

An evaluation of the accuracy of side underride crash Case Listings in the Fatality Analysis Reporting System using internet-based articles

Abstract

The purpose of this study is to evaluate the accuracy of side underride Case Listings (crash records) within the Fatality Analysis Reporting System (FARS), the National traffic census covering all fatal motor vehicle crashes in the United States. Internet searches were conducted using Google to locate and confirm 40 articles that reported fatalities resulting from side underride crashes with semitrailers. Photos and/or descriptions from the articles were used to validate that each side underride crash, if accurately recorded in FARS, should be coded as “Underriding a Motor Vehicle In-Transport”. Thirty-nine of 40 Case Listings for the side underride crashes were located in FARS. The underride data element was inaccurately coded in 16 of 39 FARS Case Listing passenger vehicle crash files with the corresponding 25 of 58 fatalities not assigned to side underride crashes. The remaining side underride crash, which resulted in three fatalities, was not located in FARS and is entirely missing. Because 17 of 40 (43 percent) side underride crashes and the associated 28 of 61 (46 percent) fatalities are inaccurately coded or missing entirely from FARS, the number of crashes and corresponding fatalities that result from side underride crashes with semitrailers are significantly undercounted.

Eric Hein, Revised February 26, 2023

Introduction

The Fatality Analysis Reporting System ([FARS](#)) is a voluntary information collection of fatal motor vehicle traffic crashes maintained by the National Highway Traffic Safety Administration ((NHTSA) 2022)). The FARS, which became operational in 1975, collects data from all 50 States, the District of Columbia, and Puerto Rico under Cooperative Agreements to report a standard set of data elements on each fatal crash within their jurisdictions (e.g., see NHTSA 2022a; 87 FR 19573). To be included in FARS, a crash must involve a motor vehicle traveling on a traffic way customarily open to the public and must result in the death of a vehicle occupant or a nonoccupant within 30 days.

The Cooperative Agreements are managed by the National Center for Statistics and Analysis (NCSA) within NHTSA. FARS is populated from the States' Police Crash Reporting forms of all fatal motor vehicle traffic crashes in the United States. Trained State employees, called FARS analysts, are responsible for gathering, translating, and transmitting their State's data into NCSA's standard format (NHTSA 2014; see also Government Attic 2018). FARS analysts code more than 140 FARS data elements, including the "underride/override" data element relating to whether the crash resulted in an underride with a large truck or semitrailer (NHTSA 2022). The specific data elements may be modified slightly each year to conform to changing user needs, vehicle characteristics, and highway safety emphasis areas.

An underride crash occurs when a vehicle collides with a semitrailer even at low speeds, due to the height differential, bypassing the vehicle's safety features because the point of impact is the passenger compartment, not the front bumper. Frequently, the vehicle goes partially or completely under the semitrailer causing the passenger compartment to be crushed when it contacts the semitrailer, resulting in death or severe injuries for the occupants. NHTSA's (2022b) FARS definition for an underride is "...a crash in which any portion of a passenger vehicle slides under the body of a larger truck or trailer as an underride crash".

NHTSA (2022b) reported that 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. In fact, the FARS database is the sole source for tracking deaths in the United States from underride crashes. In FARS, "...the data element UNDERIDE [sic] is dependent on the data contained in the police crash report" and "...identifies this vehicle's involvement in an underride or override during the crash" (NCSA 2022). Still, the NCSA (2022) reported that an analysis of the 1994-1996 FARS and the 1997 Trucks in Fatal Crashes revealed that underrides are generally not identified on the state data crash reports. Peer-reviewed articles also substantiate the problem of undercounting the number of underride crashes and fatalities in FARS (Blower and Campbell 1999; Braver, *et al.* 1997a; Braver *et al.* 1997b; Brumbelow 2012; and Padmanaban 2013). Moreover, the U.S. Government Accountability Office (GAO 2019) found that truck underride crashes need improved and more consistent data collection.

Since 1993, the U.S. Department of Transportation (USDOT) has issued cost-benefit guidance on valuing the reduction of fatalities and injuries by regulations or investments (USDOT 2022). A cost-benefit analysis provides estimates of the anticipated benefits that are expected to accrue over a specified period and compares them to the anticipated costs to evaluate whether, for example, a regulation would be considered cost effective (e.g., see Hein *et al.* 2022). This USDOT guidance ensures that the economic costs and benefits of road safety measures can be monetized and compared (USDOT 2022). Because the FARS database is known to underreport underride crashes and fatalities, if a cost-benefit analysis uses inaccurate estimates of side underride crashes and fatalities, the cost-benefit analysis will underrepresent the potential economic and societal benefits of side underride guards in preventing fatalities and minimizing serious injuries.

Despite NHTSA's long history of knowledge that underrides are generally not identified in state crash reports, and therefore not accurately recorded in FARS, the agency did nothing for decades to improve the accuracy of underride data collection. Yet, NHTSA (2016) reported that one of the important uses of FARS data was to "...estimate the potential effectiveness of new technology", which would include side underride guards for semitrailers. Considering the importance of accurate underride fatal crash records (e.g., used in a cost-benefit analysis to determine if rulemaking is cost effective) and the known underreporting of data on decedents in all states, side underride crash fatalities were chosen to investigate the extent of this underreporting problem in FARS. To my knowledge, none of the previous studies investigated the magnitude of side underride crash underreporting within FARS using verified side underride crashes obtained from internet-based information.

Under the Cooperative Agreements that NHTSA maintains with all States, crash report forms and crash investigation procedures differ in whether underride crash-related information is gathered and reported in FARS (NHTSA 2022b). For example, variations exist in underride data definitions and therefore, the underride data element, collected by each state (NHTSA 2022b; e.g., many states lack an underride checkbox in their standardized State Police Crash Reporting Forms).

Consequently, the purpose of this study is to investigate the prevalence of underreporting of side underride crash fatalities in FARS Case Listing records, with the intent of providing recommendations to NHTSA that would improve the accuracy of death data for cost-benefit analyses, research, and determinations required by the USDOT under the Infrastructure Investment and Jobs Act (2021). As an example, this would help ensure that the Secretary of USDOT uses the best information when evaluating whether mandating side underride guards on semitrailers is warranted to prevent deaths and reduce the number of serious injuries from these crashes.

Methods

To examine the extent of underreporting of side underride crashes within FARS, internet searches were performed using Google to locate and confirm the first 40 articles that reported fatalities resulting from side underride crashes with semitrailers. Searches were not filtered or restricted to find ambiguous side underride crash records, but were limited to crashes occurring in 2020 or earlier because FARS data is only currently available from 2006 to 2020. The main search strategy used combinations of key words to find side underride crashes including: “under semi” OR “underneath semi” OR “beneath semi” OR “wedged under semi” OR “pinned under semi” OR “stuck under semi”; in combination with “dead”, “fatal”, “died”, or “killed.” Crashes were selected if the article contained at least one photo or, in articles where a photo was unclear or lacking, contained an unambiguous description where at least one death occurred after a vehicle became lodged under the side of a semitrailer and the crash conformed to NHTSA’s (2022b) underride definition when “...any portion of a passenger vehicle slides under the body of a larger truck or trailer.”

Once a fatality was verified to be from a side underride crash, FARS was queried using the Fatality and Injury Reporting System Tool (FIRST) for the corresponding “Case Listing” (i.e., crash record) (NCSA 2023, USDOT 2022a). Each FARS Case Listing was located using the following crash information: Date, State, County, the road on which the crash occurred, and whether the resulting fatality involved a large truck. Each FARS Case Listing of a fatal underride crash record is filled with data using one file containing passenger vehicle information and a separate file containing truck/semitrailer information. Within FARS, the “underride/override” data element identifies a vehicle’s involvement in an underride or override crash, with the “striking vehicle” determining the underride/override condition (NCSA 2022). If the striking vehicle is over the other, then the crash is an override. If the striking vehicle is under the other, the crash is an underride (NCSA 2022). The “underride/override” FARS data element is needed to identify the magnitude of crashes in which an underride or override occurs to support NHTSA rulemaking activities and motor vehicle bumper compatibility research (NHTSA 2020). Therefore, the “underride/override” FARS data element was examined for each of the separate passenger vehicle and the truck/semitrailer reports generated from FIRST and then validated by examining the raw data from FARS (NHTSA 2023).

Results

Forty internet-based articles of passenger vehicle crashes were located, with each verified to have resulted in at least one fatality from side underride crashes with semitrailers (Appendix 1; Table 1). Photographs and/or descriptions were used to confirm that each crash clearly conformed to NHTSA’s (2022b) definition of an underride crash, and specifically, a side underride crash, where a passenger vehicle slides under the side body of a semitrailer (Appendix 1; Table 1) (Appendix 2; Table 2).

Case Listings for 39 of the 40 side underride crashes with semitrailers were in FARS. The “underride/override” data element within the passenger vehicle FARS Case Listing file was found to be inaccurately coded as “No Underride or Override Noted” for 16 of 39 of the verified

side underride crashes, which undercounted the corresponding 25 of 58 fatalities resulting from side underride crashes (Appendix 1; Table 1). For 38 of 39 of the verified side underride crashes, the “underride/override” data element within the truck/semitrailer FARS Case Listing file was coded as “No Underride or Override Noted” (Table 1). The remaining truck/semitrailer FARS Case Listing file for a verified side underride crash was inaccurately coded as “Overriding a Motor Vehicle In-Transport” (Table 1, FARS Case Listing 210303).

Inexplicably, one side underride crash that resulted in three fatalities was not located in FARS and is entirely missing (Table 1; December 20, 2020; Alameda County, CA) and one truck/semitrailer Case Listing file that resulted in one fatality was also missing from FARS. In sum, 17 of 40 (43 percent) side underride crashes and the associated 28 of 61 (46 percent) fatalities are inaccurately coded or missing entirely from FARS.

Finally, of the 22 FARS Case Listings that accurately recorded the underride data element, 18 (82 percent) noted passenger compartment intrusion occurred in the side underride crash (Table 1).

Discussion

The comparison of side underride crashes and fatalities reported via internet-based articles to Case Listings in FARS revealed frequent inaccurate records of side underride crashes and fatalities in FARS. The inaccurate coding of the underride data element in each of the Case Listings demonstrates that the National traffic census data in FARS significantly undercounts the number of crashes and fatalities that result from side underride crashes with semitrailers. This study confirms that using internet-based articles is a robust investigatory tool to evaluate the extent of inaccurate coding of the “underride/override” data element associated with side underride crashes in FARS.

Since the 1990s, underreporting of underride fatalities in the FARS database has been documented by several studies (Blower and Campbell 1999, Braver, *et al.* 1997a, Braver *et al.* 1997b, Brumelow 2012, GAO 2019, and Padmanaban 2013). In fact, GAO (2019) recommended that NHTSA “...update the [vehicle crash data elements in FARS]...to provide a standardized definition of underride crashes and to include underride as a recommended data field.” Unfortunately, the extensive history of underreporting side underride crash fatalities has not encouraged NHTSA to develop methods to improve the quality and completeness of these data in FARS. As an example, NHTSA (2022b) waited over 25 years to even publish a standard definition of an underride crash, which is believed to be a significant contributory cause of underreporting.

NHTSA still does not require the “underride/override” data element on the State Police Crash Reporting Forms, even though this data element could be added to the mandatory reporting for

fatal traffic crashes required under the Cooperative Agreements with the 50 States, the District of Columbia, and Puerto Rico. FARS data is used extensively by NHTSA, States and local jurisdictions, the highway research community, and Congress (NHTSA 2022c). The “underride/override” data element is dependent on the data contained in the State Police Crash Reporting Forms (NCSA 2022). Consequently, the quality and accuracy of side underride fatality data detailed on State Police Crash Reporting Forms determine the accuracy of mortality statistics and the validity of research findings and decisions concerning vehicle safety programs based on these records. Because 17 of 40 (43 percent) crashes and 28 of 61 (46 percent) fatalities are inaccurately recorded or missing entirely from FARS, the number of side underride crashes and corresponding fatalities that result from collisions with semitrailers are significantly undercounted. It is likely that inaccurate coding of these side underride crashes and fatalities stemmed from a combination of the lack of a mandatory checkbox on some State Police Crash Reporting Forms, the lack of a standard underride definition, no mandatory directive to report the “underride/override” data element under Cooperative Agreements with States, and inadequate training of State police who complete the crash reporting forms.

This inclusion of a mandatory “underride/override” data element for each state could be approved during the clearance process with the Office of Management and Budget (OMB) when FARS information collection is authorized (e.g., see NHTSA 2022a; 87 FR 19573; NHTSA 2022c; 87 FR 43380). Before a federal agency can collect certain information from the public, it must receive approval from OMB under procedures established by the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). However, including a mandatory underride data element on each of State Police Crash Reporting Forms would be a relatively straight-forward request for OMB approval.

None of the 22 fatal crash passenger vehicle FARS Case Listing report files that were accurately coded and the corresponding truck/semitrailer FARS Case Listing report files were internally consistent and matched for the “underride/override” data element for the same crash (Table 1). For some reason, NHTSA (2020) coding rules specify that for the “underride/override” data element, “...it is important to determine the vehicle performing the action; two vehicles cannot be considered to underride and override simultaneously”. In the coding manual used by FARS analysts to input data, NHTSA (2020) provides these examples: a) vehicles completely underriding a trailer from the side without stopping; and b) vehicles striking the side of a tractor-trailer and coming to a stop under the trailer. It is noteworthy that NHTSA (2020) considers the passenger vehicle to be uniformly the underriding vehicle in side underride crashes; the semitrailer is never deemed the “striking vehicle”. In fact, if the passenger vehicle FARS Case Listing file codes the “underride/override” data element as an underride, then the truck/semitrailer FARS Case Listing file is required to code the “underride/override” data element with “No Underride or Override Noted” (NHTSA 2020). Therefore, by design, NHTSA does not include a data element or mechanism within the truck/semitrailer FARS Case Listing report to identify that the truck/semitrailer was underridden by a passenger vehicle, even though the FIRST query tool generates separate FARS Case Listing reports for both the passenger vehicle and the truck/semitrailer involved in the crash. There is also no mention of this confusing inconsistency

between the passenger vehicle and the truck/semitrailer listing reports in the User's Manual (NCSA 2023). Unfortunately, NHTSA's coding examples and the resulting coding directive consistently implies fault for side underride crashes on the behavior or design of passenger vehicles, rather than clearly identifying within the corresponding truck/semitrailer FARS Case Listing file that the semitrailer was underridden in the same crash. Moreover, unless one is aware of this omission by design from the truck/semitrailer FARS Case Listing file, using NHTSA's FIRST query tool will always obscure and could easily result in further undercounting of the number of side underride crashes and fatalities.

The current study found that passenger compartment intrusion occurred in at least 82 percent of the verified side underride crashes. Similarly, Braver *et al.* (2009) found that, as expected, airbags frequently do not deploy in underride crashes. Side underride guards are designed to engage car safety systems (e.g., airbags, crumple zones, crash avoidance sensors, seat belts) during a collision to minimize fatalities and reduce the potential for serious injuries to occur (Brumbelow 2012, Insurance Institute for Highway Safety (IIHS) 2017, Mattos *et al.* 2021). Underride crashes involving passenger compartment intrusion are more likely to result in a fatality or serious injury than crashes in which the passenger vehicle's safety features engage and are able to protect the occupants (GAO 2019). Significant expenses went into developing these car safety systems, but, when a side underride crash occurs, without a side underride guard these systems are generally rendered useless.

Conclusion

This study demonstrates that underreporting of side underride crashes and fatalities in FARS is common. FARS is the National database that is NHTSA's and many States' principal means of tracking trends in vehicle crash fatalities and quantifying potential problems in highway safety. Given the importance of the "underride/override" data element in FARS to identify the magnitude of side underride crashes and fatalities or to support NHTSA rulemaking activities and motor vehicle bumper compatibility research (NHTSA 2020), new methods are clearly needed to increase the accuracy of FARS side underride death data.

Therefore, it is recommended that:

1. NHTSA mandate that an "underride/override" data element be included on all State Police Crash Report Forms through the reporting requirement of the Cooperative Agreements. NHTSA should also further refine the data element into rear, side, or front underride categories so each of these types of underride crashes can be catalogued. This new underride reporting requirement could be approved during the next clearance process with OMB to authorize the standard set of FARS information and data elements collected (e.g., see NHTSA 2022a; 87 FR 19573; NHTSA 2022c; 87 FR 43380). This recommendation also aligns with USDOT's (2022b) National Roadway Safety Strategy to address roadway safety and is consistent with NHTSA's mission to save lives, prevent injuries, and reduce economic losses resulting from motor vehicle crashes by providing

the agency vital information about fatal crashes. The importance of accurately reporting underride crashes could also be highlighted during FARS data input training by NHTSA's FARS contractor (e.g., see GAO 2019).

2. NHTSA establish a process to correct inaccurate underride data element records in FARS using photos or other documentation that demonstrates a crash should have been coded as an underride. NHTSA recently corrected an inaccurate "underride/override" data element record from "No Underride or Override Noted" to "Underriding a Motor Vehicle In-Transport" for one of the FARS Case Listings reviewed (NHTSA 2019; FARS Case Listing 120918; Appendix 1; Table 1). However, FARS corrections are not possible for inaccurate data element records more than 3 years old. According to NHTSA's retention plan for NCSA data collection systems, States are instructed to only retain information for the current year plus three previous years (NHTSA 2022d). Currently, NHTSA (2022d) will not update FARS Case Listing records beyond this retention schedule. Because FARS is critical in identifying, understanding, and analyzing crash fatalities, making informed decisions concerning vehicle safety programs, and developing countermeasures and strategies (e.g., to mitigate and prevent side underride crashes), including cost-benefit analyses for possible future rulemaking, not having a process to correct underride data >3 years old is untenable and should be changed.
3. Change the "underride/override" data element coding rule to explicitly identify both the truck/semitrailer and passenger vehicle involved in the crash (i.e., code the "underride/override" data element with "Underriden by a Motor Vehicle", rather than the inaccurate and confusing "No Underride or Override Noted"). Unless one is aware of the current omission by design from the truck/semitrailer FARS Case Listing file, using NHTSA's FIRST FARS query tool will consistently obscure and likely undercount the number of side underride crashes and fatalities.
4. An investigation be conducted to comprehensively evaluate the accuracy of side underride data in at least the last 10 years of FARS Case Listing records using the same methods as this study (i.e., using Google to search and locate articles that reported fatalities resulting from side underride crashes with semitrailers and comparing these verified side underride crashes to FARS Case Listings).
5. These methods also be used to investigate the prevalence of underreporting of both rear underride and front override crash fatalities with semitrailers and the prevalence of underreporting of underride fatalities involving Single Unit Trucks (front, side, rear), as well as add the reporting of Vulnerable Road User's (i.e., pedestrian, bicyclist, motorcyclist) deaths under trucks and semitrailers.

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Appendix 1

Fatality Analysis Reporting System Case Listing data and internet-based articles of confirmed side underride crash fatalities.

FARS Case Listing	Crash Date	Recorded Underride Data Field Element Truck/Trailer File	Recorded Underride Data Field Element Passenger Vehicle File	Fatalities	County	State	Vehicle	Semitrailer Manufacturer	Basis for confirming that crash was a side underride	Internet address of crash description
120467	3/1/2019	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion	1	Palm Beach	FL	Tesla Model 3	Vanguard	See Photograph in Appendix 2 Description: "The car hit the left side of the semitrailer just aft of the trailer's midpoint. The roof of the car was sheared off as the vehicle underrode the semitrailer and continued south."	https://www.foxnews.com/auto/feds-investigating-fatal-tesla-model-3-crash-in-florida https://www.nts.gov/investigations/Pages/HWY19FH008.aspx
120532	3/11/2014	No Underride or Override Noted	No Underride or Override Noted	3	Polk	FL	Buick Century	Wabash	See Photograph in Appendix 2 Description: "...The car lodged underneath the trailer and was dragged for about 400 feet."	https://www.theledger.com/story/news/2014/03/11/parents-child-killed-in-polk/8169310007/
120918	5/7/2016	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion (inaccurately recorded as no underride in 2019; now correct)	1	Levy	FL	Tesla Model S	Utility	See Photograph in Appendix 2 Description: "Because of the high ride-height of the trailer, as well as its positioning across the road, the Model S passed under the trailer and the first impact was between the windshield and the trailer."	https://www.nytimes.com/interactive/2016/07/01/business/inside-tesla-accident.html https://www.theverge.com/2016/6/30/12072408/tesla-autopilot-car-crash-death-autonomous-model-s https://static.nhtsa.gov/odi/inv/2016/INCLA-PE16007-7876.PDF https://www.nts.gov/investigations/AccidentReports/Reports/HAR1702.pdf
170962	11/30/2020	No Underride or Override Noted	No Underride or Override Noted	4	Cook	IL	Chevrolet Impala	Vanguard	See DashCam in Link and Photograph in Appendix 2 Description: "...the driver went through the stop sign and crashed into the semitrailer..."	https://www.cbsnews.com/chicago/news/police-dashcam-video-captures-crash-that-killed-3-in-berkeley/ http://www.theindependentnewspapers.com/2020/12/three-teens-killed-in-crash-while-fleeing-berkeley-police-driver-collides-with-semitrailer-at-taft-bohlander-fourth-teen-later-dies-from-injuries/
121219	5/19/2018	No Underride or Override Noted	No Underride or Override Noted	1	Orange	FL	Ford Focus	Wabash	Description: "The Ford struck the semi's right side, before passing under its trailer."	https://www.orlandosentinel.com/news/breaking-news/os-man-killed-john-young-parkway-taft-vineland-20180519-story.html
122375	10/31/2016	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion	1	Lake	FL	Dodge Ram Pickup	Great Dane	See Photograph in Appendix 2 Description: "A car was lodged under a semi-truck [trailer] at the scent of a fatal crash..." "A pickup driven by Kevin Cottle, 21, of Leesburg hit the side of the tractor-trailer and drove underneath it."	https://www.dailycommercial.com/story/news/local/2016/11/01/fog-could-have-contributed-to-fatal-5-vehicle-crash/24642934007/ https://www.wftv.com/traffic/incidents/one-killed-in-groveland-crash-involving-tractor-trailer-/462327986/
170500	7/11/2017	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport,	1	Stark	IL	Jeep Patriot	Walker Stainless Equipment	Description: "In the impact sequence, Corrina's jeep traveled into the side of the trailer, under	https://acrobat.adobe.com/link/track?uri=urn%3Aaad%3Aascds%3AUS%3A7ca1d170-6359-4d20-a710-f34966422394&viewer%21megaVerb=group-discover

			Underride, Compartment Intrusion						the trailer, and came to a rest west of the trailer..."	https://www.pjstar.com/story/news/courts/2021/11/30/peoria-county-awards-fatal-2017-killed-stark-county-woman/8797745002/
180041	2/3/2019	No Underride or Override Noted	No Underride or Override Noted	1	Putnam	IN	GMC Sierra Pickup	Unknown	See Photograph in Appendix 2	https://www.wishtv.com/news/1-dead-after-semi-pickup-collide-on-us-40/
180150	3/28/2012	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion	5	Knox	IN	Cadillac Seville	Wabash	Description: "...the car they were riding in became wedged under a semitrailer and burst into flames..." "Lockard apparently crossed from the northbound lanes of U.S. 41 into the southbound lanes and drove under the semi's trailer, triggering an explosion and fire that engulfed her car and the trailer..."	https://www.heraldtimesonline.com/story/news/2012/03/30/2-toddlers-mother-among-5-dead-in-us-41-crash/47148855/
180562	10/4/2019	No Underride or Override Noted	No Underride or Override Noted	3	Lake	IN	Dodge Charger	Great Dane	See Photograph in Appendix 2 Description: "...Two of the three people killed in a deadly crash after a car became jammed underneath a semi..."	https://abc7chicago.com/crash-i-8094-semi-northwest-indiana/5590913/ https://www.youtube.com/watch?v=3Uoqb2OxW-o
180648	10/29/2018	No Underride or Override Noted	No Underride or Override Noted	1	Kosciusko	IN	Dodge Caliber SUV	Swift Intermodal	See Photograph in Appendix 2 Description: "...upon arrival found a passenger vehicle had under rode a semi-trailer..."	https://www.inkfreeenews.com/2018/10/29/fatal-crash-on-us-30-kills-one/
180730	12/16/2019	No Underride or Override Noted	No Underride or Override Noted	2	Marshall	IN	Ford Taurus	Utility	See Photograph in Appendix 2 Description: "...vehicle ended up under the trailer of a westbound Volvo semi."	https://www.wndu.com/content/news/2-dead-after-crashing-into-semitrailer-566246081.html
210303	7/6/2020	Overriding a Motor Vehicle In-Transport	No Underride or Override Noted	1	Boone	KY	Toyota Corolla	Unknown	See Photograph in Appendix 2 Description: "...leading her to spin out of control and end up under the trailer of a semi."	https://www.wymt.com/2020/07/06/21-year-old-floyd-county-woman-killed-in-collision-with-tractor-trailer/ https://local12.com/news/local/one-dead-in-i-71-crash-in-boone-county-cincinnati
220249	5/5/2009	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion	1	Caddo Parish	LA	Chevrolet Suburban	Utility	See Photograph in Appendix 2 Description: "...Beane's Suburban struck the side of the UTM trailer at a ninety degree angle, causing his Suburban to travel beneath (a collision the plaintiff describes as a "side underride") the trailer."	https://scholar.google.com/scholar_case?case=4275706816494743715&q=Beane+v.+Utility+Trailer&hl=en&as_sdt=6,38&as_vis=1 https://www.ktbs.com/news/truck-driver-ticketed-in-wreck-that-killed-deputy/article_2e988d28-5280-5235-a233-a138eea5e73c.html https://www.kplctv.com/story/10308815/update-deputy-killed-in-crash-with-18-wheeler/
260701	10/6/2017	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion Unknown	1	Mason	MI	Pontiac G5	Utility	Description: "...Pontiac G5 failed to stop for the stop sign at U.S. 31 and struck a northbound tractor-trailer..." "...The vehicle went under the trailer and was dragged down the road..."	https://www.mlive.com/news/muskegon/2017/10/driver_16_killed_in_crash_with.html https://www.shorelinemedia.net/ludington_daily_news/ludington-area-school-district-community-mourn-loss-of-student-henry-macdougall-following-semi-vs-car/article_559ac00c-ab7c-11e7-b309-279a0eb77569.html
270248	9/20/2017	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport,	1	Cass	MN	Jeep Grand Cherokee	Unknown	Description: "The semi-truck was backing into a private drive on the south side of the highway when a	https://www.cbsnews.com/minnesota/news/cass-county-fatal-crash/

			Underride, Compartment Intrusion						2012 Jeep Grand Cherokee heading east hit the truck's trailer."	
320002	1/7/2017	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion	1	Clark	NV	Ford Focus wagon	Unknown	See Photograph in Appendix 2 Description: "...the Ford failed to stop at a red light, thus crashing into the left side of the semi. The Ford became lodged under the trailer."	https://www.ktnv.com/news/car-lodged-under-semi-truck-trailer-near-pecos-and-sunset
360487	7/5/2017	No Underride or Override Noted	Underriding a Motor Vehicle Not In-Transport, Underride, No Compartment Intrusion	4	Oswego	NY	Subaru Impreza and Mercury Sable	Tremcar milk tanker	Description: "The incident, which involved multiple passenger vehicles sliding underneath a jackknifed tractor trailer, triggered lawmakers to propose legislation that would require tractor trailers to be equipped with side underride guards..."	https://www.baumhedlundlaw.com/blog/2019/june/truck-accident-lawsuit-renews-calls-for-underride/ https://www.schumer.senate.gov/newsroom/press-releases/following-fatal-accident-on-i-81-schumer-launches-a-major-effort-to-make-truck-rigs-safer-for-cars-sharing-the-roads-trucks-should-be-equipped-with-energy-absorbing-underride-guards-to-protect-drivers-and-passengers-from-crashes---could-help-prevent-future-fatal-accidents-
370614	6/5/2018	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion	2	Mecklenburg	NC	Nissan Murano	Unknown	See Photograph in Appendix 2 Description: "...a Nissan Murano struck the side of a tractor-trailer in the intersection. The vehicle had come to rest under the trailer..."	https://www.wsocvt.com/news/local/medic-2-killed-after-car-collides-with-tractor-trailer-in-north-charlotte/763250290/ https://www.wbtv.com/story/38350444/driver-passenger-killed-in-northeast-charlotte-crash-identified/
390821	10/11/2017	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion Unknown	1	Sandusky	OH	Cadillac SRX4 SUV	Wabash	See Photograph in Appendix 2 Description: "...Mayle's 2012 Cadillac struck Mugridge's 2013 Peterbilt semi and was trapped under the trailer."	https://www.thenews-messenger.com/story/news/local/2017/10/11/1-dead-suv-semi-crash-cr-138-and-us-20/753124001/
40906	12/26/2019	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion	1	Maricopa	AZ	Infiniti QX5 SUV	Wabash	See Photograph in Appendix 2 Description: "...an SUV collided with a commercial truck, ending up underneath the big rig's trailer with its top sheared off."	https://www.12news.com/article/news/local/valley/suv-stuck-under-semi-truck-after-crash-in-phoenix/75-9283db78-0ee0-41d6-a783-c1a84049c265 https://www.fox10phoenix.com/news/driver-killed-after-suv-gets-wedged-under-semi-truck-in-phoenix
421040	12/28/2020	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion	1	Bucks	PA	Honda CRV	Wabash	See Photograph in Appendix 2 Description: "...sport utility vehicle was pinned under a tractor-trailer..."	https://www.mcall.com/news/police/mc-nws-bucks-fatal-20201229-qhis3bacergmzjdcqm2qmcx2y-story.html
450487	7/18/2018	No Underride or Override Noted	No Underride or Override Noted	2	Spartanburg	SC	Ford Taurus	Wabash	See Photograph in Appendix 2 Description: "...The vehicle ran a red light at the intersection of Highway 221 and I-85 and hit a tractor trailer."	https://www.wspa.com/news/driver-dies-days-after-chase-crash-that-killed-passenger-in-spartanburg-co/1315406775/ https://www.wyff4.com/article/driver-dies-days-after-crash-police-chase-that-also-killed-passenger/22507613
460116	11/9/2020	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion	1	Pennington	SD	KIA Optima	Utility	See Photograph in Appendix 2 Description: "...The vehicle was wedged underneath the semi..."	https://www.kotatv.com/2020/11/09/serious-crash-redirects-traffic-at-elk-vale-road-as-police-investigate/

470789	11/18/2014	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion	1	Shelby	TN	Jeep Cherokee	Unknown	Description: "Higginbotham's SUV was going east on Walnut Grove when he plowed into the trailer portion of the truck..."	https://archive.commercialappeal.com/news/crime/1-dead-in-crash-with-tractor-trailer-on-interstate-240-walnut-grove-ep-782224975-324296031.html/
480069	1/15/2015	No Underride or Override Noted	No Underride or Override Noted	1	Bexar	TX	Subaru	Unknown Intermodal	See Photograph in Appendix 2 Description: "...the semi had nearly completed its turn when a Subaru traveling in the opposite direction crashed into the trailer and became wedged underneath..."	https://www.ksat.com/news/2015/01/15/driver-killed-after-car-gets-stuck-under-semi-trailer-2/
480777	3/20/2016	No Underride or Override Noted	No Underride or Override Noted	1	Wilbarger	TX	Chevrolet pickup truck	Utility	See Photograph in Appendix 2 Description: "...the Chevy crashed head-on into the side of the trailer, wedging the front of the pickup under the trailer..."	https://www.texomashomepage.com/news/local-news/one-killed-in-semi-truck-crash/406057150/ https://www.timesrecordnews.com/story/news/local/2016/03/21/fatal-wreck-one-killed-in-crash-at-harrold/92573828/
480926	4/1/2017	No Underride or Override Noted	No Underride or Override Noted	1	Polk	TX	Kia Soul	Fontaine	See Photograph in Appendix 2 Description: "...a 21-year-old college student killed by a side underride collision with an owner operated 18-wheeler..." "...Chapla's vehicle was fully lodged under Adair's trailer as the 18 wheeler pulled off the highway to Loop 116 dragging the car..."	https://www.mcabw.org/news-room/245-wham-and-rogers-verdict-receives-top-recognition https://montgomerycountypolicereporter.com/woodlands-woman-killed-polk-county-crash-18-wheeler/
481868	7/17/2020	No Underride or Override Noted	No Underride or Override Noted	1	Harris	TX	Chevrolet Impala	Unknown 3 Bay Dry Bulk Pneumatic	See Photograph in Appendix 2 Description: "...One person was killed when a car ended up wedged under a semi..."	https://abc13.com/houston-traffic-in-texas-now-i-10-i-45/6321663/
482615	10/15/2018	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion Unknown	2	Burleson	TX	Dodge Caravan	Troxell Trailer Manufacturing Company	Description: "...a big rig pulling a saltwater tank was turning onto Highway 21 from FM 1362 when a Dodge minivan hit the trailer."	https://www.kbtx.com/content/news/DPS-investigating-major-accident-on-Hwy-21-in-Cooks-Point-497563711.html https://www.montgomeryfirm.com/news/leslie-sophie-rosenberg-fatal-crash/
490023	2/23/2017	No Underride or Override Noted	No Underride or Override Noted	1	Box Elder	UT	Ford Escort	Strick	See Photograph in Appendix 2 Description: "That impact sent his car under the semi-trailer."	https://www.hjnews.com/allaccess/clarkston-man-killed-in-collision-with-semi-near-willard/article_6493984c-44df-55b3-8587-9fe53519f3e0.html
490075	6/1/2019	Missing; Not entered in FARS	No Underride or Override Noted	1	Utah	UT	Dodge Ram Pickup	Unknown	See Photograph in Appendix 2 Description: "...the vehicle ended up wedged beneath the semi-trailer..."	https://gephardtaily.com/local/pickup-driver-killed-in-fiery-crash-off-i-15-in-springville/
60565	4/13/2016	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport,	1	San Diego	CA	Toyota 4-Runner	Western Trailer Company	See Photograph in Appendix 2 Description: "...vehicle struck the back of the eastbound semi	https://www.10news.com/news/one-dead-after-car-gets-jammed-under-semi-on-sr-52-in-santee https://www.cbs8.com/article/news/man-killed-after-suv-smashed-into-semi-truck-on-sr-52-identified/509-80716977-74e6-4d1a-883e-676136389757

			Underride, Compartment Intrusion						broadside, winding up wedged beneath it..."	
60573	4/30/2016	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion Unknown	1	Los Angeles	CA	Chevrolet Silverado Pickup truck	Wabash	See Photograph in Appendix 2 Description: "Murillo and the driver of the pickup were trapped inside as the truck was lodged underneath the 18-wheeler."	https://abc7.com/armando-murillo-killed-in-vernon-hit-and-run-man/1317398/
60888	3/1/2020	No Underride or Override Noted	No Underride or Override Noted	1	San Bernardino	CA	Ford Focus	Unknown	See Photograph in Appendix 2 Description: "...the Ford Focus failed to stop at the stop sign at Johnson Road, causing the vehicle to collide into the trailer the semi-truck was pulling..."	https://www.vvng.com/coroner-identifies-woman-killed-after-crashing-into-semi-truck-in-apple-valley/ https://www.vvdailypress.com/story/news/local/desert-dispatch/2020/03/02/woman-dead-after-sunday-night/1603564007/
61133	7/9/2017	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion	1	Riverside	CA	Honda Accord	Utility	Description: "the decedent...was unable to bring the vehicle he was operating, a 2011 Honda Accord, to rest prior to the collision with the underside of the tractor trailer..." "...the Honda operated by decedent went directly under the side of the trailer..." "...The first arriving engine company reported that one vehicle was underneath a semi-truck with one victim trapped."	https://annaleahmary.com/wordpress/wp-content/uploads/2019/09/VALENZUELA.First-Amended-Complaint-conformed.pdf https://www.youtube.com/watch?v=ISoljL5w5_s
80020	1/25/2011	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion	1	Boulder	CO	Mazda CX-7 crossover SUV	Unknown	See Photograph in Appendix 2 Description: "...Feda's 2010 Mazda CX-7 crossover SUV smashed underneath the trailer."	https://www.dailycamera.com/2011/01/25/man-killed-in-louisville-crash-identified-as-longmont-resident-daniel-c-feda-57/
80204	6/4/2020	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion	2	El Paso	CO	Ford Fiesta	Con-Way manufacturing	See Photograph in Appendix 2 Description: "...this caused the Ford sedan to crash into the side of the semi-trailer-truck and become lodged underneath..."	https://www.koaa.com/news/covering-colorado/fatal-crash-shuts-down-all-lanes-at-south-academy-east-fountain-boulevards https://gazette.com/news/crime/public-safety/crash-wedges-car-under-semi-leaves-2-dead-in-colorado-springs/article_0541ce1c-a65f-11ea-94d3-675b44b57c37.html
80299	7/2/2018	No Underride or Override Noted	Underriding a Motor Vehicle In-Transport, Underride, Compartment Intrusion	1	Weld	CO	Dodge Grand Caravan	Great Dane	See Photograph in Appendix 2 Description: "...The van appeared to be wedged underneath the semi..."	https://www.greeleytribune.com/2018/07/02/crews-responding-to-crash-involving-semi-car-at-u-s-34-and-weld-county-road-49/
No FARS record	12/21/2020	Missing; Not entered in FARS	Missing; Not entered in FARS	3	Alameda	CA	Mercedes-Benz	CIMC container chassis trailer	Description: "...the car, a white Mercedes, went underneath the trailer slicing the car in half."	https://www.ktvu.com/news/3-killed-in-livermore-crash-between-car-big-rig https://www.pleasantonweekly.com/news/2021/03/02/livermore-triple-fatal-crash-investigation-complete-case-now-under-review-by-da

Appendix 2

Photographs used to confirm that a side underride crash occurred with a semitrailer.



Crash Associated with FARS Case Listing: 40906



Crash Associated with FARS Case Listing: 60565



Crash Associated with FARS Case Listing: 60573



Crash Associated with FARS Case Listing: 60888



Crash Associated with FARS Case Listing: 61133



Crash Associated with FARS Case Listing: 80020



Crash Associated with FARS Case Listing: 80204



Crash Associated with FARS Case Listing: 80299



Crash Associated with FARS Case Listing: 120532



Figure 7. Closeup view of impact damage to the right side of the Utility semitrailer. The arrow indicates a segment of front windshield trim from the Tesla entrapped in the forward-most area of damage.

Crash Associated with FARS Case Listing: 120918



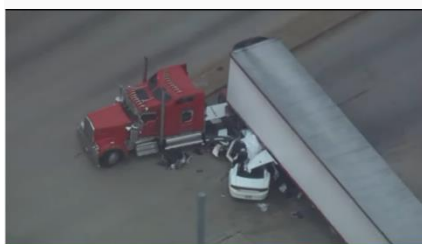
Crash Associated with FARS Case Listing: 170962



Crash Associated with FARS Case Listing: 122375



Crash Associated with FARS Case Listing: 180041



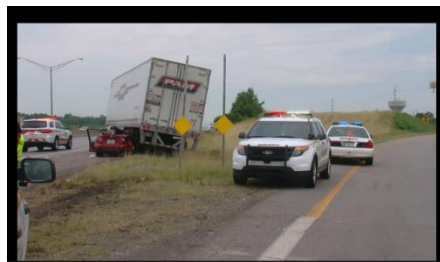
Crash Associated with FARS Case Listing: 180562



Crash Associated with FARS Case Listing: 180648



Crash Associated with FARS Case Listing: 180730



Crash Associated with FARS Case Listing: 210303



Crash Associated with FARS Case Listing: 220249



Crash Associated with FARS Case Listing: 320002



Crash Associated with FARS Case Listing: 370614



Crash Associated with FARS Case Listing: 390821



Crash Associated with FARS Case Listing: 421040



Crash Associated with FARS Case Listing: 450487



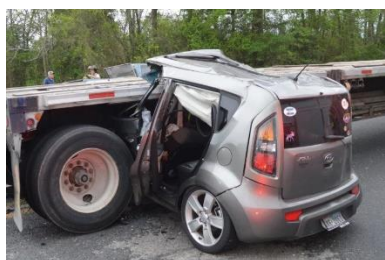
Crash Associated with FARS Case Listing: 460116



Crash Associated with FARS Case Listing: 480069



Crash Associated with FARS Case Listing: 480777



Crash Associated with FARS Case Listing: 480926



Crash Associated with FARS Case Listing: 481868



Crash Associated with FARS Case Listing: 490023



Crash Associated with FARS Case Listing: 490075



Crash Associated with No Record in FARS (Date: December 21, 2020; 3 fatalities)

Eric Hein worked throughout the United States as a wildlife biologist. He was an endangered species scientist and policy leader for the U.S. Fish and Wildlife Service, recently retiring after 30 years. Eric's truck safety advocacy began in 2015, when his 16-year-old son Riley Eric Hein was tragically killed due to the lack of a side underride guard on a 2016 semitrailer produced by Utility Trailer Manufacturing Company. Eric is a passionate, fact-based advocate who understands the Federal regulatory system and now educates the public and elected officials about the safety and financial benefits of side underride guards, campaigning for them to be mandatory on semitrailers and single-unit trucks. He is also on the Board of Directors of the Institute for Safer Trucking, a nonprofit organization focused on educating the public on truck safety issues and the data-driven solutions to address them. Eric earned his Master of Science degree in Wildlife Biology in 1992 from Colorado State University and has a Bachelor of Science in Geography with a minor in Zoology from Southern Illinois University.