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December 18th, 2023

Ms. Ann Carlson
Acting Administrator
National Highway Traffic Safety Administration
1200 New Jersey Avenue SE
Washington, D.C. 20590

RE: Ford Motor Company's Response to NHTSA Initial Decision That Certain Driver and Passenger Air Bag Inflators Contain a Safety Defect: ARC Automotive Inc. and Delphi Automotive Systems, LLC (Docket No. NHTSA-2023-0038)

Dear Acting Administrator Carlson:

Ford Motor Company ("Ford"), the largest producer of vehicles assembled in the United States, with offices at One American Road, Dearborn, Michigan 48126-2798, appreciates the opportunity to provide comments to the Initial Decision That Certain Driver and Passenger Air Bag Inflators Contain a Safety Defect: ARC Automotive Inc. and Delphi Automotive Systems, LLC, published by the National Highway Traffic Safety Administration (NHTSA) in the Federal Register, Docket No. NHTSA-2023-0038. Ford respectfully submits this comment to NHTSA's Initial Decision dated September 5, 2023 (the "Initial Decision") to recall ARC hybrid, toroidal inflators (the "ARC Inflators") manufactured between 2000 and January 2018. Ford is pleased to share that with over 2 million Ford vehicles equipped with ARC Inflators, which have collectively driven billions of miles for up to 19 years, that there have been no inflator ruptures in the field.[1] With such a large sample size, the data demonstrates that the inflators in Ford vehicles do not have a defect.

Ford is a global manufacturer of automobiles headquartered in Dearborn, Michigan. Since its founding in 1903, Ford has designed and built vehicles with a focus on safety—ensuring the wide availability of safe, quality vehicles for customers throughout the United States and the world. Ford has a longstanding track record of proactively identifying potential safety defects in its vehicles, implementing comprehensive recall and repair programs where appropriate, and working cooperatively with NHTSA, its dealers, and vehicle owners to ensure that necessary repairs are made. For instance, Ford promptly initiated a recall of 650 vehicles (17V529) that

[1] Ford is not aware of any ARC inflator ruptures in Ford vehicles. Ford has diligently searched its records, NHTSA has not informed Ford otherwise, and no rupture has been alleged in litigation.

contained potentially defective ARC Inflators, based on a report of an abnormal Lot Acceptance Test (LAT) at the Tier 1 supplier's facility. It has fully repaired 95% of such vehicles. Ford is proud of its record and its commitment to vehicle safety.

Nevertheless, Ford has serious concerns about the scope of the recall proposed by NHTSA in its Initial Decision. The proposed recall would impact more than two million vehicles that Ford manufactured between 2005 and 2017.[2] Within those millions of Ford vehicles, there have been *zero* reported ruptures of ARC Inflators in the field.

The full population of ARC Inflators subject to the proposed recall consist of different types of hybrid, toroidal inflators, with different designs and manufacturing specifications—so even if a safety-related defect existed in some of the ARC Inflators, there is no evidence that any such defect exists in Ford vehicles' ARC Inflators. In short, the "one-size-fits-all" approach that NHTSA has proposed is an overbroad response to the ARC Inflator ruptures identified by NHTSA. This approach is not supported by the record of this proceeding and would not benefit Ford vehicle owners.

I. Factual Background

A. Background and Scope of the ARC Inflators

Ford, like most other vehicles manufacturers, does not design its own airbags and the inflators used in those airbags. Rather, Ford specifies the necessary performance specifications to a Tier 1 airbag module supplier, which in turn establishes an airbag module design and sources components from Tier 2 suppliers, such as ARC. During development of the airbags, both Ford and its Tier 1 suppliers conduct testing to ensure that the airbags perform as specified to protect vehicle occupants. Likewise, as part of the manufacturing and verification process, airbag inflators and modules undergo Lot Acceptance Testing (LAT) at both the Tier 1 and Tier 2 points of production.

The ARC Inflators at issue in the Initial Decision encompass 52 million inflators that vary considerably in design. The inflators at issue include both driver and passenger airbags, and each of those categories in turn includes both single-stage and dual-stage inflator designs. Further, each of these sub-categories of inflators includes multiple inflator types and designs. In all, there are over 40 unique Inflator Codes differentiating the ARC toroidal hybrid inflator designs that are subject to the Initial Decision.

B. Ford Vehicles with ARC Inflators Have Never Ruptured in the Field

Ford has manufactured vehicles with only two types of ARC hybrid, toroidal inflators: dual-stage driver inflators DCADH (Dual Clean Advanced Driver Hybrid) with code FT, and dual-stage passenger inflators DPH7 (Dual Passenger Hybrid) with code K9. These inflators have not been involved in any field ruptures in any vehicles.

The dual-stage driver DCADH FT inflators are present in over half-a-million Ford vehicles with model years between 2005 and 2011. Thus, these FT inflators have been in service in Ford

[2] As described later in this document, it appears that NHTSA included around one million Ford vehicles that did not have the ARC hybrid, toroidal inflators subject to its Initial Decision
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vehicles for 13 to 18 years. Nevertheless, throughout that entire period, there has never been a crash involving a driver airbag rupture of an FT inflator in any of those vehicles. Similarly, the dual-stage passenger DPH7 K9 inflators are present in Ford vehicles with model years between 2015 and 2017—a total of about two million vehicles. Again, in the 8 to 10 years that these vehicles have been in service, there has never been any crash involving a K9 passenger airbag inflator rupture.

C. Only Three K9 LAT Ruptures Have Been Reported, and Were Fully Resolved

To Ford's knowledge, there were no ruptures during the LAT process for dual-stage driver FT inflators. And in the few instances that dual-stage passenger K9 inflators ruptured during LAT testing, relevant production lots were scrapped by the supplier or, in the case of one lot, recalled by Ford. A LAT rupture occurred at Ford's Tier 1 airbag supplier in July 2017. In that case, the supplier notified Ford of the inflator rupture, and Ford's team took prompt action to address the issue by recalling all vehicles from that lot and replacing the vehicles' inflators with inflators from certified lots (*see* NHTSA Recall No. 17V-529).

D. The 2018 NHTSA Field Test Confirmed that the ARC Inflators Are Reliable

In April 2018, NHTSA supervised an ARC test program that collected nearly 1,000 inflators from salvage yards and tested them for a potential defect. In ARC's tests, *none* of those inflators ruptured. Thus, as ARC has explained to NHTSA, that "test program demonstrated with 99% reliability and 99% confidence that the inflators in the subject population would deploy without rupturing." May 11, 2023 Letter from S. Gold to S. Ridella.

II. There Is No Basis to Conclude that any ARC Inflators Present in Ford Vehicles Are Defective

A. The ARC Inflators Used in Ford Vehicles Are Qualitatively Different from Those that Have Ruptured in the Field

As noted, there are over forty different design configurations of ARC Hybrid Toroidal Inflators, designated by Inflator Codes. Ford has ARC dual-stage driver DCADH FT inflators and dual stage passenger DPH7 K9 inflators. The Ford dual-stage driver FT inflators and dual-stage passenger K9 inflators have different design specifications from the ARC inflators with field rupture incidences. These design differences include primary booster load, secondary booster load, peak pressure specifications, orifice size and manifold thickness. NHTSA cited five (5) crashes with ruptures involving dual-stage driver airbag ARC inflators:

- Three incidents involved a Chevrolet Traverse, which is identified by ARC with an inflator code different from Ford vehicles. The ARC FT inflator design in Ford vehicles has different primary and secondary booster loads, different peak pressure specifications, and a larger orifice size when compared to the Traverse inflator.

- One incident involved a Chevrolet Malibu, which is identified by ARC with an inflator code different from Ford vehicles. The ARC FT inflator design in Ford vehicles has different primary and secondary booster loads, different peak pressure specifications, and a larger orifice size when compared to the Malibu inflator.

- One incident involved a Chrysler Town & Country, which is identified by ARC with an inflator code different from Ford vehicles. The ARC FT inflator design in Ford vehicles has a different secondary booster load and a thicker manifold size when compared to the Chrysler Town & Country Inflator.

NHTSA cited one (1) crash with a rupture involving a dual-stage passenger airbag ARC inflator:

- One incident involved an Audi A3, which is identified by ARC with an inflator code different from Ford vehicles. The ARC K9 inflator design in Ford vehicles has a different primary booster load and different peak pressure specifications when compared to the Audi inflator.

These differences can be relevant where, per design, a root cause has been defined with supporting data. As reviewed, the data does not suggest a common cause across the different inflator types. At best, one can only point out that differences exist, and look to the field performance of the DCADH FT and DPH7 K9 inflators in Ford vehicles. With zero ruptures in the field, there is no indication that a safety defect exists in Ford vehicles built with these inflators.

B. Ford's Statistical Analyses Confirms an Expected Rupture Rate of 0%

In its investigation of the ARC Inflators, NHTSA requested that Ford estimate the number of airbag deployments expected for vehicles with ARC Inflators in the field as part of the EA16-003 investigation. NHTSA requested a min/low and max/high range to be provided. As part of its response, Ford estimated the number of airbag deployments using police reported traffic crash data from the Texas Crash Information System (C.R.I.S.) during the period from January 2010 through December 2022. Ford used the C.R.I.S. data to calculate the number of airbag deployments reported for both driver- and passenger-side airbags. Ford then used its own sales data to calculate the number of vehicle days—*i.e.*, the number of vehicles sold by production month multiplied by the number of days since production—for each model and model year. Combining this data, Ford developed crash rates for each model and model year vehicle, then used internal production data for the entire United States to create national estimates for field deployments of driver- and passenger-side airbags.

When this analysis is updated to include all Ford vehicles in scope of the Initial Decision, Ford estimates that, within the population of Ford vehicles with dual-stage driver inflators with code FT, a range of 72,956 (min/low) to 109,323 (max/high) crashes involving driver airbag deployments have occurred. Similarly, Ford estimates that, within the population of Ford vehicles with dual-stage passenger inflators with code K9, a range of 4,959 (min/low) to 91,659 (max/high) crashes involving frontal passenger airbag deployments have occurred.[3] However, as stated above, there have been *zero* occurrences of an airbag rupture in these vehicles in the field. Accordingly, based on this analysis, Ford estimates that the rupture rate range for FT driver inflators is 0 out of 72,956 – 0 out of 109,323 and the rupture rate range for K9 passenger inflators is 0 out of 4,959 – 0 out of 91,659.

[3] There is a wider range for passenger deployments because a passenger airbag will deploy only if the vehicle's Occupant Classification System (OCS) detects a passenger in the seat. If a crash event occurs that would otherwise trigger deployment of an airbag, but the OCS does not detect a passenger, the passenger airbag will not deploy, per design.

Further, in the October 5, 2023 public meeting regarding the Initial Decision, Dr. Glassbrenner of NHTSA provided a statistical model for the full population of 52 million vehicles in the United States with the ARC Inflators. This estimate combined all of the ARC Inflators together, notwithstanding their dissimilar characteristics. On December 4, 2023, NHTSA made available the spreadsheet prepared by Dr. Donna Glassbrenner in the course of her analysis. The Excel spreadsheet file named "Confidential – Estimated airbag deployments and rupture rate and derivation of assumption – Contains CBI" provided estimates by manufacturer. Ford used this data as additional input along with the estimates provided under EA16-003.

Upon reviewing the Glassbrenner spreadsheet file, Ford noticed Ford vehicles listed in the file that do not have ARC hybrid, toroidal inflators. The following Ford vehicles included in Dr. Glassbrenner's analysis are outside the scope of NHTSA's Initial Decision as they do not contain ARC hybrid toroidal inflators: Ford Flex, Ford Taurus, Ford Taurus X, Lincoln MKS, Lincoln MKT, Mercury Sable.[4] These vehicles contain cylindrical DPH5 inflators, and should be removed from the analysis. The physical difference between a cylindrical and toroidal inflator design is shown in Figure 1.[5]

Figure 1. Comparison of a cylindrical inflator vs. a toroidal inflator

Dr. Glassbrenner's spreadsheet also includes projections of airbag deployments through 2056. As vehicles age, a reduction in annual mileage driven is expected. As older vehicles reduce their mileage driven, the opportunity for a crash involving an airbag deployment each year will also be reduced. Ford does not believe that the 0.004 factor for airbag deployment is static – it will not apply equally across older vehicles that are driven less than newer vehicles. That vehicle mileage should have been considered by NHTSA in their analysis.

Ford compiled estimates from Dr. Glassbrenner's analysis for the specific Ford vehicle models with ARC hybrid toroidal inflators through 2023, which corresponds to the time period of the EA16-003 analysis. Ford did not make any adjustments to Dr. Glassbrenner's model and, by using the model here, is not advancing an opinion on the accuracy or legal conclusions of the Glassbrenner model. Across vehicles with ARC dual-stage driver DCADH FT inflators, using the NHTSA model, 57,995 airbag deployments have occurred. There have been zero occurrences of an airbag rupture in vehicles with dual stage driver FT inflators, so the expected rupture rate for

[4] Dr. Glassbrenner's analysis includes Ford vehicles with DPH5 cylindrical inflators. NHTSA sent its initial IR to Ford in 2016. Ford interpreted NHTSA's request broadly, and provided a list of all vehicles manufactured by Ford that were "equipped with driver or passenger frontal airbag inflators produced by ARC Automotive, Inc." This included both toroidal hybrid inflators and cylindrical inflators manufactured by ARC. Subsequent IRs for 16-003 further clarified the toroidal shaped hybrid airbag scope, and specifically requested information for PH7 passenger airbags (2020, 2022) and DCADH driver airbags (2022).

[5] A pictorial representation for the DPH5 inflator is contained on page 5 of an ARC document that was marked confidential and is not reproduced in these comments. The title of that document is "CONF BUS INFO - Inflator Expanded Views – Cylindrical.pdf" and can be found in the directory: \\ARC - General Information\ARC Inflator - EXPANDED VIEWS. Other drawings of toroidal inflators are in the same directory.

FT inflators is 0 out of 57,995. For Ford vehicles with ARC dual-stage passenger DPH7 K9 inflators, using the NHTSA model, 53,138 airbag deployments have occurred. This estimate includes vehicles through the end of 2023. There have been zero occurrences of an airbag rupture in vehicles with dual stage passenger K9 inflators, so the expected rupture rate for K9 inflators is 0 out of 53,138.

Ford also applied the Glassbrenner model approach to develop deployment estimates using registration data to account for vehicles no longer on the road. As a data source, Ford used a recently developed dataset that includes vehicle registration data along with other inputs to establish Vehicles in Operation (VIO). Using this new data source provided a more accurate estimate of the Ford subject vehicles on the road in the US each year. These annual volumes were used in conjunction with the Glassbrenner model to calculate the estimated field deployment value for Ford vehicles. Factoring in all Ford vehicles with dual-stage driver FT inflators on the road in the United States, and applying the NHTSA rate of 0.4% being involved in a crash each year where frontal airbags would deploy, results in an estimated 39,088 airbag deployments; and because there have been zero occurrences of an airbag rupture in vehicles with dual-stage driver FT inflators, the expected rupture rate for those inflators is 0 out of 39,088. Similarly, applying the 0.4% rate to all Ford vehicles on the road with K9 passenger inflators yields an estimated 52,972 airbag deployments, resulting in a rupture rate for those inflators of 0 out of 52,972. Additional information and data related to this analysis can be found in Appendix A.

Looking across the Ford analysis used for EA16-003 requests and the model provided by Dr. Glassbrenner in the NHTSA public meeting, while the estimated number of deployments may vary, the rupture rate remains 0 for both the dual stage driver FT inflator and the dual stage passenger K9 inflators. A summary of the airbag deployment estimates is shown in Table 1.

Table 1. Estimates of ARC airbag deployments and ARC airbag rupture rates for Ford vehicles

	Dual-Stage Driver CDADH FT Inflator			**Dual-Stage Passenger DPH7 K9 Inflator**		
Estimate source	# airbag deployments	# airbag ruptures	rupture rate	# airbag deployments	# airbag ruptures	rupture rate
EA16-003 min	72,956	0	0	4,959	0	0
EA16-003 max	109,323	0	0	91,659	0	0
Glassbrenner model - Ford ARC toroidal inflators	57,995	0	0	53,138	0	0
Ford estimate using Glassbrenner model with Vehicles In Operation data	39,088	0	0	52,972	0	0

C. There Are Many Other Potential Explanations for the Ruptures of ARC Inflators in the Field

NHTSA has not identified any single root cause for the ARC Inflator ruptures that occurred in the field. Rather, NHTSA merely hypothesizes that the "ruptures *may* result from the weld slag produced by the friction welding manufacturing process," whereby the weld slag may block the inflator exit orifice and result in overpressurization. *See* Initial Decision at 3 (emphasis added). However, several of the reported field ruptures are entirely inconsistent with the hypothesis. For example, the first incident listed in the Initial Decision, relating to a MY 2002 Chrysler Town and Country, was caused by a broken pin used in the manufacturing process, not weld slag. The third incident listed in the Initial Decision, relating to a MY 2010 Chevrolet Malibu, did not involve any overpressurization of the inflator.

Because there has not been a rupture on a Ford vehicle, Ford has not conducted a field rupture root cause investigation. A careful review of the confidential file identifies several root cause theories for the different ruptures, but nothing that would support a conclusion that there is a systematic defect.

III. Conclusion

Through the last eight years of this inquiry, Ford has provided information to NHTSA and helped NHTSA conduct joint investigations, such as the borescope project in 2018. Ford's analysis of the design and manufacturing data, coupled with the field performance in Ford vehicles, has led it to the conclusion that no additional safety recall is needed for Ford vehicles equipped with ARC inflators. With respect to any ARC inflator recall that NHTSA ultimately might determine to be necessary, Ford believes that NHTSA should follow past practice and implement a manufacturer-specific approach that is tailored to the specific inflator types at issue and the particular vehicles in which those inflators are used, where NHTSA can show an actual safety risk.

NHTSA's proposed recall -- as drastic and broad as it is -- might have been warranted if there were adequate data or evidence to demonstrate an unreasonable safety risk in the entire population of ARC inflators. And Ford remains committed to take appropriate action if information emerges in the future that demonstrates an unreasonable safety risk in the ARC inflators installed in Ford vehicles. But as it is, NHTSA is asking tens of millions of vehicle owners to bring their vehicles into a dealership for a "repair" of a component for which there is no demonstrated defect that presents an unreasonable risk to safety. And, as to the Ford vehicles in particular, the record of this proceeding does not support the issuance of a Final Determination of defect.

For the reasons outlined in these comments and in the Joint Comments of the Safety Professionals, Ford maintains that there is no safety-related defect in the Ford vehicles identified in NHTSA's Initial Determination.

At Ford, the safety of our customers and the integrity of our products remains a top priority, and we appreciate the opportunity to submit these comments for NHTSA's consideration and look forward to continuing to work collaboratively with NHTSA to advance motor vehicle safety. If you have any questions regarding this submission, please contact Gretchen Zobel (email: gzobel@ford.com or phone: 313-495-6594).

Sincerely,

Emily Frascaroli

Appendix A – Ford Vehicle Data Using NHTSA Airbag Deployment Model

In the October 5 NHTSA Public Meeting, Dr. Donna Glassbrenner, a mathematical statistician in NHTSA's Mathematical Analysis Division, presented a model to estimate the rupture rate of ARC Inflators. NHTSA provided a spreadsheet file named "Confidential – Estimated air bag deployments and rupture rate and derivation of assumption – Contains CBI" with Dr. Glassbrenner's analysis to the manufacturers on December 4, 2023. To better understand the performance of Ford vehicles, Ford applied the Glassbrenner model to the two types of ARC toroidal inflators used in Ford vehicles: dual-stage driver DCADH inflators with code FT, and dual-stage passenger DPH7 inflators with code K9.[6]

To apply the model, Ford reviewed Dr. Glassbrenner's information published in the Notes from October 5 Transcript of Public Meeting. The key points to her model are shown in italics below:

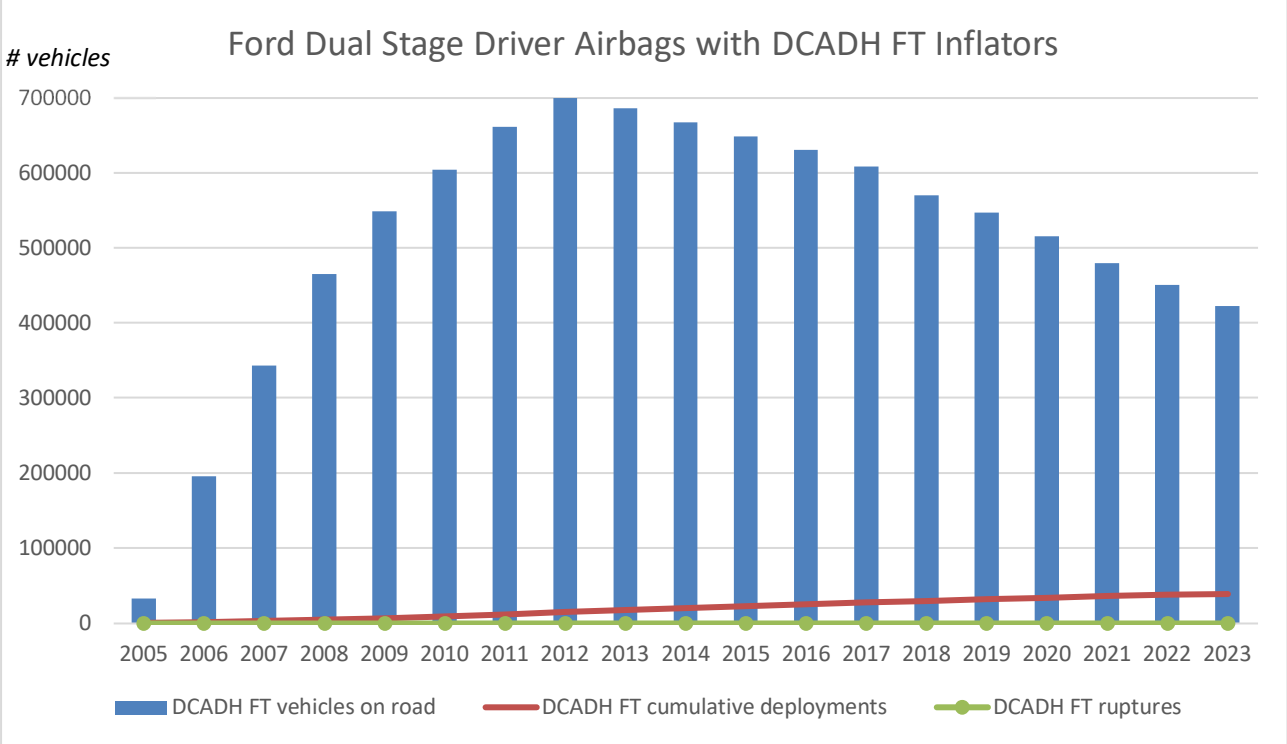
> *"…we should look at the population of inflators that have deployed on the road. Then, to accurately calculate the rate at which the inflators have ruptured, which I'll refer to as the rupture rate, one must divide the number of ruptures that have occurred by the number of subject inflators involved in an airbag deployment on the road.*
>
> *The first assumption is that each year, 0.4% of vehicles on the road that contain the subject inflators were involved in a frontal crash where the vehicle's velocity changed by 15 miles per hour or more. We arrived at this percentage by using the data on light trucks from the 2015 Fatality Analysis Reporting System, or Fars, the 2015 General Estimate System, the 2016 Vehicle registration data from S&P Global Mobility, and the 2015 Crash Worthiness Data System.*
>
> *The second assumption is that when this change in velocity of 15 miles per hour or more occurs, an airbag containing the subject inflator will deploy regardless of any other conditions of the crash. We reached this assumption using information received from vehicle manufacturers related to other airbag inflator data.*
>
> *The third assumption concerns the fact that some of the vehicles we are talking about are older, up to 23 years old. A vehicle made in the year 2000 might no longer be on the road. It might have been salvaged some years ago, whether from a crash, a too expensive repair, or some other reason. Without taking this context into account, we would overestimate the number of airbag field deployments that have occurred and consequently underestimate the rupture rate. To account for vehicles leaving the road as they age, I used NHTSA's 2016 Corporate Average Fuel Economy attrition Model. Using this model, I assumed that the vehicles equipped with the subject inflators remain on the road according to the average of the car and class 1-2a light truck Attrition models."*
>
> *I added up the yearly estimated field deployments to obtain the total field deployments involving the subject inflators."*

[6] Ford is using this model for illustrative purposes and is not advancing an opinion on the accuracy or legal conclusions of the Glassbrenner model. For comparison purposes, Ford is simply applying the Glassbrenner model with its current assumptions. These graphs display actual data for the Ford vehicles on the road instead of using CAFÉ model for calculating an attrition rate.

For the third assumption, to account for vehicles no longer on the road, Ford used a recently developed dataset that includes vehicle registration data along with other inputs. Using this new data source provided a more accurate estimate of the Ford subject vehicles on the road in the US each year. These annual volumes were used in conjunction with the Glassbrenner model to calculate the estimated field deployment value for Ford vehicles.

The number of Ford vehicles on the road each year with Dual Stage Driver Airbags with DCADH FT inflators is shown in the blue bars in Figure 2. These included Ford Crown Victoria, Mercury Grand Marquis, and Lincoln Town Car vehicles of MY 2005-2011. The volume peaked in 2012 with 699,000 vehicles actively on the road. As of 2023, there are 421,000 vehicles with DCADH FT inflators remaining. This population will continue to decline over time, since 2011 was the last model year of production. Using the NHTSA model assumptions, each year 0.4% of vehicles on the road will be involved in a crash where an airbag containing the subject inflator will deploy. The cumulative deployment is shown by the red line in Figure 2. As of 2023, 39,088 deployments of airbags with DCADH FT inflators in Ford vehicles are estimated to have occurred per the model. There have been zero (0) ruptures each year, indicated by the green dotted line in Figure 2. The rupture rate is calculated by the number of ruptures divided by the estimated field deployments, which is 0 out of 39,088, yielding a rupture rate of 0 for Ford vehicles with DCADH FT inflators.

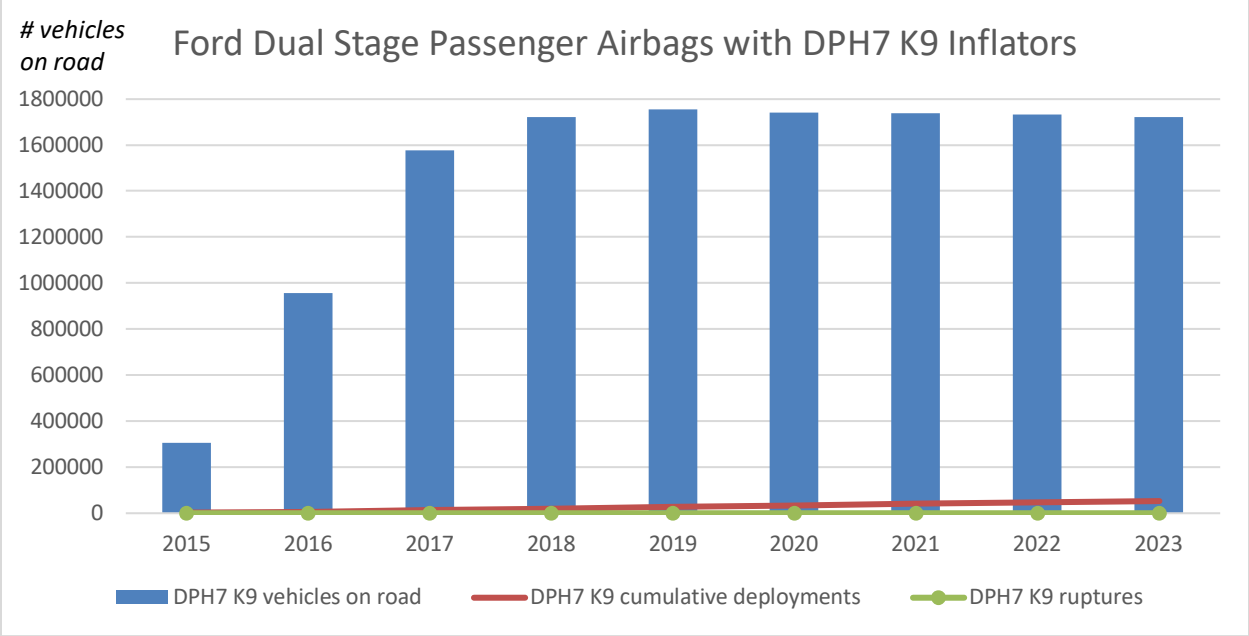
Figure 2. NHTSA Glassbrenner Model Results for Ford Dual Stage Driver Airbags with DCADH FT Inflators



The number of Ford vehicles on the road each year with Dual Stage Passenger Airbags with DPH7 K9 inflators is shown in the blue bars Figure 3. These included MY 2015-2017 Ford

F-150 and Ford Mustang vehicles and MY 2017 Ford GT vehicles. The volume peaked in 2019 with 1,755,009 vehicles actively on the road in the US with DPH7 K9 inflators. As of 2023, there are 1,720,971 Ford vehicles with DPH7 K9 inflators. This population will continue to decline over time, since 2017 was the last model year of production of these vehicles with ARC hybrid toroidal inflators. Using the model assumptions, each year 0.4% of vehicles on the road will be involved in a crash where an airbag containing the subject inflator will deploy. The cumulative deployment is shown by the red line in Figure 3. As of 2023, 52,972 deployments of airbags with DPH7 K9 inflators in Ford vehicles are estimated to have occurred per the NHTSA model.[7] There have been zero (0) ruptures each year, as indicated by the green dotted line in Figure 3. The rupture rate is calculated by the number of ruptures divided by the estimated field deployments, which is 0 out of 52,972, yielding a rupture rate of 0 for Ford vehicles with DPH7 K9 inflators.

Figure 3. NHTSA Glassbrenner Model Results for Ford Dual Stage Passenger Airbags with DPH7 K9 Inflators



[7] Ford used the 0.4% methodology, however the dual-stage passenger airbags have Occupant Classification Systems (OCS) which will only deploy the passenger airbag when an occupant in the passenger seat is detected. It is not clear if the Glassbrenner model took this into account. Similarly, there are other reasons mentioned in our comments that indicate that the data analysis may be unreliable.