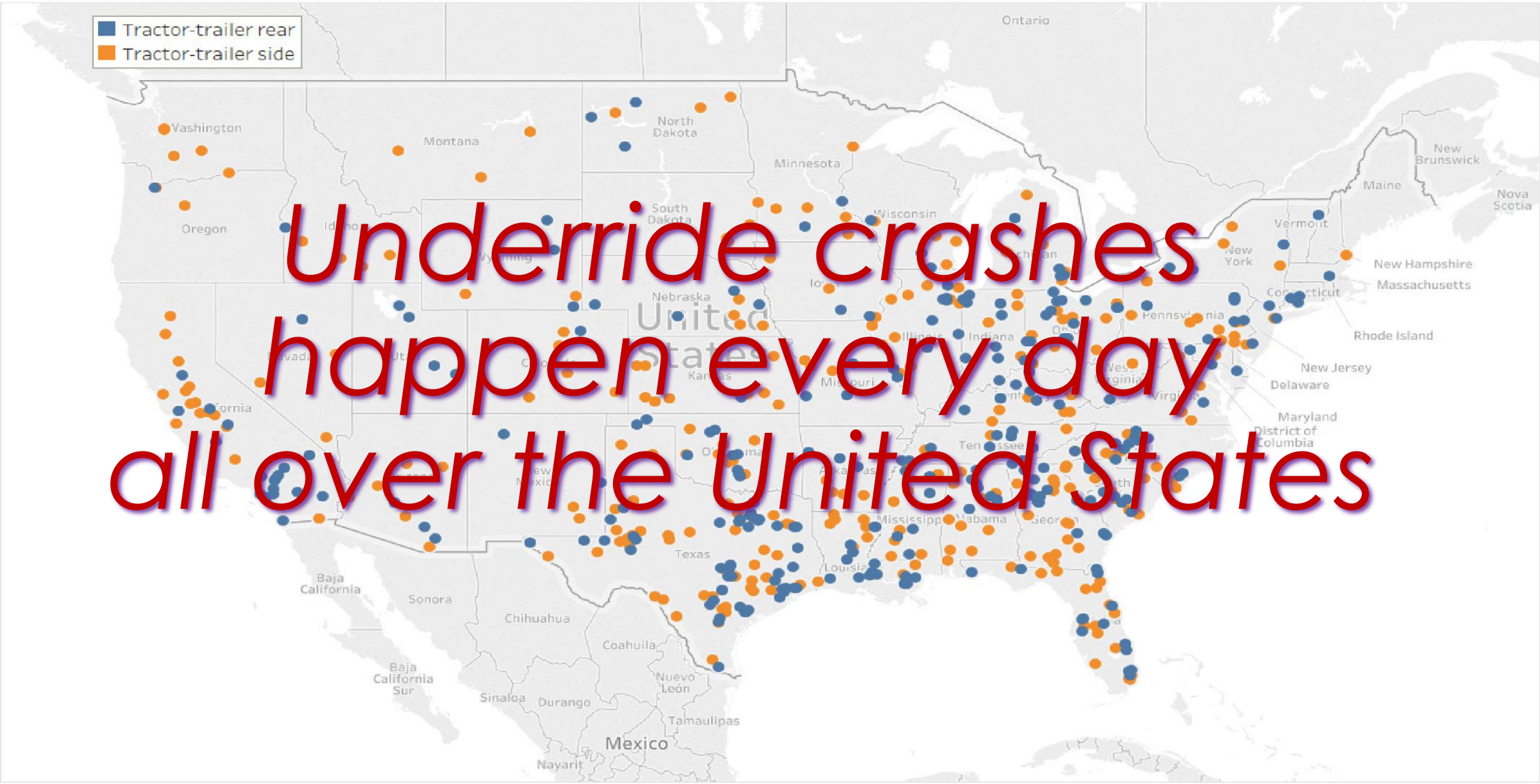
Underride Data

On A Mission To Make

Truck Crashes More

Survivable

2015 Passenger vehicle occupant fatalities in 2-vehicle crashes with tractor-trailers



Underride crashes happen every day all over the United States

PVEH_LRGTRK_UNDERRIDE_FATS_STATE_2015B.pdf – 1994-2015

Underride-Fatality-Data-from-FARS-by-State.pdf

1994-2015					
	Front	408	97	155	660
	Left Side	582	82	303	967
	Right Side	349	56	220	625
	Rear	1,015	203	585	1,803
	Other/Unknown	65	8	67	140
	Total	2,419	446	1,330	4,195

Braver, Elisa R. / Cammisa, Michael X. / Lund, Adrian K. / Early, Nancy / Mitter, Eric L. / Powell, Michael R.

Transportation Research Record 1595
August 1997

During 1988-93, the Fatal Accident Reporting System (FARS) coded 4% of all fatal large truck-passenger vehicle crashes as involving underride or override (a passenger vehicle going underneath a large truck). In contrast, the National Accident Sampling System Crashworthiness Data System (NASS/CDS) coded 27% of a sample of 275 fatal large truck-passenger vehicle crashes as underrides during the same years. Seven percent of these 275 fatal crashes are identified as underrides in FARS. The discrepancy between FARS and NASS coding becomes more pronounced when underrides involving sides of passenger vehicles or trucks are considered. This is because NASS/CDS did not code underrides involving side impacts, and FARS did. When underrides involving side impacts were added, the total percentage of underrides in NASS/CDS rose from 27% to 50% of fatal truck-car crashes. The most likely explanations for the lower incidence of underride coding in FARS are: (1) The greater amounts of information available to NASS/CDS analysts enable more complete identification of underrides, (2) FARS analysts sometimes may not recognize that underride has occurred, and (3) underride was not a separate FARS variable prior to 1994. Based on NASS/CDS data, an estimated 1,108 fatal underride crashes occurred each year during 1988-93 (95% confidence interval (CI) = 735, 1482). Of these 1,108 underrides, 634 involved the fronts (CI = 328, 942), 248 involved the rears (CI = 137, 360), and 226 involved the sides (CI = 110, 341) of large trucks.

Incidence of large truck-passenger vehicle underride crashes in the Fatal Accident Reporting System and the National Accident Sampling System

Indiana FARS

Crash Year by the	Initial Impact Point on the Large Truck	Passenger Vehicle Compartment Intrusion?			Total
		Compartment Intrusion	No Compartment Intrusion	Compartment Intrusion Unknown	
	Rear	0	0	1	1
	Total	1	0	3	4
2003	Rear	1	0	0	1
	Total	1	0	0	1
2004	Left Side	0	0	1	1
	Right Side	1	0	0	1
	Rear	0	0	1	1
	Total	1	0	2	3
2005	Front	1	0	1	2
	Left Side	0	0	1	1

Roya

FULL FIELD DATA DUMP OF 2004 FARS CASE 180748 - VEHICLE FILE
FATAL MOTOR VEHICLE TRAFFIC CRASH OCCURRING ON NOVEMBER 24, 2004 IN INDIANA
THE CRASH INVOLVED A BMW AND A TRUCK TRACTOR
2004 FATALITY ANALYSIS REPORTING SYSTEM (FARS) - FINAL

ST_CASE	VEHICLE #	VIN	VIN_1	VIN_2	VIN_3	VIN_4	VIN_5	VIN_6	VIN_7	VIN_8	VIN_9	VIN_10	VIN_11	VIN_12	STATE	OCCUPANTS	MAKE	MODEL	BODY TYPE
180748	1	WBABN33441JW	W	B	A	B	N	3	3	4	4	1	J	W	Indiana	2	BMW	34	2dr Sedan/HT/Coupe
180748	2	1FUJBBCK94LN	1	F	U	J	B	B	C	K	9	4	L	N	Indiana	1	Freightliner	883	Truck/Tractor

ST_CASE	VEHICLE #	REGISTRATION STATE	REGISTERED VEHICLE OWNER	ROLLOVER	JACKKNIFE	TRAVEL SPEED	HAZARDOUS CARGO	TOWED TRAILING UNIT	VEHICLE CONFIGURATION	NUMBER OF AXLES	CARGO BODY TYPE	SPECIAL USE	EMERGENCY USE	IN IM
180748	1	Illinois	Driver Not Owner	No Rollover	Not Articulated	Unknown	No	No	Not Applicable	Not Applicable	Not Applicable	No Special Use	No	Cl
180748	2	Multi-In State	Business or Govt	No Rollover	No	Unknown	No	Yes/1 Unit	Tractor/Semi	5	Van/Enclosed Box	No Special Use	No	

ST_CASE	VEHICLE #	PRINCIPAL IMPACT	UNDERRIDE/OVERRIDE	DEFORMATION	VEHICLE ROLE	MANNER LEAVING SCENE	FIRE OCCURRENCE	RELATED FACTOR 1	RELATED FACTOR 2	VEHICLE MANEUVER	CRASH AVOIDANCE MANEUVER	MOST HARMFUL EVENT	FATALS IN VEHICLE	EVENT 1
180748	1	Clock 12	No Under/Override	Disabling	Striking	Towed Away	No Fire	None	None	Going Straight	No Maneuver	Veh in Transp	1	Veh in Transp
180748	2	Clock 3	No Under/Override	Disabling	Struck	Towed Away	No Fire	None	None	Going Straight	No Maneuver	Veh in Transp	0	Veh in Transp

ST_CASE	VEHICLE #	EVENT 2	EVENT 3	EVENT 4	EVENT 5	EVENT 6	VIN LENGTH	BUS USE	GVW RATING	VEHICLE MODEL	MODEL YEAR	VIN MODEL	VIN SERIES TRUCK	VIN_BT	MOTOR CARRIER ID	TRUCK FUEL CODE	WHLBASE SHORT-AUTO	WHLI LONG-A
180748	1	Unknown	Unknown	Unknown	Unknown	Unknown	17	Not Used a	Not	BMW 3-series	2001	SCL	***	CR	00000000000	*	1073	

Under-reporting: a major problem

GEORGIA

Crash Year by Initial Impact Point on the Large Truck		Passenger Vehicle Compartment Intrusion?			Total
		Compartment Intrusion	No Compartment Intrusion	Compartment Intrusion Unknown	
2011	Right Side	0	0	1	1
	Total	0	0	1	1
2012	Left Side	1	0	0	1
	Right Side	0	0	3	3
	Rear	0	0	4	4
	Total	1	0	7	8
2013	Left Side	4	1	2	7
	Rear	1	0	0	1
	Total	5	1	2	8
2014	Right Side	2	0	0	2
	Rear	0	0	1	1
	Total	2	0	1	3
2015					
1994-2015					

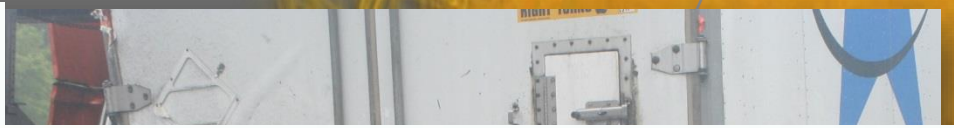
This report was

file:///U:/_E

VARIABLE LISTING OF CASE # 130366 VEHICLE DATA FILE
FATAL MOTOR VEHICLE TRAFFIC CRASH ON MAY 4, 2013 IN GREENSBORO, GA
FATALITY ANALYSIS REPORTING SYSTEM(FARS) 2013 ARF

Extent of Damage	Vehicle Removal	Most Harmful Event	Related Factors-Vehicle Level	Related Factors-Vehicle Level 2	Fire Occurrence
Disabling Damage	Towed Due to Disabling Damage	Motor Vehicle In-Transport	None	None	No or Not Reported
Disabling Damage	Towed Due to Disabling Damage	Motor Vehicle In-Transport	None	None	No or Not Reported
Disabling Damage	Towed Due to Disabling Damage	Motor Vehicle In-Transport	None	None	No or Not Reported
Emergency Use	**Travel Speed**	**Underride/Override**	**Rollover**	**Location of Rollover**	**Initial Contact Point**
Not Applicable	Not Reported	No Underride or Override Noted	No Rollover	No Rollover	1 Clock Point
Not Applicable	Not Reported	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion Unknown	No Rollover	No Rollover	11 Clock Point

major problem



NO		TEST NOT GIVEN	
Law Enforcement Suspected Drug Use NO	Drug Test Type	Drug Tested TEST NOT GIVEN	Drug Test Result

PASSENGER V02

Person Type PASSENGER	NM#	Vehicle# V02	Person Ty
First Name ANNALEAH	Middle Name		
Address 1617 BURNT MILL ROAD		Address Other	
Phone Number 252-903-2444	Phone Number (other)		Cor AP
Motor Vehicle Seating Position: Row SECOND	Motor Vehicle Seating Position: Seat LEFT		
Restraint Systems SHOULDER AND LAP BELT USED			
Air Bag Deployed NOT APPLICABLE			
Trapped Extrication TRAPPED & EXTRICATED WITH JOL			
Injury Severity Level Type FATAL INJURY (K)	Injury Severity Level Detail		
Source of Transport to Medical Facility EMS GROUND	EMS Agency Name or ID GREENE COUNTY EMS		
Law Enforcement Suspected Alcohol Use NO	Alcohol Test Type		
Law Enforcement Suspected Drug Use NO	Drug Test Type		

PASSENGER V02

Person Type PASSENGER	NM#	Vehicle# V02	Person T
First Name MARY	Middle Name		
Address 1617 BURNT MILL ROAD		Address Other	
Phone Number 252-903-2444	Phone Number (other)		Co AF
Motor Vehicle Seating Position: Row SECOND	Motor Vehicle Seating Position: Seat RIGHT		
Restraint Systems SHOULDER AND LAP BELT USED			
Air Bag Deployed NOT APPLICABLE			
Trapped Extrication TRAPPED & EXTRICATED WITH JOL			
Injury Severity Level Type NON FATAL INJURY	Injury Severity Level Detail INCAPACITATING (A)		
Source of Transport to Medical Facility EMS GROUND	EMS Agency Name or ID GREENE COUNTY EMS		
Law Enforcement Suspected Alcohol Use NO	Alcohol Test Type		
Law Enforcement Suspected Drug Use NO	Drug Test Type		

DRIVER V03

Person Type DRIVER	NM#	Vehicle# V03	Person T
First Name	Middle Name		

2013 | Left Si

Rear

GEORGIA DEPARTMENT OF PUBLIC SAFETY

MOTOR CARRIER COMPLIANCE DIVISION

COMMERCIAL MOTOR VEHICLE SIGNIFICANT CRASH REPORT (SCR)

Prepared/Taken by: JAMES BAILEY # 7525
Date of Report: 5/4/2013
Date of Crash: 5/4/2013
Time of Crash: 13:53
Crash County: Greene
Nearest City: Greensboro
MCCD Region in which Crash Occurred 4
Crash Street/Highway: I-20 W MM 130
Investigating Officer/Trooper **AND** Agency: SFC Bentley # 864 GSP/SCRT

SIGNIFICANCE

Fatality? Yes ☒ No ☐ Est. # of Fatalities: 1

Injury? Yes ☒ No ☐ Est. # of Injuries: 4

Road Closure? Yes ☒ No ☐ HAZMAT Cargo? Yes ☐ No ☒

Est. Length (Time) of Road Closure: 4 Type of HM

Oversize, Permitted Load? Yes ☐ No ☒ Permit Number

MCCD Responding/On Scene? Yes ☒ No ☐ Number Of MCCD 1

Senior MCCD Officer Present/En Route: MC03 Bailey 7525

MCSAP Inspection Performed? Yes ☐ No ☒ Report Number(s)

Crash Notifications made to:
HQ: ☐ Name:
FMCSA: ☐ Name:
Radio Room: ☐ Name:

Crash Year by the Large Truck	Initial Impact Point on the Large Truck	Passe Compart Intrusi
2005		

FIELD DATA DUMP OF 2016 FARS CASE 120918 - VEHICLE FILE
L MOTOR VEHICLE TRAFFIC CRASH OCCURRING ON MAY 7, 2016 AT 4:40PM IN FLORIDA
CRASH INVOLVED A TESLA AND A TRUCK TRACTOR
FATALITY ANALYSIS REPORTING SYSTEM (FARS) - FINAL

10

ecutive lumber	Vehicle Number	Travel Speed	Underride/Override	Rollover Type	Location of Rollover	Areas of Impact - Initial Contact Point	Extent of Damage	Vehicle Removal	Most Harmful Event	Vehicle Related Factors (1)	Vehicle Related Factors (2)	Fire Occurrence	Driver Presence	Driver License State	Driver ZIP Code	Non-CDL License Status	Non-CDL License Type
120918	1	035 MPH	No Underride or Override Noted	No Rollover	No Rollover	9 Clock Point	Functional Damage	Not Towed	Motor Vehicle In-Transport	None	None	No or Not Reported	Yes	Florida	34684	Valid	Full Driver License
120918	2	065 MPH	No Underride or Override Noted	No Rollover	No Rollover	12 Clock Point	Disabling Damage	Towed Due to Disabling Damage	Motor Vehicle In-Transport	None	None	No or Not Reported	Yes	Ohio	44705	Valid	Full Driver License

rting: a roblem

Joshua Brown Tesla Side Underride Crash

Estimated number of side underride, rear underride, and front override crashes and associated fatalities in the United States from 2007 to 2020 using cataloged FARS data multiplied by side underride undercount correction factors.

Type of Crash	Number of Crashes in FARS	Number of Fatalities in FARS	Undercount Factor	Estimated Number of Crashes	Estimated Number of Fatalities	Estimated Average Number of Crashes and Fatalities Per Year
Side Underride	1,238	1,415	1.77	2,191[A]	2,505	157/179
Rear Underride	1,589	2,273	1.77	2,813	4,023	201/287
Front Override	1,135	1,296	1.77	2,009	2,294	144/164
Total	3,962	4,984		7,013	8,822	

[A]Example Calculation: number of side underride crashes multiplied by undercount correction factor: 1,238*1.77=2,191

Source: Eric Hein

Estimated number of side underride, rear underride, and front override crashes and associated fatalities in the United States from 1969 to 2020 using estimated average number of crashes and fatalities from 2007 to 2020.

Type of Crash	Estimated Average Number of Crashes and Fatalities Per Year	Estimated Number of Crashes Over 51 Years	Estimated Number of Fatalities Over 51 Years
Side Underride	157[A]/179	8,007	9,129
Rear Underride	201/287	10,251	14,637
Front Override	144/164	7,344	8,364
Total		25,602	32,130

[A] Example Calculation: estimated number of side underride crashes per year multiplied by 51 years: 157*51=8,007

Source: Eric Hein

Under-counted and under-reported

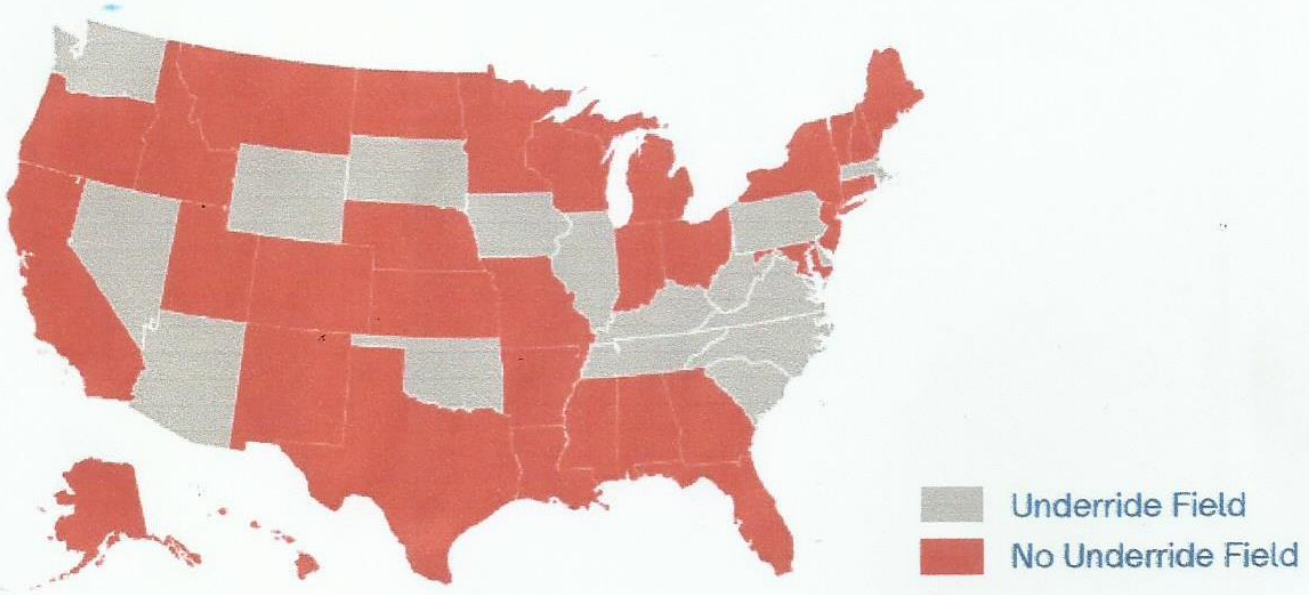
- *Inconsistency in police reports*
- *No checkbox for underride in police reports*
- *Poorly understood by law enforcement*
- *Looking for reason for crash - not reason for fatalities.*
- *Looking at driver behavior instead of dangerous design of trailer.*
- *Lack of awareness*
- *Well-documented inaccuracy of data -* ***GAO CONCLUDES UNDERRIDE IS UNDERREPORTED, DUH***

UNDERRIDE CRASHES

The Institute for Safer Trucking defines underride collisions as a crash in which a vehicle ***or a vulnerable road user (such as a pedestrian, bicyclist, person on a personal conveyance, or motorcyclist)*** travels underneath a truck and/or trailer.

ONLY 17 STATES HAVE UNDERRIDE FIELD ON THEIR POLICE ACCIDENT REPORT

Below is a breakdown of states that include a specific field for "underride" on their police accident report (PAR). In order to accurately capture the number of underride collisions all states should have a specific field for underride on their PAR as well as education for law enforcement about reporting truck underride crashes.



Safety Starts With Crash Data

The United States Department of Transportation recognizes that addressing highway safety challenges starts with quality crash data, and the collection of quality crash data starts with you as a law enforcement officer. There is almost no safety program, initiative, countermeasure or analysis that can be done without quality crash data. Your efforts in investigating and reporting on crashes form the foundation of all safety programs.

A recent study conducted by the U.S. Government Accountability Office[1] (GAO) found that truck underride crashes are in need of improved and more consistent data collection. The National Highway Traffic Safety Administration (NHTSA) defines truck underride crashes as **collisions in which a car slides under the body of a truck—such as a tractor-trailer or single-unit truck—due to the height difference between the vehicles. NHTSA categorizes a crash in which any portion of a passenger vehicle slides under the body of a larger truck or trailer as an underride crash**. As shown in Figures 1 and 2, during these crashes the under-ridden vehicle may intrude into the striking vehicle's passenger compartment. In other instances, the striking vehicle may pass completely under the struck vehicle and exit the other side, shearing off the roof of the striking vehicle. These underride crashes can lead to severe injuries or fatalities.

Figure 1: Side truck underride crash

Figure 2: Rear truck underride crash

The GAO study found that traffic fatalities from underride crashes involving large trucks are likely underreported among police crash reports.

[1] Truck Underride Guards: Improved Data Collection, Inspections, and Research Needed, www.gao.gov/products/gao-19-264

Truck Underride Crash Data – A National Perspective

Both the Federal Motor Carrier Safety Administration (FMCSA) and NHTSA share the mission to reduce crashes, injuries, and fatalities. To carry out this mission at the national level, FMCSA and NHTSA rely on law enforcement officials to conduct crash investigations and determine and reliably report their contributing factors. The availability of accurate underride crash data is critical in identifying and analyzing crash trends and developing countermeasures and strategies to mitigate and prevent these types of crashes.

Inconsistency in State Definitions of Underride

While all States have crash report forms and procedures to gather data following a crash, State forms and crash investigation procedures differ in whether and how underride crash-related information is captured and reported. To assist with accurately accounting for underride crashes, particularly in the Fatality Analysis Reporting System (FARS), NHTSA is asking law enforcement to always use the term "underride" when referencing crashes that meet the criterion as defined earlier in this publication.

Law Enforcement Underride Crash Reporting

FMCSA and NHTSA recognize that although law enforcement officials collect data about motor vehicle crashes, there are significant differences in the way that such data are gathered and reported, leading to inconsistencies in interpretation.

Variations exist in data definitions and the number and type of data elements collected, and the threshold for collecting data varies from jurisdiction to jurisdiction. Given these variations, we are asking law enforcement to use any available mechanism in their reporting systems to carefully describe the relative location of the striking vehicle with respect to the struck vehicle and to accurately report underride crash data in individual crash reports, whether or not underride crash data fields are included in the crash form or in the event that officers use diagrams and narrative information. As noted above, specifying the term "underride" in the report will greatly assist in improving consistency and accurate identification of these crashes. NHTSA will continue to provide training and guidance resources to the law enforcement community to improve accurate and consistent reporting of truck underride crashes.

For more information, contact NHTSA at www.nhtsa.gov/about-nhtsa/contact-us.

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

U.S. Department of Transportation
Federal Motor Carrier Safety Administration

15357-071523-v6a

NHTSA 2022 Underride Brochure in response to GAO/IIJA

2023 Outreach to 50 State Highway Patrols

Contact Chart for
State Highway Patrol Headquarters

These inaccuracies directly impact decisions about underride regulations. That is why we are asking you to participate in this Tour and, also, to take steps to improve underride reporting in your state. We are asking you to take the necessary steps to add or expand underride fields on your crash report forms. Also, we would like to know what we can do to help you make improvements in the training of your officers to adequately report the occurrence of underride.

1.Despite any photos or diagrams you receive from law enforcement which might lead you to believe that a crash is an underride/override, you are restricted by NHTSA guidelines to code it as "No Underride/Override Noted" -- unless an underride field has been checked or the investigating officer has used the word underride/override in the crash report narrative.

2.State FARS Analysts complete the NHTSA FARS coding digitally and does not send any accompanying documents or photos to NHTSA.

3.Each state's crash report is different.

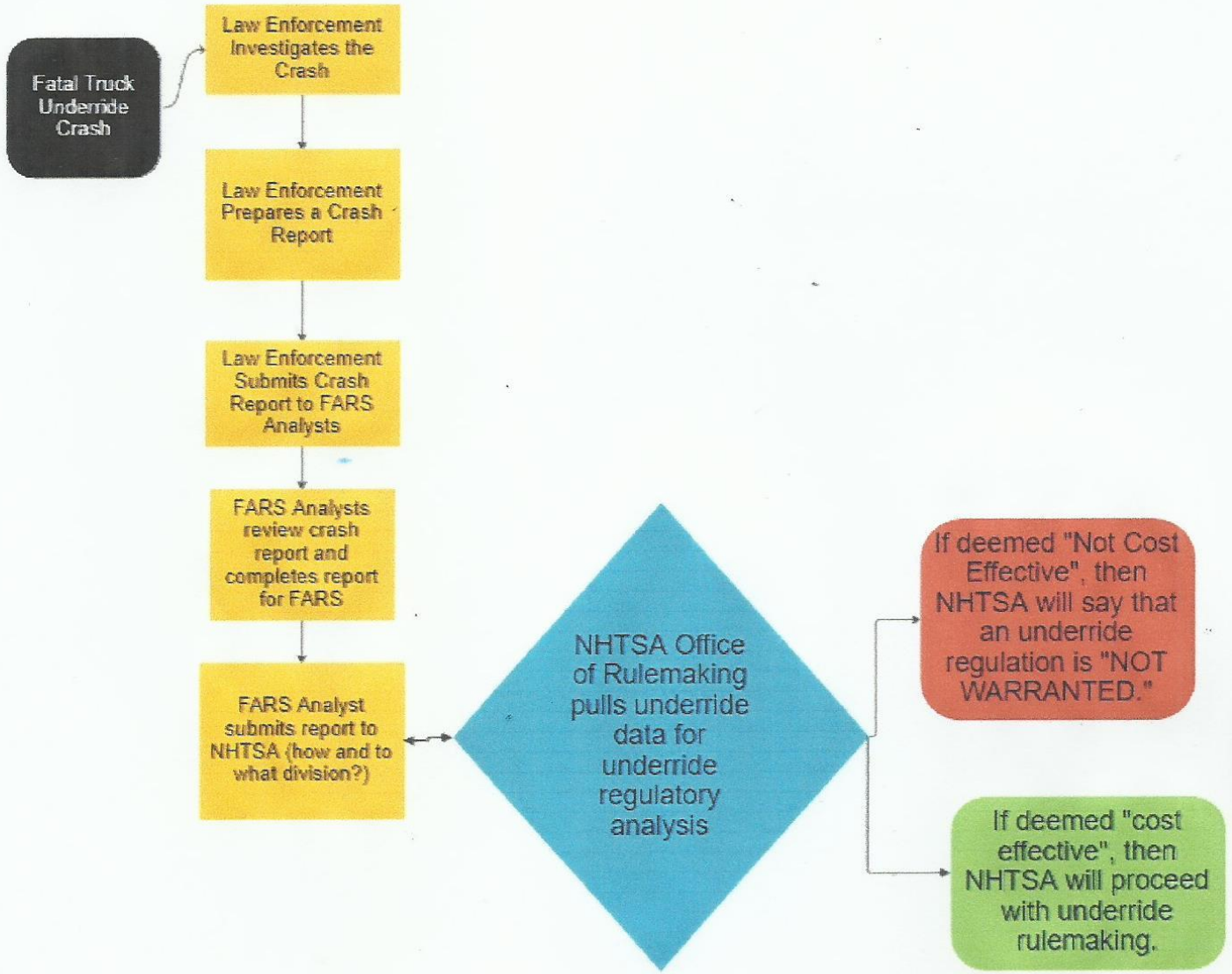
4.You have been working since September 2019 to develop an eCrash system which you believe will be helpful. You have heard that the State of Alabama has the best crash report form.

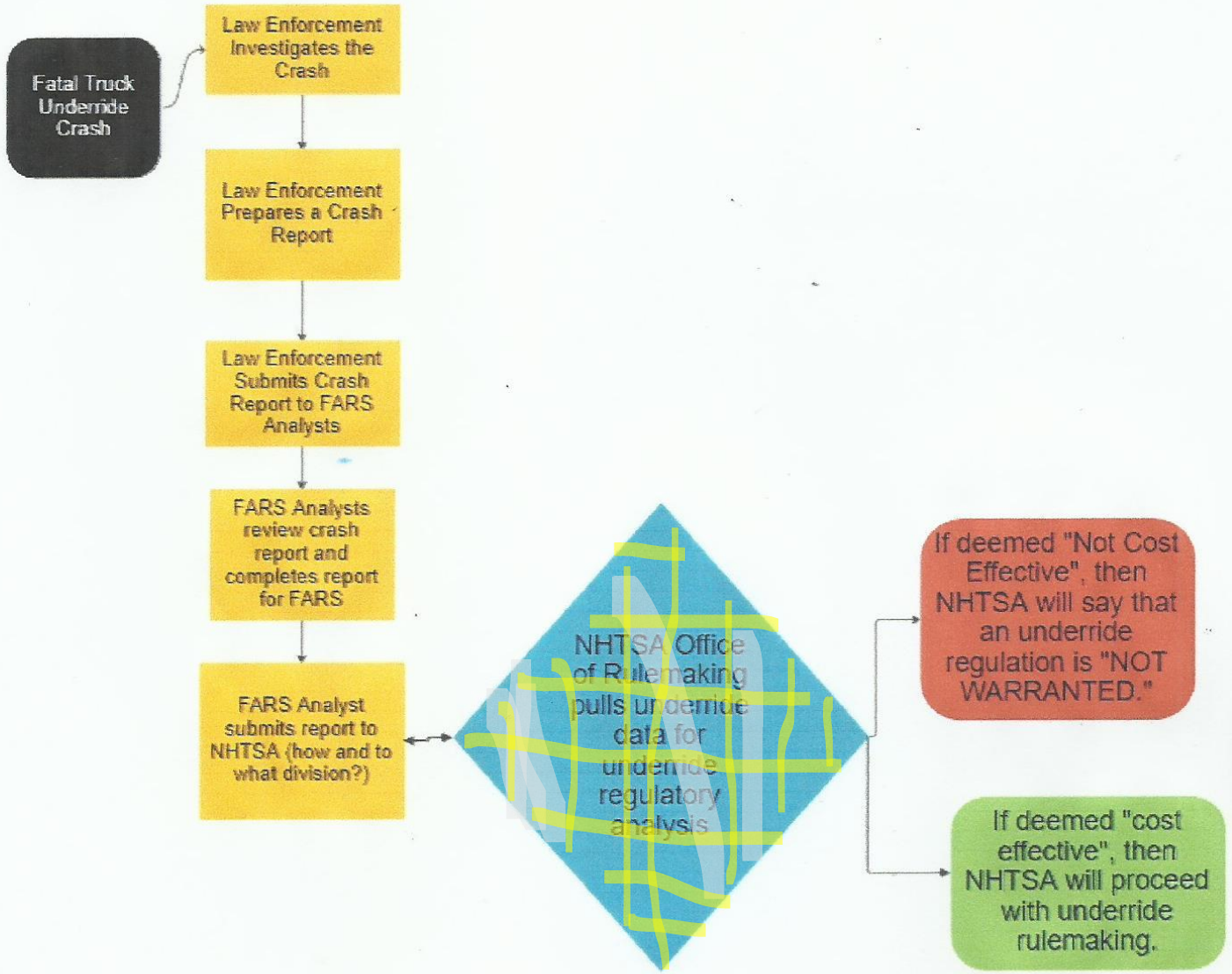
5.Reporting traffic fatalities through the FARS system is mandatory.

6.NHTSA schedules a system-wide annual training in December or January for FARS Analysts from every state to attend to hear about any changes in the FARS coding manual, which is updated annually, for the coming year. To the best of your knowledge, the topic of underride has not been included in that training. NHTSA Training Coordinator is Vashawn Veal.

7.NHTSA requires you to keep crash documents for three years. When the fourth year begins, you destroy the previous crash reports/documents.

8.You receive death certificates (if within 30 days of the crash) and, if the deaths were not already included in a crash report, you alert the investigating/reporting officer and ask them to update the crash report. Then you suspend the report until you see that the report has been updated before the end of the year when you would then send it to NHTSA


Fatal Truck Underride Crash
Law Enforcement Investigates the Crash
Law Enforcement Prepares a Crash Report
Law Enforcement Submits Crash Report to FARS Analysts
FARS Analysts review crash report and completes report for FARS
FARS Analyst submits report to NHTSA (how and to what division?)
NHTSA Office of Rulemaking pulls underride data for underride regulatory analysis
If deemed "Not Cost Effective", then NHTSA will say that an underride regulation is "NOT WARRANTED."
If deemed "cost effective", then NHTSA will proceed with underride rulemaking.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Effects of limitations

NHTSA cost benefit analysis	IIHS findings
Ignored crashes involving 3+ vehicles	Excludes two-thirds of relevant fatalities
Ignored many impact types (e.g. side-to-side)	
Ignored benefits to other road users (e.g. pedestrians, cyclists, motorcyclists)	53 pedestrians & bicyclists, 52 motorcyclists killed annually in trailer side crashes
Assumed no underride unless police report indicated otherwise (53%)	Photographs show 69-89% underride rate
Assumed no benefit of guards at 41+ mph	NHTSA has not tested any SUG designs to demonstrate a failure speed
Used posted speed limits to estimate crash severity; ignored crash angles, braking	EDR ("black box") data show 63% of fatal crashes involve forward velocity change <40 mph; unrelated to speed limit

IIHS HLDI

Matt Brumbelow, IIHS, Presentation to NHTSA, November 9, 2023, at 4:32

IIHS lives saved estimate

Using data from other NHTSA sources

- 549 average annual passenger vehicle occupant fatalities in crashes involving side of tractor trailer
- 159-217 of these could be addressed by SUGs, based on photographic case reviews
- This is 9-13 times NHTSA's estimate of 17 lives saved per year
- Some crashes may be too severe for SUG effectiveness, but EDR data indicate this would be minority (exact number would depend on SUG requirements in a regulation)
- Still doesn't include 105 annual pedestrian, bicyclist, motorcyclist fatalities
- In total, we estimate a SUG rule would save *at least 10 times* the lives estimated by NHTSA, making it *cost effective*

FARS Accuracy is Necessary But Not Sufficient

Zero

"Not Cost Effective"