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December 18, 2023

Ann Carlson
Acting Administrator
National Highway Traffic Safety Administration
1200 New Jersey Avenue, SE
Washington DC 20590

Re: Docket NHTSA-2023-0038;
Written Comments of General Motors LLC

Dear Acting Administrator Carlson:

Pursuant to 49 U.S.C. § 30118(b) and 49 C.F.R. § 554.10(b), enclosed are the written comments of General Motors LLC (GM) in response to the Initial Decision That Certain Frontal Driver and Passenger Air Bag Inflators Manufactured by ARC Automotive Inc. and Delphi Automotive Systems LLC Contain a Safety Defect, published by the National Highway Traffic Safety Administration on September 8, 2023. 88 F.R. 62140.

The enclosed comments contain limited redactions applied to content reflecting GM- or third party-claimed confidential business information. Consistent with 49 C.F.R. Part 512, GM also is submitting an unredacted copy of this submission to NHTSA's Office of the Chief Counsel pursuant to the instructions contained in the Notice published by agency on December 7, 2023. *See* 88 F.R. 85359.

Very truly yours,

Erika Z. Jones

Enclosure

cc: Kannon Shanmugam, Paul, Weiss, Rifkind, Wharton & Garrison LLP
Dan Toal, Paul, Weiss, Rifkind, Wharton & Garrison LLP

<u>Written Comments of General Motors LLC</u>
<u>Docket NHTSA-2023-0038</u>

Pursuant to 49 U.S.C. § 30118(b) and 49 C.F.R. § 554.10(b), General Motors LLC ("**GM**") provides the following information, views, and arguments in response to the Initial Decision That Certain Frontal Driver and Passenger Air Bag Inflators Manufactured by ARC Automotive Inc. and Delphi Automotive Systems LLC Contain a Safety Defect (the "**Initial Decision**"), published by the National Highway Traffic Safety Administration ("**NHTSA**") on September 8, 2023.[1]

GM has monitored and investigated the performance of airbag inflators manufactured by ARC Automotive, Inc. ("**ARC**") and Delphi Automotive Systems LLC ("**Delphi**") throughout the pendency of NHTSA's investigation. GM has also supported and cooperated with the investigation conducted by the agency's Office of Defects Investigation ("**ODI**") technical staff, and when data has supported the need for action, GM has promptly taken such action. To date, GM has voluntarily recalled over one million ARC airbag inflators, and it continues to study and monitor the performance of the remaining ARC inflators in GM vehicles in the field with support from a third-party engineering firm. But GM disagrees with the Initial Decision, which falls far short of the agency's technical and procedural standards, especially in major defects enforcement cases, and fails to carry the agency's burden of demonstrating that a massive and unprecedented expansion of the existing ARC inflator recalls—extending to as much as 15% of the over 300 million registered motor vehicles in the United States—is legally required or would advance public safety.

In the Initial Decision, the agency posits that 52 million airbag inflators manufactured over nearly two decades by two different companies, on different assembly lines, using different manufacturing processes contain a common manufacturing defect—a defect that the agency cannot conclusively identify. NHTSA argues that this alleged defect is an inflator exit-gas orifice blockage caused by "weld slag," even though evidence indicates that this was not the cause of at least four of the seven field ruptures. The agency nonetheless summarily declares that the occurrence of these seven failures from varied and random root causes constitutes *per se* evidence of a safety-related defect in every ARC-designed toroidal inflator produced by ARC and Delphi over a nearly 20-year period, and proposes that tens of millions of inflators be recalled and replaced without considering, as required by law, the substantial adverse public safety, societal, and economic consequences of such an undertaking.

There is a reason that NHTSA's investigation into ARC airbag inflators continued for eight years: this case continues to implicate substantial technical uncertainty about the nature and root causes of these rare but serious events. That uncertainty, for reasons unknown, has apparently yielded to a confidence not grounded in appropriate data or technical analysis. The agency's repeated comparisons to the Takata airbag inflator recalls—which were conducted in response to an identified, understood design defect that worsened over time and that, in some vehicles,

[1] Citations to the Initial Decision herein are to the version published in the Federal Register at 88 F.R. 62140 (Sept. 8, 2023).

ultimately caused rupture rates exceeding 50%[2]—only serve to highlight the various ways that this investigation is different: the serious engineering questions that the Initial Decision does not answer, the unsupported and arbitrary assumptions upon which the Initial Decision is based, and the inadequate administrative record that the agency has generated. GM respectfully urges NHTSA to decline to issue a final recall order at this time and on this record.

I. Factual Background

A. NHTSA's initial investigation identifies no root cause

In July 2015, NHTSA opened a Preliminary Evaluation (PE15-027) to investigate two injury incidents that allegedly involved ruptures of driver-side air bag inflators manufactured by ARC. 88 F.R. at 62143. On August 4, 2016, after learning of a third rupture, NHTSA escalated the investigation to an Engineering Analysis (EA16-003). Over the next three years, from 2016-2018, NHTSA led an industry effort involving ARC, Tier 1 suppliers, and vehicle manufacturers (OEMs) to collect, analyze, and ballistically test over 900 ARC inflators manufactured from 2000-2006. The purpose of this study was to analyze a statistically significant sample of ARC inflators to assess the risk of future ruptures. The agency established criteria to determine whether the inflators' performance would be acceptable, requiring 99% reliability at a 99% confidence level. Not a single inflator ruptured, and ballistic-tank curves demonstrated that the inflators in the study met the underlying engineering specifications.

B. GM recalls ARC inflators

There have been four ARC inflator ruptures in GM vehicles in the field. The first occurred in 2017 in a 2011 model year Chevrolet Malibu. In 2021, there were two ruptures in 2015 model year Chevrolet Traverse vehicles. In each case, GM: (a) thoroughly investigated the rupture event, in cooperation with ARC and NHTSA, but was unable to determine a root cause or that other ARC inflators might be at risk of rupture; and (b) conducted a safety recall of ARC inflators produced in the same production lot as the ruptured inflator.[3]

In 2023, a fourth rupture occurred, this time in an ARC inflator in a 2017 model year Chevrolet Traverse. In response to this event, GM expanded its two 2021 lot-specific recalls, out

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[2] NHTSA, Consumer Alert: Honda Upgrades Takata Alpha Recall to "Do Not Drive" Warning, Targeting Older, Most Dangerous Air Bags, at https://www.nhtsa.gov/press-releases/consumer-alert-honda-upgrades-takata-alpha-recall-do-not-drive-warning-targeting (last accessed December 1, 2023); *see also* PSAN Inflator Test Program and Predictive Aging Model Final Report (October 2019) at C-11, available at https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/ngis _takata_investigation_final_report_oct_2019.pdf (last accessed December 1, 2023) (collecting failure rates in field returned Takata PSPI-L inflators from Miami-Dade, Broward, Palm Beach, and Collier counties in Florida that ranged from 6.9-8.5 percent).

[3] In its Initial Decision, NHTSA derisively characterizes these field actions as "after-the-fact recalls." 88 F.R. at 62145. But the use of lot-based recalls as a precautionary measure to mitigate unknown field risks and collect parts for further engineering study is a long-standing OEM practice that has been encouraged by NHTSA. In a 2019 presentation related to the ARC investigation, NHTSA approvingly discussed another OEM's lot-specific recall in response to a field rupture as [redacted] **Exhibit 1** (ARC PAB Inflator (PH7) ("PAB-20190617-Final.pptx")) (June 17, 2019) at 8, *available at* NHTSA Confidential File, Technical Meetings\20190617Meeting.

of an abundance of caution, to encompass all 2014-2017 model year Chevrolet Traverse, Buick Enclave, and GMC Acadia vehicles. In total, these four campaigns address over one million GM vehicles globally.[4]

C. NHTSA abruptly terminates its investigation and issues the Recall Request Letter

On April 26, 2023—the day after a joint NHTSA/ARC/GM inspection of the third Traverse rupture event—NHTSA convened a Multi-Disciplinary Review Panel to review EA16-003. The next day, NHTSA sent ARC a Recall Request Letter (the "**RRL**"), demanding it "immediately submit to NHTSA a Part 573 Recall Report that identifies a safety defect in the subject driver and passenger air bag inflators." RRL at 5.

The RRL did not identify any specific manufacturing or design defect in the ARC inflators (or any subset of them). Instead, NHTSA hypothesized that the ruptures might result from a blockage of the airbag inflator's exit orifice caused by a "possible" byproduct of the inflator manufacturing process known as weld slag. RRL at 2. But NHTSA did not endorse weld slag as the definitive root cause of any of the ruptures, deducing instead from a string of possibilities that "the exit orifice could become blocked," which in turn "could cause over pressurization of the airbag inflator," which finally "has the potential to cause it to rupture." *Id.* (emphasis added). Despite the obvious technical uncertainty inherent in these statements, NHTSA requested that ARC declare 67 million inflators manufactured by ARC and Delphi to be defective and conduct an equipment recall. *Id.* at 1. ARC has not agreed to do so. *See* ARC's RRL Response.

D. NHTSA issues the Initial Decision

On or about August 24, 2023, in anticipation of its issuing an initial decision, NHTSA made available to affected companies, including OEMs and Tier 1 suppliers, an electronic Confidential File containing hundreds of gigabytes of data, encompassing over 100,000 files collected by the agency during its investigation. The material in the Confidential File was not organized in any comprehensive manner, and the data appeared to consist largely of industry responses to information requests that NHTSA had issued over the course of its investigation. *See* Joint Comments of Safety Professionals Relating to NHTSA's Initial Decision (Dec. 18, 2023) at 12. There were very few documents that reflected NHTSA's analysis of the subject inflator population at all, let alone any that accounted for the many different inflator configurations within that population. *Id.* at 2 & n.2. Nor did NHTSA provide any information documenting its own evaluation of a possible root cause for the field ruptures, its comparison of the field performance of ARC inflators against inflators manufactured by other suppliers, or its assessment of whether a defect trend exists that affects motor vehicle safety. *Id.* at 3-4. And there were no documents even mentioning the safety or societal costs, or any other direct or indirect costs, of a proposed recall of tens of millions of inflators, some of which are over 20 years old.

On September 8, 2023, NHTSA published its Initial Decision, which announced NHTSA's intention to order the recall of 52 million ARC inflators—over 20% fewer inflators than the 67

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[4] *See* NHTSA Recalls Nos 19V-019, 21V-782, 22V-246, and 23V-334.

million referenced in the RRL issued just five months earlier. In a footnote, NHTSA attributed the change of the affected vehicle population to "over-inclusive responses reported to the agency by certain manufacturers over the course of the investigation," and stated that "[t]he exact population of inflators and vehicles (including the specific vehicle makes, models, and model years) subject to any recall that may result will be determined by the manufacturers." 88 F.R. at 62141 n.2.

The Initial Decision is notable for its brevity and lack of independent technical work by the agency, which is atypical when NHTSA invokes its authority to order a safety recall. NHTSA attempted to support the Initial Decision with an incomplete and assumption-laden statistical analysis performed by Dr. Donna Glassbrenner. During the October 5th public meeting, Dr. Glassbrenner, while conceding that NHTSA "can never predict with certainty what will happen in the future," nonetheless concluded that "[g]iven the remaining population of these inflators in vehicles, based on available information, it is reasonable to assume that ruptures will continue to occur." Oct. 5, 2023 Tr. at 59:1-7. Nothing in the Initial Decision or administrative record provided any evidentiary or analytical support for this assertion.

In contrast to the Initial Decision here, NHTSA's Initial Decision in the Ford/Firestone investigation (EA00-023) represents the level of analysis appropriate for a process of this importance and a recall of this magnitude. The Initial Decision in that case spanned 85 pages, and contained multiple levels of analysis, including claim rates, for both Firestone and peer tires. *See* Engineering Analysis Report and Initial Decision Regarding EA00-023: Firestone Wilderness AT Tires at 14 & Table 5 (Oct. 2001). Although shorter, NHTSA's Initial Decision Report in the Mini Cooper S Exhaust Pipe Tip investigation likewise features some of the key analytical elements contained in the Firestone Initial Decision, including a derivation of claim rates based on vehicle population and a comparison of those rates with certain peer vehicles—this type of analysis is not included in the ARC Initial Decision. *See* Engineering Initial Decision Report Regarding EA08-020: BMW Mini Cooper S Exhaust Pipe Tips at 7-8 & Table 5 (Nov. 2008).[5]

II. The Legal Framework

To justify a final recall order under the National Traffic and Motor Vehicle Safety Act of 1966, *see* 49 U.S.C. § 30101 et seq. (the "**Safety Act**"), NHTSA bears the burden of proof "on the two elements required by the [Safety] Act: (1) that a 'defect' exists and (2) that the defect is 'related

[5] The investigation file produced by the agency appears to be incomplete, and documents that the agency relied upon in deciding to issue the RRL and the Initial Decision have not been made available to affected manufacturers and suppliers. On November 21, 2023, GM and other manufacturers sent NHTSA a letter demanding that NHTSA supplement the record prior to the Initial Decision comment deadline. Letter from Erika Z. Jones to Tanya Topka, Acting Director, NHTSA Office of Defects Investigation at 1-2 (Nov. 21, 2023); *see* also 49 C.F.R. § 554.10(b) (the Agency is required to "make[] available all information" on which the Initial Decision is based). On December 1, 2023, the agency agreed to supplement the record with certain work papers and calculations prepared by Dr. Glassbrenner, but it declined to provide other documents. It is a basic premise of administrative law that agencies must disclose critical factual information to the public. *See Air Transp. Ass'n of Am. v. FAA*, 169 F.3d 1, 7 (D.C. Cir. 1999) ("[T]he most critical factual material that is used to support the agency's position on review must have been made public in the proceeding and exposed to refutation."); *United States v. Nova Scotia Food Products Corp.*, 568 F.2d 240, 248 (2d Cir. 1977) (similar). More specifically, as the D.C. Circuit recently reaffirmed, courts will vacate agency action when regulators fail to publicize the data underlying its determinations. *See Window Covering Manufacturers Ass'n v. Consumer Prod. Safety Comm'n*, 82 F.4th 1273, 1282-84 (D.C. Cir. 2023).

to motor vehicle safety.'" *United States v. General Motors Corp.*, 561 F.2d 923, 926 (D.C. Cir. 1977) ("*Pitman Arms*").[6]

A. NHTSA must show that there have been "a significant number of failures"

To establish the existence of a defect, NHTSA must show "a significant number of failures" that are not attributable to "causes like age and expected wear and tear." *United States v. General Motors Corp.*, 518 F.2d 420, 438 (D.C. Cir. 1975) ("*Wheels*"). The *Wheels* court explained its "use of the term 'significant' to indicate that there must be a non-*de minimis* number of failures." 518 F.2d at 438 n.84. It further clarified that "[t]he question whether a 'significant' number of failures have taken place must be answered in terms of the facts and circumstances of each particular case," and the "[r]elevant considerations" informing that answer should include both (i) "the failure rate of the component in question," and (ii) "failure rates of comparable components." *Id.* at 438 n.84.

The determination of "significance," in other words, cannot be made in a vacuum. It requires the agency to consider both the absolute rate of failure of the component and the relative rate of failure of the component compared to similar components. *See also Pitman Arms*, 561 F.2d at 929 ("However, the matter stands quite differently where it appears that the defect is systematic and is prevalent in a particular class of cars. Such a defect may be identified by an unusually high rate of failures in actual operation . . . ." (emphasis added)).

B. NHTSA must show that failures are not "occasional or isolated"

As courts have also explained, an "occasional or isolated" failure is not a defect that rises to the level of "significant." *Pitman Arms*, 561 F.2d at 929. The Safety Act codified and expressed Congress's "commonsense" policy judgment that "manufacturers are not required to design vehicles or components that never fail." *Wheels*, 518 F.2d at 436. In delineating the boundaries of what constitutes a "significant number of failures," courts have consistently acknowledged that vehicles cannot be made to be free of failure, and that Congress did not intend to impose such a duty on vehicle and equipment manufacturers:

> Out of any manufacturing process, some products are bound to be "lemons." These failures may be due to flaws in the design, construction (including occasional human error on the production line) or inspection process. When the defects are occasional or isolated, the risk associated with them is part of the ordinary danger of operating an automobile; minimizing them is one aspect of the quality of a manufacturer's product which consumers choose to pay for. Total elimination of this risk would require a standard of design, construction, and testing that would produce a purchase price so prohibitive that it cannot be taken as the contemplation of Congress. And that obtains even though such a defect may be in a vital component and result in a safety risk.

[6] Even though the analysis in *Pitman Arms* is contained in the opinion's dissent, NHTSA and subsequent courts have relied on the dissent in *Pitman Arms* in interpreting the meaning of "defect" and "relate[d] to motor vehicle safety" under the Safety Act. *See* RRL at 4 (citing to the dissent in *Pitman Arms*).

Pitman Arms, 561 F.2d at 929 (emphasis added).

C. NHTSA must engage in peer-component analysis to show that a component's failure rate is "significant" in comparison to similar components

To assess the "failure rates of comparable components," as required by the case law, NHTSA customarily conducts a peer review at multiple stages of its investigation and defects-analysis processes. During the data review stage of ODI's investigative process, an investigator may "perform peer vehicle and precedent reviews to understand the potential scope of the defect and leverage ODI's historical knowledge and experience" to determine whether to open an investigation. *See* Risk-Based Processes for Safety Defect Analysis and Management of Recalls, U.S. Dept. of Trans. (Nov. 2020) at 8. And during "the EA phase of an investigation, investigators may send additional IR letters to gather additional relevant information, including 'peer IRs' to other manufacturers." *Id.* at 10.

Peer-component analysis is a critical component of ODI's processes. In an earlier NHTSA enforcement action resulting in an initial defect determination involving allegedly defective power brake-check valves, the NHTSA administrator declined to finally determine that a defect existed largely on the basis of peer-component performance data:

> The result of this investigation disclosed that check valve failure trends for each of the major American passenger car manufacturers are such that all manufacturers, within the years in question, had problems on a similar scale. To single out any segment of this vast vehicle population for recall appears unfair, and to recall the entire vehicle population appears to be an effort not contemplated by the [Safety] Act.

See Termination of Defect Proceedings, Failures of Power Brake Vacuum Valves on 1965-1970 General Motors Vehicles, 42 F.R. 13379 (Mar. 10, 1977); *see also* Dismissal of Section 152 Safety Defect Proceedings, General Motors Power Brake Vacuum Check Valve, Decision of John W. Snow, Administrator, National Highway Traffic Safety Administration (Jan. 26, 1977) at 3 (closing the investigation after comparing the number of check valve failures in one OEM's vehicles with the larger vehicle population and explaining that "population-proportional failure trends for all manufacturers were found to be in the same general range of magnitude").

Only through peer analysis is it possible to determine whether a component's field failure rate is "significant," and therefore evidence of a potential defect, or within the normal failure range of components built to the prevailing state-of-the-art of design and manufacturing.

D. NHTSA must show that a risk is "unreasonable" under a multi-factor test

If NHTSA meets the threshold showing that a defect exists because there have been a "significant number of failures" to justify a recall, it must then prove that the defect is "related to motor vehicle safety,"—meaning that it "presents an unreasonable risk of accidents or injuries."

U.S. v. General Motors, 656 F. Supp. 1555, 1578-1580 (D.D.C. 1987) ("*X-Cars*"), aff'd, 841 F.2d 400 (D.C. Cir. 1988). The requirement that the risk be "unreasonable" before a recall is compelled flows directly from the statutory language. Congress defined "motor vehicle safety" to mean the "performance of a motor vehicle or motor vehicle equipment in a way that protects the public against unreasonable risk of death or injury in an accident." 49 U.S.C. § 30102(a)(9).

Here, too, Congress intended the Safety Act to reflect a "commonsense limitation," *Wheels*, 518 F.2d at 46, and courts have rejected the conclusory, *per-se* analysis reflected in the Initial Decision:

> Re-examination of the *Wheels* decision, and a review of subsequent decisions in analogous contexts under other federal safety legislation, however, persuade the Court that *Wheels* and *Pitman Arms* <u>should not be read today as establishing a rigid rule</u> turning entirely upon a diminution of control in the abstract. The unreasonableness of any risk to safety <u>must be</u> assessed relatively in at least three dimensions: (1) the severity of the harm it threatens; (2) the frequency with which that harm occurs in the threatened population relative to its incidence in the general population; and (3) the economic, social, and safety consequences of reducing the risk to a so-called "reasonable" level.

X-Cars, 656 F. Supp at 1578 (emphasis added). Thus, after NHTSA demonstrates a "significant number of failures" of a vehicle or component, the agency must still establish that reducing that particular risk is justified in light of the "economic, social, and safety consequences" of eliminating the defect.

III. <u>The Initial Decision Is Arbitrary, Capricious, and Contrary To Law.</u>

The Initial Decision is the result of an eight-year investigation that the agency abruptly terminated in April 2023 without conclusively identifying a root cause and without conducting a peer-component analysis. On the basis of an inadequate administrative record generated by an incomplete investigation, and to remedy an alleged defect <u>that neither ARC nor NHTSA fully understands</u>, NHTSA intends to order the replacement of airbag inflators in a substantial portion of the U.S. vehicle fleet, without assessing—as required by the Safety Act and *X-Cars*—the "economic, social, and safety consequences" of what would be the second largest vehicle recall in U.S. history. These consequences include the possibility of creating new manufacturing and repair risks that no manufacturer—under any standard of care—can reduce to zero.

The Initial Decision cannot justify such a recall for at least five reasons. First, NHTSA has failed to carry its burden of demonstrating that the seven ruptures in the Initial Decision constitute a "significant number" of field failures. Second, by failing to even consider the "economic, social, and safety consequences" of ordering a recall of this size, scope, and complexity, NHTSA cannot carry its burden of demonstrating that any alleged defect in ARC inflators constitutes an unreasonable risk to safety. Third, NHTSA's statistical analysis is generally and critically flawed due to a series of analytical errors and unjustified assumptions; it does not support the agency's requested recall or the agency's claims at the October 5th meeting. Fourth, NHTSA's inclusion of Delphi-manufactured inflators—which have never ruptured—in the Initial Decision demonstrates that its proposed recall population is arbitrarily and unreasonably defined. Fifth, NHTSA's heavy reliance on the Takata inflator recalls to support its position in this proceeding is misplaced because the Takata inflator recalls, for a host of reasons, are distinguishable.

A. NHTSA has not demonstrated that seven ruptures out of 52 million inflators is a "significant number" under the Safety Act

To demonstrate that a defect exists, NHTSA must establish that a "significant" number of failures have occurred in the field. What is significant depends on the "facts and circumstance of each particular case," but two key considerations are: (i) the failure rate of the component in question, and (ii) the failure rates of comparable components. *Wheels*, 518 F.2d at 438 n.84.

NHTSA's analysis fails to satisfy either requirement. First, even accepting NHTSA's (incorrect) characterization of the failure rate, the failure rate of seven out of 2.6 million deployments is insufficient to justify a defect finding, and has no precedent in prior NHTSA defects enforcement cases. Second, a defect finding here would be unreasonable and invalid because NHTSA has not analyzed the rupture rate of comparable inflators, and therefore cannot say whether the failure rate of ARC inflators is "significant" under the law. Third, because the evidence demonstrates that at least four of the seven field ruptures listed in the Initial Decision were not caused by weld-slag blockage, NHTSA cannot reasonably infer that these ruptures are related to each other or otherwise evidence of a systemic manufacturing defect; they are, at most, "isolated and occasional" failures that do not rise to the level of a "defect" under the Safety Act.

1. NHTSA has not demonstrated that the failure rate of ARC inflators is "significant"

The Initial Decision identifies only seven relevant inflator ruptures in an estimated recall population of 52 million subject inflators, which equates to a failure rate of .000013%. Stated in terms of occurrences-per-million events, a metric frequently used in NHTSA analyses, this equates to 0.13 ppm. And if, as explained below, the incidents involving the 2002 Chrysler Town & Country, the 2011 Chevrolet Malibu, and the two 2015 Chevrolet Traverse incidents are removed from the population of ruptures because they cannot be attributed to weld slag, the failure rate falls to 0.0577 ppm. *See* Section III.A.3, *infra*. Accordingly, the appropriate measure of the "failure rate of the component," *see Wheels*, 518 F.2d at 438 n.84, is either 0.13 ppm or 0.0577 ppm. Neither establishes the "significant number" of failures or the "unusually high rate of failures in actual operation," required by precedent. *Pitman Arms*, 561 F.2d at 929.

The Initial Decision proposes an alternative way to calculate the failure rate as a function of estimated airbag deployments among the inflator population, which NHTSA estimates at 2.6 million.[7] As a preliminary matter, using estimated deployment events as a basis for a failure-rate calculation is a significant and arbitrary departure from NHTSA's traditional methodology of

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[7] Many of the assumptions relied on by the agency in preparing this figure remain unclear. *See* Section III.C *supra.*

calculating those rates based on vehicle population. *See*, e.g., Mini Cooper S Initial Decision at 5-7 (analyzing burn rates per 100,000 vehicles produced).

It is also only as reliable as the agency's understanding of the number of subject inflators currently in the field, which—in this case—is neither accurate nor reliable. To estimate total ARC field deployments, NHTSA relied on another estimate: its "estimate" of the "subject" ARC inflators in the field, which it prepared using manufacturer-supplied production data. 88 F.R. at 62141 n.2. In just the few months between the RRL and the Initial Decision, this field-population estimate fell from 67 million to 52 million inflators—a change of over 20 percent, which the agency attributed to "correcting for over-inclusive responses reported to the agency by certain manufacturers." *Id.* But NHTSA's updated field-population estimate appears to also contain material errors; GM's initial review of the work papers supplied by the agency on December 4, 2023 identified missing annual production volumes (in some cases, multiple years of production) for at least four different GM vehicle models.[8] A key pillar of the agency's case in this proceeding is an estimate, based on an estimate, that is in turn based on incomplete and incorrect tabulations of OEM-supplied production data.

Even crediting NHTSA's unsubstantiated and unprecedented assumption that airbag deployments are an appropriate measure to assess inflators' field performance and failure frequency, and assuming also that it is reasonable to rely on the 2.6-million-deployment estimate, NHTSA continues to rely on a failure rate that is vanishingly small: .000269% or 2.69 occurrences per million events. After removing the four rupture events that, as discussed *infra*, were caused by something other than NHTSA's weld-slag theory, that failure rate drops to .000115%, or 1.15 ppm—far short of "a substantial percentage of the total," or a "systemic and prevalent" pattern of failures that NHTSA must demonstrate to justify a recall. *Wheels*, 518 F.2d at 438 n.84; *Pitman Arms*, 561 F.2d at 929.

To put these numbers into context, the table below compares the failure rates in this case to those in published defect enforcement cases:

Case	**Calculation**	**PPM**	**Percentage**
Wheels	1,503 wheel failures in a population of approximately 200,000 vehicles (i.e., 800,000 wheels) "clearly proffered evidence showing a significant number of failures in performance." 518 F.2d at 427, 430, 442.	1,879	.19%

[8] These models and model years were included in GM's 2016 responses to an information request issued by the agency in EA16-003.

United States v. General Motors Corp., 417 F. Supp. 933 (D.D.C. 1976) (*Carburetors*); *United States v. General Motors Corp.*, 565 F.2d 754, 756 n.4 (D.C. Cir. 1977)	1,306 reports of carburetor failures in relevant population involving 374,518 vehicles. *Id.* at 935.	3,487	.35%
United States v. Ford Motor Co., 421 F. Supp. 1239 (D.D.C. 1976)	"[A]t least" 11,000 failures among a population of 727,000 vehicles, which Ford conceded constituted a "significant number" of failures. *Id.* at 1241-42.	15,131	1.5%
United States v. General Motors Corp., 65 F.R.D. 115 (D.D.C. 1974)[9]	26,424 replacement part sales associated with the relevant 1959-1960 model year vehicle population, totaling 284,456 vehicles. *Id.* at 116, 118.	92,893	9.3%
United States v. Ford Motor Co., 453 F. Supp. 1240 (1979) (*Windshield Wipers*)	85,366 replacement wipers sales over a population of 374,000 wiper arms *Id.* at 1243.	228,251	22.8%
X-Cars	4,000 complaints referenced by NHTSA among a 294,000 vehicle population. 656 F. Supp. at 1569, 1571 n.34	13,605	1.4%
ARC (7 ruptures/52M vehicle population)	7 airbag inflator ruptures in a population of 52 million airbag inflators	**.135**	**.000013%**
ARC (7 ruptures/2.6 million est. deployments)	7 airbag inflator ruptures in a 2.6 million estimated airbag deployments	**2.69**	**.000269%**
ARC (3 ruptures/52M vehicle population)	3 airbag inflator ruptures in a population of 52 million airbag inflators	**.0577**	**.00000577%**
ARC (3 ruptures/2.6 million est. deployments)	3 airbag inflator ruptures in a 2.6 million estimated airbag deployments	**1.15**	**.000115%**

TABLE 1: NHTSA HISTORICAL DEFECTS ENFORCEMENT RATES

NHTSA's defect theory in this case is extraordinary and unprecedented. The Initial Decision attempts to show that the ARC failure rate is "significant" under the Safety Act by: (a) propping up the numerator to include rupture incidents that have nothing to do with the agency's weld-slag theory; and (b) depressing the denominator by using estimated deployments instead of

[9] This opinion was generated during the District Court proceedings that ultimately led to the leading *Pitman Arms* opinion cited herein.

vehicle population. But even then, the resulting failure rate is lower by orders of magnitude than the rate in any contested, published defect-enforcement case in the agency's 50-plus year history.

The case law construing the Safety Act is clear that Congress did not intend to impose a standard of theoretical perfection on manufacturers, even with respect to key safety components. *See Pitman Arms*, 561 F.2d at 929 (emphasizing that the "total elimination" of risk cannot "be taken as the contemplation of Congress" even where that risk "may be in a vital component"). A final recall order, on these facts, would be tantamount to that: a requirement that inflator suppliers design and manufacture components that never fail.

2. NHTSA has not demonstrated that the failure rate of ARC inflators is "significant" relative to comparable components

As part of demonstrating that a component is failing at a "significant" rate, *Wheels* also requires the agency to consider the "failure rates of comparable components." *Wheels*, 518 F.2d at 438 n.84. As NHTSA notes in the Initial Decision, airbag ruptures, while serious and rare, have been reported in airbag inflators produced by most—and perhaps all—major airbag inflator suppliers. 88 F.R. at 62142 n.4 (collecting prior airbag inflator rupture recalls).

Is the rupture rate of ARC inflators "significant" compared to inflators produced by other manufacturers using different designs and manufacturing processes? NHTSA does not say. The Initial Decision contains no mention of the failure rates of inflators in the vehicle population at large, or the failure rates of specific comparable components.[10] This peer-component comparison is a standard part of almost all ODI investigations that reach the engineering analysis stage. *See* Risk-Based Processes for Safety Defect Analysis and Management of Recalls, U.S. Dept. of Trans. (Nov. 2020) at 8. It is inexplicably absent from the Initial Decision, the Confidential File, and the public documents generated as part of this eight-year-old investigation.

This omission is particularly challenging to understand given that NHTSA has the data to perform this analysis at its fingertips. Beginning in 2015, the agency ordered manufacturers to report all alleged and confirmed field-rupture events to NHTSA under Standing General Orders 2015-02 and 2015-02A. These reports give the agency direct insight into the field performance of airbag inflators built by every inflator manufacturer in not just the entire U.S vehicle fleet, but worldwide. Assuming that the agency must have considered these data in the course of deciding whether to issue the Initial Decision, GM and certain other affected manufacturers requested that the agency supplement the Confidential File with these reports; NHTSA declined to do so, and confirmed that these "[o]ther Standing General Order reports related to the referenced Orders are not part of this investigative file."[11] NHTSA's decision to not consider this obviously relevant data as part of its analysis is inexplicable and unreasonable, and its refusal to include this data in the

[10] *See* Joint Comments of Safety Professionals Relating to NHTSA's Initial Decision at n.7.

[11] *See* Letter from Tanya Topka, Acting Director, NHTSA Office of Defects Investigation, to Erika Z. Jones at 2 (Sept. 23, 2023); Letter from Erika Z. Jones to Tanya Topka, Acting Director, NHTSA Office of Defects Investigation at 1-2 (Nov. 21, 2023); Letter from Eileen Fallon Sullivan, Associate Administrator for Enforcement, NHTSA, to Erika Z. Jones (December 1, 2023) at 2.

Confidential File deprives interested parties of the evidence necessary to assess the agency's position in light of the failure rates of other peer products.

The decision record that the agency has produced does not contain any data or analysis indicating that NHTSA analyzed the failure rates of ARC inflators against the "failure rates of comparable components," as required by law. Because the agency declined to conduct this analysis, it cannot demonstrate that ARC inflators are defective, and should decline to issue a final recall order. *See* 42 F.R. at 13379 (declining to issue final recall order where the agency was unable to identify a subpopulation of unrecalled vehicles to "single out" as potentially defective, and concluding that "a recall of the entire population appears to be an effort not contemplated by [the Safety Act]).

3. NHTSA's inability to identify a root cause further supports the conclusion that the seven field failures cited in the Initial Decision are "occasional and isolated" and not evidence of a population-wide defect

In the Initial Decision, NHTSA dismissed the significance of the agency failing to identify a root cause that would link the seven ruptures cited in the RRL: "The fact that the subject population has experienced seven confirmed ruptures, no matter the root cause, warrants the initial determination of a safety defect." 88 F.R. at 62145.

Here, again, the agency simply assumes what it is legally obligated to prove. While it is indeed true that "[a] determination of 'defect' may be based exclusively on the performance record of the vehicle or component," the case law also establishes that failures which appear to be "occasional or isolated" from the rest of a vehicle population are not evidence of a population-wide defect. [12] *See Pitman Arms*, 561 F.2d at 929. As a matter of logic, understanding the root cause of field failures helps support the inference that other vehicle populations may contain a common defect and that past failures are validly predictive of future failures. Root-cause analysis, in other words, helps distinguish isolated and occasional product failures—which Congress did not intend the Safety Act to regulate—from field failures that might evidence a broader defect trend. *See Pitman Arms*, 561 F.2d at 929.

For these and other reasons, NHTSA has historically focused on and been guided by its root-cause analysis in major defects enforcement cases. This is clear from the initial decision in the Ford/Firestone investigation:

> Under the National Traffic and Motor Vehicle Safety Act, in order to compel a manufacturer to conduct a recall, NHTSA has the

[12] Notably, GM conducted the prior "Lambda" recalls and the recall expansion without determining the root cause of the inflator ruptures in those three events. As GM explained in its May 10, 2023, Part 573 filing, GM defined the scope of its recall expansion using field data—three rupture events "involv[ing] the same inflator variant" that were installed as original equipment in 2014-17 model year GM "Lambda" sport-utility vehicles—and did so proactively and conservatively, recalling over a million vehicles globally out of an abundance of caution. Consequently, it is not GM's position that a confirmed root cause is necessary to conduct a recall; but where, as here, the agency attempts to use seven isolated events to argue that 52 million inflators contain a safety-related defect under the Safety Act, more is required.

> burden of proving that a safety-related defect exists in the manufacturer's products. The record of this investigation supports a determination that a safety-related defect exists in the focus tires manufactured by Firestone prior to its 1998 modifications to the belt wedge that are installed on SUVs. Although the agency has concerns about the possibility of future tread separations in focus tires manufactured after the wedge change, the available evidence at this time does not clearly demonstrate that a safety-related defect exists in those focus tires. NHTSA will, however, continue to closely monitor the performance of these tires.

See Engineering Analysis Report and Initial Decision Regarding EA00-023: Firestone Wilderness AT Tires at v-vi (Oct. 2001). In other words, NHTSA found a common root cause for the failures of the "focus tires" manufactured by Firestone prior to its 1998 modifications, but could not do so with respect to the tires manufactured after those changes. It closed the investigation as to those later-built tires with a commitment to "closely monitor the performance of those tires," even though there were three reported fatalities associated with the post-wedge change tires. Initial Decision at Table 3.

Similarly, during the recent Takata investigation, the agency understood the "critical" nature of conducting and completing the root-cause analysis, and assured Congress that its work on that issue would leave "no stone unturned":

> MR. FRIEDMAN. We are following the data and that is the basis for our decision. We do know that there are design differences between passenger side and driver side airbags. But let me be clear: As Takata and the automakers indicated, they have not yet gotten to the bottom of the root cause of this issue. <u>That is a critical step</u> that we are pushing for and we are involved in because <u>getting to the root cause will help dramatically clarify things for consumers, for automakers, for suppliers,</u> and for the actions that each and every one must take. <u>That is a critical step</u>, and we will continue to push ourselves and industry to get to the bottom of this. That is one of the reasons why we are now looking to get under contract hopefully within about a week and [sic] expert in propellants and airbag production and design so that we can have added expertise on top of the experts we already have to get to the bottom of this as quickly as possible. <u>We will leave no stone unturned</u> in our efforts.

Takata Airbag Ruptures and Recalls: Hearing Before the Subcomm. on Commerce, Manufacturing and Trade at 80-81 (Dec. 3, 2014), at https://www.govinfo.gov/app/details/ CHRG-113hhrg94147 ("**Takata Congressional Hearing Transcript**") (Testimony of David J. Friedman, NHTSA Deputy Administrator).

In the ARC proceeding, however, the agency terminated its investigation and issued the RRL without ever arriving at a root cause that could connect the seven ruptures listed in the Initial

Decision. The Initial Decision asserts that its weld-slag theory remains the "most likely" root cause. 88 F.R. at 62143. But that claim is divorced from the data in NHTSA's own investigative file, which contains compelling evidence that, at a minimum, four of the seven ruptures that purportedly supply the fact basis for the Initial Decision were not caused by a weld-slag blockage:

- An investigation of the 2002 model year Town & Country case confirmed that the rupture stemmed from a manufacturing anomaly: a piece of metal, likely a part of the manufacturing apparatus called the flash dam pin, became lodged in the exit orifice. ARC RRL Response at 14-15. No other field rupture has involved a piece of the manufacturing equipment becoming lodged in the exit orifice.

- The 2011 Malibu rupture occurred because of a weld failure of the pressure vessel, indicating that the rupture had nothing to do with exit-orifice blockage resulting in internal inflator over-pressurization. **Exhibit 2** (EA16-003: ARC Inflator Ruptures ("20200420 - LeadershipBriefOnRecentEvents.pptx")) (Apr. 20, 2020) at 6, *available at* NHTSA Confidential File, Field Incidents - SGO 2015-02\2009 Elantra - Egypt at 6 ([redacted]); **Exhibit 3** (2010-11 Malibu DAB Inflator Rupture ("2011 Malibu DAB Inflator Update NHTSA 29jan2019.pdf")) (Jan. 29, 2019) at 3 *available* at NHTSA Confidential File, Field Incidents-SGO 2015-02\2011 Malibu-McQuaide]\2011 Malibu at 6 ([redacted]).

- Finally, CT scans conducted on the inflators involved in the two 2021 ruptures involving Chevrolet Traverse vehicles identified no evidence of an orifice blockage. The results of these scans were shared with the agency in a meeting on July 27, 2022. **Exhibit 4** (Analysis of D-CADH inflators ("TG Report to NHTSA 7-27-22.pdf" (July 27, 2022) at 17, *available at* NHTSA Confidential File, Field Incidents – SGO 2015-02\2015 Traverse-Benham\USG587-1 _GM_CONF at 17 ([redacted]).

The agency's root-cause theory does not hold up. Evidence indicates that more than half of the ruptures listed in the Initial Decision were caused by something other than weld-slag. *See also* ARC RRL Response at 14-15. ARC raised this issue in its response to the RRL, inviting the agency to respond and reconcile its theory with the evidence. The agency has declined to do so; it has simply continued to assert that weld slag remains the "most likely" root cause, but also—and apparently alternatively—that a confirmed or even facially plausible root cause "is unnecessary for a recall determination" in this proceeding. 88 F.R. at 62145.

The agency's position is arbitrary, unreasonable, and contrary to law. *See Motor Vehicle Mfrs. Ass'n, Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (an agency acts in an arbitrary and capricious manner when it "offer[s] an explanation for its decision that runs counter to the evidence before the agency"). The varied or unknown root causes at the heart of these incidents are strong evidence that they are *sui generis*— "occasional or isolated" failures—that are not evidence of a safety-related defect in the tens of millions of unrecalled vehicles covered by the

Initial Decision. *See Pitman Arms*, 561 F.2d at 929.[13] It also undermines NHTSA's contention that the number of relevant ruptures is seven rather than, at most, three—or potentially even fewer. Because NHTSA cannot identify a common manufacturing defect linking the seven ruptures in the Initial Decision to each other, it also cannot reasonably infer that its hypothetical manufacturing defect is common to 52 million <u>other</u> ARC- and Delphi-manufactured toroidal inflators, and cannot carry its statutory burden of demonstrating that a defect exists under the Safety Act.

B. NHTSA has not attempted to show, and cannot show, an "unreasonable risk"

Even if the Initial Decision had demonstrated a "significant number" of ruptures, that alone would not justify a recall absent a finding that there is an "unreasonable risk" of harm as intended by the Safety Act. But the Initial Decision does not contain any analysis of unreasonable risk. It does not cite, let alone attempt to apply, the multi-factor analysis required by *X-Cars*. Instead, it arbitrarily and improperly concludes, *ipse dixit*, that its alleged defect constitutes an unreasonable risk to safety.

The agency's approach is contrary to law. As the D.C. Circuit explained in *Wheels*, "the word 'unreasonable' was placed in the [Safety Act] deliberately, to signify a 'commonsense' balancing of safety benefits and economic cost." 518 F.2d at 435. Recalls are not a permissible solution when "the only 'remedies' are ineffective, prohibitively expensive, or affirmatively detrimental to public safety." *X-Cars*, 656 F. Supp. at 1578-79. In determining whether to order a recall, then, the agency must consider this "important aspect of the problem," which is mandated by Congress and by governing precedent. *See Motor Vehicle Mfrs. Ass'n, Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (an agency acts in an arbitrary and capricious manner when it "entirely fail[s] to consider an important aspect of the problem").

The Initial Decision does not engage in this analysis. To determine that this risk is "unreasonable," NHTSA was required to conduct a careful evaluation of both the incremental safety benefit of conducting a recall and the potential "economic, social, and safety consequences" of such a remedy. *X-Cars*, 656 F. Supp at 1578. As to the incremental safety benefits, for example, the Initial Decision does not compare the risk of rupture to the risk of other kinds of failures if the inflators were replaced, nor does the Initial Decision compare the failure rate of these inflators to other inflators in the field. *See Wheels*, 518 F.2d 420, 438 n.84 (mandating consideration of the "failure rates of comparable components"); *see also* Ex. 5 at ¶¶ 25-26 (comparing the failure rate of subject inflators with the target defect rate in stringent product quality standards frequently used in the automotive industry). Given the limits in the supply chain for automobile parts, for example, it might prove difficult to hold the replacement inflators to a consistent performance standard, and the repair process itself could introduce production- or installation-based defects. Without addressing these and other similar questions, NHTSA cannot determine whether a recall of these inflators would be "ineffective" or "affirmatively detrimental to public safety." *X-Cars*, 656 F. Supp. at 1579.

[13] That this handful of isolated ruptures can serve as the sole evidence of a defect in tens of millions of inflators is a novel position only recently espoused by the agency. *See* ARC RRL Response at 2 ("Prior to receiving the RRL, NHTSA had never suggested to ARC (or, as far as ARC is aware, any other manufacturer whose vehicles contain these inflators) that a defect of the scope suggested in your letter existed in this inflator population.").

Nor has NHTSA considered the societal cost of obtaining any (unspecified) incremental safety benefit. At a basic level, the "cost" analysis required under *Wheels* refers to the broader "economic, social, and safety consequences" of the recall. *X-Cars*, 656 F. Supp at 1578. But the Initial Decision does not consider, among other factors, the practical economic consequences of its decision;[14] the costs imposed on future purchasers of vehicles that will need to be designed and manufactured to satisfy what appears to be NHTSA's new—and impossible—safety standard; or the costs to consumers when, because of the limited supply chain for automotive parts, parts scarcity impedes production of new vehicles and necessary repairs of other automobiles. The last two potential costs are critical, because higher costs for new cars and repairs could compel consumers to decline to make necessary repairs or to upgrade to newer and safer vehicles.

NHTSA must analyze and assess the parameters of "unreasonable risk" of harm prior to determining that a recall, particularly one of this magnitude, is appropriate. It has not done so here and, as such, has failed to carry its burden.

C. NHTSA's recently produced future-ruptures projection is unsound and does not support the agency's assumption that "ruptures will continue to occur"

On December 4th, in response to request made by several of the affected manufacturers and almost three months after the Initial Decision,[15] the agency produced a spreadsheet prepared by the agency's statistician "in the course of her analysis of the estimated rate of rupture of the ARC inflators."[16] This spreadsheet contains what appears to be the agency's future-risk assessment: three estimated ruptures through the year 2056.[17]

As explained in the attached report prepared by Dr. Laurentius Marais, the agency was only able to reach this exaggerated total by making a series of calculation assumptions and decisions that are neither explained nor methodologically defensible. *See* **Exhibit 5** ("**Marais Analysis**"). These imprecisions and errors are numerous and material to the agency's calculations, and include: (1) rounding the calculated rupture rate of 0.000272% up to 0.0003% (*Id.* at ¶ 9); (2) rounding the deployment rate down from 0.00425 to 0.004 (*Id.* at ¶ 9); (3) using average attrition rates instead of readily-available, class-specific survival rates (*Id.* at ¶¶ 10-12); (4) using light-truck deployment rates for passenger cars (*Id.* at ¶ 13-14); (5) failing to account for lower deployment

[14] Cost is not a factor that GM considers when determining whether to conduct a voluntary safety recall. However, when NHTSA seeks to <u>order</u> a recall, as it is here, it is legally required to consider the economic consequences of its decision. *X-Cars*, 656 F. Supp. at 1578 ("The unreasonableness of any risk to safety <u>must be assessed</u> relatively in at least three dimensions: . . . and (3) the economic, social, and safety consequences of reducing the risk to a so-called 'reasonable' level.") (emphasis added). NHTSA has previously undertaken such an analysis. *See, e.g.,* Final Regulatory Evaluation, TREAD Act Early Warning Reporting Part 579, Office of Regulatory Analysis and Evaluation, NHTSA, July 2002, Docket # NHTSA-2001-8677-470, at 52 (estimating the cost per vehicle of safety recalls). Despite the clear requirements of the case law, the Initial Decision contains no comparable analysis.

[15] *See supra* n.5.

[16] Letter from Eileen Fallon Sullivan, Associate Administrator for Enforcement, NHTSA, to Erika Z. Jones (December 1, 2023) at 1.

[17] Donna Glassbrenner, "Confidential - Estimated air bag deployments and rupture rate and derivation of assumption - Contains CBI.xlsx (June 17, 2023). Even with this documentation, numerous documentation and information gaps continue to exist that preclude a full review and analysis of NHTSA's calculations. *See* Ex. 5 at ¶ 7.

rates in passenger airbags (*Id.* at ¶ 15); and (6) failing to account for the reduction in average vehicle miles travelled as vehicles age (*Id.* at ¶ 17).

When these errors are corrected, the estimated number of ruptures through 2056 generated by NHTSA's calculations falls from three to less than one (0.93). And when the four rupture events for which there is no evidence of weld-slag blockage—the 2002 model year Town & Country incident, the 2011 model year Malibu incident, and the two 2015 model year Traverse incidents (*see* Section III.A.3 *supra*)—are removed, the corrected NHTSA calculation projects 0.40 future ruptures.[18] The agency's claim that it "is reasonable to assume that ruptures will continue to occur" is not supported—and, in fact, affirmatively contradicted—by NHTSA's own calculations:

Nature of Correction	Estimated Deployments		Expected Ruptures
	Past (through 9/2023)	Future (10/2023 – 2056)	Future (10/2023 – 2056)
NHTSA/Glassbrenner Model	2,571,148	1,009,905	3.03
… undo rounding of rupture and deployment rates	2,531,848	1,073,024	2.75
… and use vehicle-class-specific survival rates	2,723,393	1,098,876	2.82
… and use vehicle-class-specific deployment rates	3,216,967	1,305,358	2.84
… and use PAB-specific deployment rates	2,813,144	841,268	2.09
… and account for vehicle-age effect on annual VMT	2,951,000	393,913	0.93
… and assume 3 past ruptures instead of 7	"	"	0.40

TABLE 2: TABLE 6 FROM MARAIS ANALYSIS - CUMULATIVE CORRECTIONS TO NHTSA PROJECTION OF EXPECTED FUTURE RUPTURES

The agency's heavy reliance on these calculations is difficult to understand in light of the agency's comments in a recent order discounting the reliability of a much more sophisticated predictive model. *See* Denial of Consolidated Petition for Decision of Inconsequential Defect, 85 F.R. 76159, 76172 (Nov. 27, 2020). In this order, the agency discounted the reliability of the outputs of a "parametric mathematical model" that involved "more than 65,000 hours of testing and analysis by experienced scientists, engineers and technicians," and which was designed to predict the future-rupture risk and general service-life expectancy of certain Takata-manufactured inflators. *See id.* at 76163; *see also* PSAN Inflator Test Program and Predictive Aging Model Final Report (October 2019) at 1, available at https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/ ngis_takata_investigation_final_report_ oct_2019.pdf (last accessed December 1, 2023). NHTSA criticized the model's overall predictive reliability and expressed general concerns regarding "using models to predict low-frequency events." 85 F.R. at 76171. The agency faulted the absence of margins of error in the model's risk estimates, which it deemed to be "particularly important when evaluating the risk of a catastrophic event like an inflator rupture." *Id.* The agency further

[18] Dr. Marais' adjustments were not results oriented; several of the individual adjustments resulted in a net increase of the future rupture rates. *See* Marais Analysis at Table 6.

criticized the manner in which certain of the model's outputs "pool[ed] the risk posed by inflators across ages and/or Zones," and the model's "fail[ure] to account for the differences in the risk of rupture for new vehicles and older vehicles." *Id.* at 76170.

The agency's concerns regarding the general reliability of "models to predict low-frequency events" is not reflected in the record in this proceeding. Here, the agency appears content to rely on a future-risk assessment that is far more primitive and imprecise than the model at issue in 2020, and is based on calculations and methods that the agency previously found objectionable:

- The margins of error that NHTSA previously insisted were "particularly important when evaluating the risk of a catastrophic event like an inflator rupture" are completely absent from the agency's calculations and documentation.[19]

- The agency's analysis lumps together the future rupture risk of all 52 million inflators, despite numerous differences in design, construction, vehicle seating position, recall status, and vehicle age and use—effectively "pool[ing] the risk posed by inflators."

- NHTSA criticized the parametric mathematical model at issue in 2020 as "fail[ing] to account for the differences in the risk of rupture for new vehicles and older vehicles." 85 F.R. at 76170. Here, the agency's analysis does not take into account the lower mileage accrued by older vehicles, which is a critical part of NHTSA's own CAFE attrition model. Dr. Marais accounted for this factor in deriving a corrected estimate of future ruptures in the fleet. Marais Analysis at ¶¶ 16-19.

The potential for failures "to occur in the future" is an essential component of defects analysis under the Safety Act. *See* 88 F.R. at 62143 (citing *United States v. General Motors*, 565 F.2d 754, 758 (D.C. Cir. 1977)). The agency's future-risk projection does not support the agency's assumption that the subject inflators will continue to rupture, and the agency's reliance on that projection is inconsistent with its past expectations and standards for predictive modeling.

D. NHTSA's demand to recall 11 million Delphi-manufactured inflators is arbitrary and unreasonable

Critically, there have been no reported ruptures in any of the approximately 11 million ARC-designed inflators that were manufactured by Delphi.[20] Despite having absolutely no field

[19] The agency's public statements and written work product omit the statistical reality that these calculations may predict zero future ruptures with equal or greater confidence. Marais Analysis at ¶ 23 & n.86 ("[U]nder the well-known and commonly used Poisson probability model, an event-generating process with an expected value of 0.93 occurrences …has a 39.5% chance of producing *zero* occurrences; an event-generating process with an expected value of 0.40 occurrences…has a 67.0% chance of producing *zero* occurrences; that is, it is *twice as likely as not* that the observed number of events will be *zero*." (emphasis in the original)).

[20] We note that the Initial Decision incorporates inaccuracies on fundamental aspects of the Delphi inflators; for example, Delphi manufactured inflators years past the 2004 timeframe specified in the Initial Decision. *See* Delphi 2016 IR submission.

or technical evidence that these inflators contain a safety-related defect, NHTSA nevertheless contends that they too must be recalled.

NHTSA's inclusion of the Delphi-manufactured inflators in the Initial Decision is particularly inexplicable given that the agency's defect theory traces directly back to ARC's manufacturing processes:

> NHTSA's investigation revealed a potential failure mechanism most likely causing the ruptures. ARC designed and manufactured the subject inflators using a method called friction welding to join the inflator upper and lower pressure vessels. The friction welding process, in some circumstances, produced excess weld slag, which, if loose, will be propelled toward the inflator exit orifice during an air bag deployment, along with any other debris in the inflator center support.

88 F.R. at 62143-44. That the agency is relying on a potential manufacturing—not a design—defect is reinforced by its claim that ARC's installation of a borescope in ARC's assembly facilities "effectively allows ARC to detect the occurrence of excess weld slag or other debris in its inflators . . . ." and bookends the allegedly defective population of inflators as those with a manufacture date before January 31, 2018. *Id.* at 62144. But the Initial Decision makes no effort to account for the fact that the Delphi inflators were manufactured in different locations, presumably using different equipment, different personnel, and different manufacturing processes. In fact, there is no evidence in the Confidential File that NHTSA ever requested any information from Delphi about its manufacturing processes.[21] NHTSA's proposed recall of these inflators is not supported by evidence, and is arbitrary and unreasonable.[22]

E. The Initial Decision's reliance on the Takata inflator recalls is falsely premised

Throughout the Initial Decision and the October 5 public meeting, NHTSA repeatedly invoked the Takata recall as precedent for its conclusion that seven inflator ruptures constitute a prima-facie case of a safety-related defect:

- "In the largest air bag inflator recall, TK Holdings, Inc. (Takata) issued recalls after determining that certain driver and passenger inflators ruptured when activated… In fact, NHTSA's recall request letter to Takata identified six inflator ruptures, one less than identified here." 88 F.R. at 62142 n.4.

- "NHTSA previously sent a recall request letter to Takata concerning six identified ruptures of its air bag inflators, which ultimately resulted in recalls carried out by

[21] *See* Joint Comments of Safety Professionals Relating to NHTSA's Initial Decision at 13.

[22] Even if the Delphi-manufactured inflators were excluded from the recall population, a recall would still be unreasonable because the agency has not and could not establish a "significant number" of ruptures or an "unreasonable risk" for the smaller population of ARC-manufactured inflators. *See* Sections III.A-.B, *supra*.

the vehicle manufacturers that used the approximately 67 million defective Takata inflators." 88 F.R. at 62145.

- "Similar to the issue that we are here to discuss today, there were six ruptures in the Takata population when the agency sent a recall request letter to Takata. What we knew then with respect to Takata and what we can predict with the population at issue is that ruptures will continue to happen." Oct. 5, 2023 Tr. at 17:22-18:5.

NHTSA's reliance on the Takata recall having any precedential value is misplaced. First, unlike here, Takata, and most other inflator recalls, involved an established, understood defect that could be traced to a manufacturing or design issue in discrete vehicle populations. *See* 88 F.R. at 62142 n.4 (citing, among others: Recall 19E-080, which addressed "rupture risk caused by excess moisture in the propellant"; Recall 21E-080, involving certain curtain air bag inflators which carried "a risk of rupture due to moisture corrosion"; and Recalls 21V-766 and 21V-800, which addressed "susceptibility to rupture due to excess moisture and propellant degradation").

Second, when NHTSA issued the Takata recall request letter in late November 2014, the evidence of a systemic rupture-related risk in nondesiccated Takata PSAN inflators was far more significant than six ruptures. Publicly available records indicate that NHTSA knew about more than double that figure, if not more.[23] And NHTSA was also aware of a growing body of lab ruptures; in the fall of 2014, Takata was ballistically testing inflators returned from the field as part of voluntary OEM-initiated regional recalls, and "regularly reporting" these results to the agency. *See* Takata Congressional Hearing Transcript at 14 (Testimony of Hiroshi Shimizu, stating that Takata was "regularly sharing" its ballistic test reports with NHTSA). In its November 17, 2014 report, Takata reported observing 57 field return ruptures <u>in just a single Takata inflator variant</u>:

[23] On November 24, 2014, Honda issued a press release describing eight Takata rupture incidents that were not included in its Early Warning Reports submitted under 49 C.F.R. Part 579, but which had been disclosed to NHTSA by other means from 2009 through 2013. *See* Honda, Fact Sheet: Honda's Early Warning Report Audit & NHTSA Special Order (Nov. 24, 2014), *at* https://hondanews.com/en-US/releases/fact-sheet-honda-s-early-warning-report-audit-nhtsa-special-order?page=1#press-release (last accessed November 30, 2023). Additionally, NHTSA's November 26, 2014, recall request letter to Takata listed five additional incidents involving: Chrysler, Mazda and Ford (one incident each) and two additional Honda ruptures from 2014 that were not included in the earlier press release.

11/17/2014

US Regional Recall Data – Passenger PSPI-L

Region	PSPI-L OEM A	PSPI-L OEM B	PSPI-L OEM C	Total
Southern Florida	41/329	0/1	0/11	41/341
Northern Florida	8/138	0/3	0/26	8/167
Puerto Rico	8/100	No Test	No Test	8/100
Other US States	0/173	0/323	No Test	0/496
Total	57/740	0/327	0/37	57/1104

Numerator shows number of inflator ruptures
Denominator shows number of total test samples to date

92

TKH-HE&C00000256

See Takata Congressional Hearing Transcript at 92; *id.* at 80 (testimony of David J. Friedman, NHTSA Deputy Administrator, discussing "more than 60 ruptures of passenger" airbag inflators in Takata ballistic testing).

Third, the Takata recall involved a common design defect rooted in the use of a chemical propellant that, over time and in certain ambient conditions, would degrade—a fact that, even in late 2014, NHTSA understood. *See id.* at 65 ("Initial data suggested that the defects in the driver and passenger were related to prolonged exposure to high heat and humidity, and so NHTSA acted quickly."); *id.* at 85 ("It is clear that the propellant is involved."). Based on NHTSA's identification of this defect, from both field failures and failures after ballistic tests, NHTSA could infer that there would be an increasing incidence of ruptures in the future in certain vehicle populations. Within 16 months of opening its formal investigation into the Takata inflator ruptures, NHTSA was aware that there had been almost 100 rupture incidents linked to injuries in the field. *See* NHTSA Memorandum, "Summary of injury and fatality reporting regarding Takata air bag inflator ruptures," Oct. 28, 2015. To date, the Takata inflator ruptures have resulted in 27 reported deaths and more than 400 reported injuries in the U.S. *See* NHTSA, Takata Recall Spotlight, at https://www.nhtsa.gov/equipment/takata-recall-spotlight (last accessed December 10, 2023).

Fourth, the basis for NHTSA's decision to issue the recall request letter in Takata was not the occurrence of a specific number of field ruptures, as suggested by the agency in this proceeding. In Takata, NHTSA pursued a substantive and data-driven analysis that assessed the different airbag configurations at issue, and carefully evaluated each new incident's relationship to prior incidents, its fit to NHTSA's root-cause theory, and safety implications in the field. According to NHTSA's own explanation, it was ultimately this analysis—and not a specific number of field ruptures—that prompted the agency to issue the Takata recall request letter, after a rupture occurred outside of the high-humidity region where past rupture events had been concentrated: "This decision [to issue a recall request letter to Takata] was based on our evaluation of a recent driver's side air bag failure in a Ford vehicle outside the area of high humidity <u>and its relationship to</u> five previous air bag ruptures of the same or similar design." *See* Takata Congressional Hearing Transcript at 72 (Statement of David J. Friedman) (emphasis added).

The agency repeatedly invokes the "six ruptures" discussed in the Takata recall request letter, as if that number supplies it with the evidentiary and legal basis to justify the recall it seeks in this case. It does not, as a matter of law, but it also fundamentally misstates the facts of the Takata recall, the number of Takata inflator ruptures known to the agency in November 2014, and the agency's stated basis for issuing a recall request letter in that prior proceeding.

*   *   *

NHTSA has long recognized—as required by the Safety Act and prevailing case law—that ordering a recall demands a compelling and well-documented safety rationale. The Initial Decision in this proceeding lacks any such showing, much less one sufficient to justify the second largest vehicle recall in U.S. history. The Initial Decision fails to faithfully apply the applicable legal standards to the facts, is based on a flawed and incomplete administrative record, and fails to establish the existence of a defect related to motor vehicle safety outside of the substantial population of vehicles that GM and other OEMs have already voluntarily recalled.

The Initial Decision invites more questions than it answers. The facts contained within it reflect that the agency has little clarity about the design and manufacturing processes affecting the 52 million inflators at issue, and a substantial uncertainty about the root causes of the seven field ruptures. A majority of these ruptures have a root cause that cannot be explained by the agency's weld-slag theory. Without a common root cause and absent any comparison to peer component parts in the field, the agency cannot demonstrate the existence of a safety-related defect in tens of millions of inflators produced over an almost 20-year period by two different manufacturers using different manufacturing processes and different designs. The agency's future-rupture calculations, when adjusted to strip out certain errors and other unjustified assumptions, do not predict a future rupture.

GM respectfully urges NHTSA to decline to issue a final recall decision. GM remains committed to continuing its monitoring and investigative efforts in cooperation with the agency, and will not hesitate to act, as it has in the past, if it identifies a safety issue in the subject inflators.

Exhibit 1

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Exhibit 5

December 17, 2023

Matthew H. Marmolejo, Esquire
Mayer Brown LLP
333 South Grand Avenue, 47th Floor
Los Angeles, CA 90071-1503

Re: Request for Comments, Initial Decision That Certain Frontal Driver and Passenger Air Bag Inflators Manufactured by ARC Automotive Inc. and Delphi Automotive Systems LLC Contain a Safety Defect, Docket Number NHTSA-2023-0038

Dear Mr. Marmolejo,

I understand that you have asked me, on behalf of your client, General Motors LLC ("GM"), to review, from the perspective of my areas of expertise, a statistical analysis of the historical incidence of ruptures in certain airbag inflators (the "subject inflators") through September 2023 performed by Dr. Donna Glassbrenner of the National Highway Traffic Safety Administration ("NHTSA"), as well as Dr. Glassbrenner's comments on the possible occurrence of additional ruptures in the future during the remaining service life of the fleet of cars and light trucks equipped with the subject inflators (the "subject fleet"). This letter is my response to your request for a written summary of the observations I have reported to you. Attachment A hereto lists materials that I relied upon for my review.

I. Qualifications

1. I am an Executive Vice President at Compass Lexecon, a consulting firm that specializes in the analysis of complex legal and regulatory issues in business, industry, and government, typically by applying quantitative methods drawn from disciplines including economics, finance, statistics, and applied mathematics to empirical data. In my own consulting practice, I specialize in applied mathematical and statistical analysis, including the analysis of event and accident data using mathematical and statistical methods for the analysis of failure rates. I hold a Ph.D. degree and master's degrees in business administration, mathematics, and

statistics from Stanford University. I have taught and conducted scholarly research while serving on the faculties of the University of Chicago and Stanford University. I am a fellow of the Royal Statistical Society and a member of the American Statistical Association, the Society for Industrial and Applied Mathematics, the American Economic Association, and the American Accounting Association, among other professional societies. I have extensive experience in applying statistical and mathematical theory and methods to real-world issues and in reviewing and assessing the validity of statistical studies, inferences, and conclusions, in areas of application that include the analysis of failure rates.

II. Background

2. I understand that on September 5, 2023, NHTSA issued an "initial decision that certain frontal driver and passenger air bag inflators manufactured by ARC Automotive Inc. and Delphi Automotive Systems LLC contain a safety defect" (the "Initial Decision")[1] and convened a subsequent public meeting (the "Public Meeting"), held on October 5, 2023,[2] concerning the Initial Decision. "The subject inflators were incorporated into air bag modules used in vehicles manufactured by 12 vehicle manufacturers," including GM."[3]

3. Concerning the numerator (i.e., the number of subject inflator rupture events) and denominator (i.e., the number of airbag deployments at risk of a subject

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[1] Department of Transportation, National Highway Traffic Safety Administration "Initial Decision That Certain Frontal Driver and Passenger Air Bag Inflators Manufactured by ARC Automotive Inc. and Delphi Automotive Systems LLC Contain a Safety Defect; and Scheduling of a Public Meeting," ((https://www.nhtsa.gov/sites/nhtsa.gov/files/2023-09/ARC-Initial%20Decision-9-5-23-signed.pdf).
[2] Public Meeting: Initial Decision That Certain ARC and Delphi Air Bag Inflators Contain a Safety Defect, October 5, 2023 (https://www.nhtsa.gov/events/public-meeting-arc-delphi-air-bag-inflators) and Public Meeting Transcription (https://www.regulations.gov/document/NHTSA-2023-0038-0003).
[3] Initial Decision at 5.

inflator rupture event) of the "incidence rate"[4] of ruptures of the subject inflators, the Initial Decision states as follows:[5]

> ARC's use of the entire subject inflator population as the baseline results in an inaccurate assessment of the risk. As crashes are relatively uncommon events, the vast majority of the [52 million] subject inflators have not experienced a command for deployment, and the defect manifests itself only upon air bag deployment. Therefore, the rupture rate of the subject inflators is properly estimated as the ratio of inflators ruptures to total field air bag deployments—not to the total subject inflator population. NHTSA estimates that approximately 2,600,000 of the subject air bag inflators have deployed in the field. A more accurate representation of the rupture risk of the subject inflators is, therefore, 7 out of 2.6 million.[6]
>
> Additional inflator ruptures are expected to occur in the future, risking more serious injuries and deaths, if they are not recalled and replaced.

4. The Initial Decision provides only a perfunctory and inadequate description of the inputs and methods it employed for calculating its estimate of 2.6 million airbag deployments, stating as follows:[7]

> This estimate assumes that: 1) In any given year, 0.4% of the vehicles with subject inflators on the road experience a frontal impact with a delta-V of 15 mph or more. (This figure was derived from the light trucks in the 2015 Fatality Analysis Reporting System (FARS), 2015 General Estimates System (GES), 2016 vehicle registration data from S&P Global Mobility's (f/k/a R.L. Polk, Inc) , and 2015 Crashworthiness Data System.); 2) The subject inflators deploy at about a change in velocity of 15 mph, regardless of other conditions (such as, in the case of passenger air bags, whether a person of a threshold weight is in the passenger seat); and 3) the vehicles with subject inflators remain on the road according to the average of the car and class 1-2a light truck attrition models from NHTSA's 2016 CAFE Model.

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[4] The Incidence Rate is the "rate at which new events occur in a population. The numerator is the number of new events that occur in a defined period or other physical span. The denominator is the population at risk of experiencing the event during this period, sometimes expressed as person-time; it may instead be in other units, such as passenger-miles." Porta, Miquel S. 2008. *A Dictionary of Epidemiology*. Oxford University Press at 124.

[5] Initial Decision at 18–19 and 4.

[6] To the extent NHTSA suggests here that the number of field deployments of the subject inflators is the *only* meaningful and "accurate" denominator for "properly" calculating a rate of incidence, I disagree. Another meaningful risk metric would be the risk of injury or death from an inflator rupture per million hours of subject-vehicle passenger occupancy, suitably defined. Good statistical principles and practice do not require that an analysis employ only *one* metric. In other matters, NHTSA itself has employed more than one risk metric in the same analysis. For example, NHTSA uses, in its annual publication of the risk of fatalities, injuries, and crashes, injury and fatality rates normalized in terms of multiple alternative measures of "exposure": population size, number of licensed drivers, number of registered motor vehicles, and VMT (NHTSA Traffic Safety Facts 2020, Tables 2 and 3, https://crashstats.nhtsa.dot.gov/#!/DocumentTypeList/12).

[7] Initial Decision fn. 16.

This excerpt from the Initial Decision identifies several data resources and assumptions involved in NHTSA's calculation, but is conspicuously lacking in the detailed steps through which NHTSA arrived at its estimate of a 0.4% rate of imputed airbag deployments or its estimates of the numbers of "vehicles with subject inflators on the road" from 2000 through September 2023. The inadequacy of NHTSA's disclosure is a serious obstacle to performing any normal degree of peer review and assessment at the level of detail that is customary for statistical analyses in scholarly and professional research, let alone any substantial sensitivity analysis of NHTSA's purported statistical basis for the Initial Decision.

5. In comments delivered at the October 5 Public Meeting, Dr. Donna Glassbrenner, the author of the NHTSA calculation outlined above,[8] provided the following additional details:

a) "The vehicles with the subject inflators range from model year 2000 through 2019";[9]

b) "I used production figures provided by manufacturers in response to ODI's information requests to estimate how many model year 2000 vehicles were on the road in calendar year 2000. I multiplied this number by 0.4% to estimate the number of field deployments that occurred in calendar year 2000. I continued in a similar fashion in subsequent calendar years, adding production figures from the newest fleet and subtracting the estimated salvage vehicles to estimate the number of affected vehicles on the road that year";[10]

c) "As we're only partway through 2023, I subtracted out the estimated field deployments from October through December of this year;"[11]

d) "[t]he rupture rate of the subject inflators is seven out of 2.6 million, which is about 0.0003%. Applying this percentage to try to predict future ruptures, the likelihood of additional ruptures is about one out of every 370,000 future airbag deployments involving the subject inflators;"[12]

e) "Regarding NHTSA's investigation into the subject inflators, my responsibility was to determine a reasonable estimate for the rate at which the subject inflators had ruptured. This rupture rate is useful in trying to predict the likelihood of future ruptures. While there is always uncertainty in predictions,

[8] Public Meeting Transcription at 52:21–53:2.
[9] Public Meeting Transcription at 57:11–12.
[10] Public Meeting Transcription at 58:16–58:5.
[11] Public Meeting Transcription at 58:7–10.
[12] Public Meeting Transcription at 58:16–22. Concerning "one out of every 370,000 future airbag deployments," note that 2,600,000 / 7 ≅ 371,428.6.

using available data allows the agency to make the best possible decisions in the face of that unavoidable uncertainty;"[13] and

f) "We can never predict with certainty what will happen in the future, but the data helps us better understand likely outcomes. Given the remaining population of these inflators in vehicles, based on available information, it is reasonable to assume that ruptures will continue to occur."[14]

6. Recently, almost three months after the Initial Decision, NHTSA released an Excel workbook[15] that provides further, more detailed (though *still* incomplete) information about Dr. Glassbrenner's calculation.[16] This workbook attempts to quantify the risk that NHTSA's proposed recall of approximately 52 million vehicles is meant to mitigate in terms of a projection of an expected *three* additional ruptures during the 33-year period from October 2023 through 2056, were the subject inflators to remain in the field.[17]

III. Even after its recent supplemental disclosure, NHTSA's documentation of the quantitative basis for its Initial Decision remains grossly deficient

7. As noted in § II above, the gaps in NHTSA's disclosed purported basis for its Initial Decision are such as to preclude normal, detailed peer review at the level that is typically *required* for peer-reviewed scholarly publication.[18] Table 1 below demonstrates the nature and extent of these documentation gaps by listing questions about pertinent NHTSA assertions, assumptions, and choices left unresolved by all of NHTSA's disclosures to date.

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[13] Public Meeting Transcription at 52:21–53:8.

[14] Public Meeting Transcription at 59:1–7.

[15] Confidential - Estimated air bag deployments and rupture rate and derivation of assumption - Contains CBI.xlsx ("NHTSA Workbook").

[16] Letter from Ms. Eileen Sullivan at NHTSA to Ms. Erika Z. Jones at Mayer Brown, LLP, December 1, 2023.

[17] Dr. Glassbrenner failed to mention this in her testimony at the Public Hearing.

[18] While I refer here to the normal standards for the reviewability of *scholarly* publications, I am aware of no principled basis for *exempting* the statistical analysis underlying a proposed regulatory action with the scale and consequences of what NHTSA proposes here from a comparable level of scrutiny.

Table 1
Open Questions Concerning Elements of NHTSA's Analysis in Support of Its Initial Decision

NHTSA Assertion, Assumption, or Choice	Open Question(s)
52,000,000 "subject inflators"[19] 52,841,139 = 40,932,800 DAB + 11,908,339 PAB[20]	- Unknown how to reconcile 52.0 million inflators and 52.84 million inflators - Unknown how many inflators and/or vehicles remain on the road in 2023 (this is knowable from Polk data, which is available to NHTSA)
"In any given year, 0.4% of the vehicles with subject inflators on the road experience a frontal impact with a delta-V of 15 mph or more. … [d]erived from the light trucks"[21]	- Why was the same, single deployment rate attributed to cars and light trucks ("LT") alike? - Why based on light trucks alone rather than cars and LT (given NHTSA crash data showing different single-vehicle accident involvement rates for cars and LT[22])? - Unknown which model years were used for this estimate - Unknown if this estimate was limited to vehicles with subject inflators - Why did NHTSA not account for effect of annual VMT differences on deployment rates? - Why is this rate estimate more appropriate than the 0.5% rate from in the "May 18, 2015 Defect Information Report"?[23]

[19] Initial Decision at 13 and fn. 15.
[20] NHTSA Workbook sheet "DAB – CBI" cell F699 and sheet "PAB – CBI" cell F259.
[21] Initial Decision fn. 16.
[22] NHTSA Traffic Safety Facts 2020, Tables 3, 43, and 45.
[23] National Highway Traffic Safety Administration, "Defect Information Report, TK Holdings Inc. PSDI, PSDI-4, and PSDI-4K Driver Air Bag Inflators" May 18, 2015 (https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/recall_15e-040.pdf)

NHTSA Assertion, Assumption, or Choice	Open Question(s)
"This figure was derived from the light trucks in the 2015 Fatality Analysis Reporting System (FARS), 2015 General Estimates System (GES), 2016 vehicle registration data from S&P Global Mobility's (f/k/a R.L. Polk, Inc), and 2015 Crashworthiness Data System.)"[24]	□ Which model years were chosen in each dataset: 2000–2015, or 2000–2014, or all model years? □ Unknown how light trucks were defined (maybe body type 01–49) □ Unknown how frontal impacts were defined □ Unknown how vehicles were identified as having been in a crash with a delta v of 15 mph or more □ Unknown how missing values were treated □ Unknown if all levels of confidence of the computer-generated delta v were used
"The subject inflators deploy at about a change in velocity of 15 mph, regardless of other conditions (such as, in the case of passenger air bags, whether a person of a threshold weight is in the passenger seat)"[25]	□ What, specifically, is this "regardless" meant to convey about NHTSA's analysis? □ How did NHTSA account for right front passenger occupancy?
"[W]hen 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."[26]	□ What does "information received from vehicle manufacturers" refer to?
Assumes "the vehicles with subject inflators remain on the road according to the average of the car and class 1-2a light truck attrition models from NHTSA's 2016 CAFE Model."[27]	□ Why did NHTSA choose to use a simple average of attrition rates for cars/LT when the respective attrition schedules are different? Does this entail an assumption that half of the subject inflators were used in cars and half in LT? □ Why did NHTSA choose not to account for effect of vehicle age on annual VMT? □ Why did NHTSA choose to use the 2016 CAFE model (which was applied to MY 2022–2025 vehicles) rather than an earlier CAFE model (or a later CAFE model based on more recent vehicle registrations than the 2016 model). □ Why did NHTSA rely on generic attrition/survival estimates rather than actual registration data for the ARC/Delphi fleet?

[24] Initial Decision fn. 16.
[25] Initial Decision fn. 16.
[26] Public Meeting Transcription at 56:8–14.
[27] Initial Decision fn. 16.

NHTSA Assertion, Assumption, or Choice	Open Question(s)
"The rupture rate of the subject inflators is seven out of 2.6 million, which is about 0.0003%. Applying this percentage to try to predict future ruptures, the likelihood of additional ruptures is about one out of every 370,000 future airbag deployments involving the subject inflators."[28] "We can never predict with certainty what will happen in the future, but the data helps us better understand likely outcomes. Given the remaining population of these inflators in vehicles, based on available information, it is reasonable to assume that ruptures will continue to occur."[29] "Additional inflator ruptures are expected to occur in the future, risking more serious injuries and deaths."[30] "[I]t is expected that additional ruptures will occur in the future."[31]	☐ What is the degree of certainty, based on NHTSA's analysis, that *any* additional ruptures will occur in future?
"I used production figures provided by manufacturers in response to ODI's information requests to estimate how many model year 2000 vehicles were on the road in calendar year 2000. I multiplied this number by 0.4% to estimate the number of field deployments that occurred in calendar year 2000. I continued in a similar fashion in subsequent calendar years, adding production figures from the newest fleet and subtracting the estimated salvage vehicles to estimate the number of affected vehicles on the road that year."[32]	☐ Did NHTSA account for how many of these vehicles were cars vs. LTs? ☐ How did NHTSA account for vehicles with subject inflators in both DAB and PAB? ☐ Why did NHTSA not account for the effect of vehicle age on annual VMT? ☐ Why did NHTSA not account for the effect of annual VMT differences on deployment rates?

[28] Public Meeting Transcription at 58:16–22.
[29] Public Meeting Transcription at 59:1–7.
[30] Initial Decision at 4.
[31] Initial Decision at 17.
[32] Public Meeting Transcription at 57:16–58:5.

NHTSA Assertion, Assumption, or Choice	Open Question(s)
Additional Related Comments	
"However, ARC's use of the entire subject inflator population as the baseline results in an inaccurate assessment of the risk. As crashes are relatively uncommon events, the vast majority of the subject inflators have not experienced a command for deployment, and the defect manifests itself only upon air bag deployment. Therefore, the rupture rate of the subject inflators is properly estimated as the ratio of inflators ruptures to total field air bag deployments—not to the total subject inflator population. NHTSA estimates that approximately 2,600,000 of the subject air bag inflators have deployed in the field… A more accurate representation of the rupture risk of the subject inflators is, therefore, 7 out of 2.6 million."[33]	Why did NHTSA not consider any broader measures of exposure than estimated deployments alone—such as those it uses in its annual Traffic Safety Facts publication of the risk of fatalities, injuries, and crashes, which includes injury and fatality rates normalized in terms of multiple alternative measures of "exposure": population size, number of licensed drivers, number of registered motor vehicles, and VMT.[34]

IV. NHTSA's projection of an expected three future ruptures of the subject inflators

8. Dr. Glassbrenner arrives at her projection of future ruptures as follows:[35]

   a. For each make, model, and model year, and airbag location (driver airbag ["DAB"] or passenger airbag ["PAB"]), propagate the production volume provided by the manufacturer to subsequent, consecutive calendar years through September 2023, and also from October 2023 through 2056, by applying year-over-year survival rates[36] in accordance with NHTSA's assumption that "the vehicles with subject inflators remain on the road according to the average of the car and class 1-2a light truck attrition models from NHTSA's 2016 CAFE

[33] Initial Decision at 18–19.
[34] See fn. 6 above.
[35] NHTSA Workbook sheets "DAB – CBI" and "PAB – CBI).
[36] "Survival" here could also be described in terms of "attrition": 90% survival is the same as 10% attrition, for example.

Model."[37,38,39,40] (The details of this model-year survival trajectory can be seen in columns B, F, and P in Attachment B and also in the illustrative excerpt shown in Table 2 below.

Table 2
NHTSA Survival-Rate Assumptions from 2016 CAFE Model[41]
(Excerpt)

Vehicle Age	Survival Rates			
	Cars	Vans	SUVs	Pickups
1	1.0000	1.0000	1.0000	1.0000
. . .				
10	0.8397	0.7963	0.7963	0.7963
. . .				
20	0.2414	0.3092	0.3092	0.3092

b. Sum the resulting projected subject inflators in service, separately for DABs and PABs, for each calendar year in 2000 – September 2023 and,

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37 Initial Decision fn. 16.

38 NHTSA, "CAFE Compliance and Effects Modeling System," workbook "parameters_2016-05-12.xlsx" sheet "Vehicle Age Data" in "Central Input.7x" (https://www.nhtsa.gov/file-downloads?p=nhtsa/downloads/CAFE/2016-Draft-TAR/Central-Analysis/) on (https://www.nhtsa.gov/corporate-average-fuel-economy/cafe-compliance-and-effects-modeling-system, last accessed November 20, 2023).

39 The attrition schedule from NHTSA's 2016 CAFE Model is reproduced in Attachment B.

40 The CAFE Model survival schedule assigns 100% survival to Vehicle Ages through 1 (see Table 2 above), where Vehicle Age is defined as the excess of the current calendar year over the vehicle's model year. Sales of model-year 2000 vehicles, for example, began as early as late 1999, so that a given model-year 2000 vehicle could potentially have accumulated *over* two years in service while still aged 1. Therefore, it is unlikely that the true survival rate of the subject vehicles through Age 1 was *exactly* 100% as Dr. Glassbrenner assumes. Further, it is *extremely* unlikely that the effective size of the in-service fleet throughout years 0 and 1 was exactly equal to the corresponding full production volumes reported to NHTSA by the manufacturers, as Dr. Glassbrenner also assumes. She adopts both of these likely counter-factual assumptions in her analysis without comment or explanation.

41 As Dr. Glassbrenner explained in the Public Meeting, 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." (Public Meeting Transcription at 56:17–20.) The trajectory of this reduction over time in the size of each sales cohort entering the fleet is often described in terms of "attrition" or "survival" percentages. NHTSA included a schedule of vehicle survival rates in its 2016 CAFE Model (see extract in Table 2). The schedule shows, for example, that 100% of cars remain in service at age 1, while at age 10 only 83.97% still remain in service.

separately, also in October 2023 – 2056, to obtain a subtotal of subject inflator years in service for each calendar year (or portion thereof).[42]

c. Multiply these subtotals of subject inflator years in service for each calendar year (or portion thereof) in 2000 – September 2023[43] by a 0.4% annual deployment rate,[44,45] and sum the results to obtain projected totals of 2,206,139 DAB and 365,009 PAB deployments through September 2023, for an overall total of 2,571,148 deployments.[46] Do the same for October 2023 – 2056 to obtain projected totals of 567,883 DAB and 442,021 PAB deployments, for an overall total of 1,009,905 future deployments.[47]

d. Calculate the past rupture rate as 0.000272% = 7 ruptures / 2,571,148 deployments through September 2023.[48]

e. Apply a (rounded) future rupture rate of 0.000300% to a projected 1,009,905 future deployments to obtain a projection of 3.03 (= 1,009,905 deployments × 0.000300) from October 2023 through 2056.[49,50]

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[42] Partial year, through September 2023 only.

[43] Partial year, through September only.

[44] Initial Decision fn. 16.

[45] The calculated deployment rate of 0.00425 was *intentionally* rounded to 0.00400: see NHTSA Workbook sheet "Derivation of 0.4%" cell B6, sheet "DAB – CBI" columns AE–AF and BN-BO, and sheet "PAB – CBI" columns W–X and BF–BG.

[46] NHTSA Workbook sheet "DAB – CBI" columns AE–AF and sheet "PAB – CBI" columns W–X.

[47] NHTSA Workbook sheet "DAB – CBI" columns BN–BO and sheet "PAB – CBI" columns BF–BG.

[48] NHTSA Workbook sheet "DAB – CBI" cells AF699–AF703.

[49] NHTSA Workbook sheet "DAB – CBI" cells BO699–BO703.

[50] 0.000272% was intentionally rounded upwards to 0.000300% NHTSA Workbook sheet "DAB – CBI" cells BM702–BO702.

V. The effect of NHTSA's back-of-the-envelope approximations is to inflate its projection of the expected number of future ruptures of the subject inflators

A. Undoing Dr. Glassbrenner's unnecessary rounding of calculated rates

9. As noted in ¶¶ 8.c and e8.e above, Dr. Glassbrenner rounded both the rupture rate and the deployment rate she calculated—0.000272% and 0.00425, respectively—to a single significant digit: 0.0003% and 0.004.[51,52] She provides no particular reason for doing so, and none is apparent to me. Even if these rate estimates were viewed as merely approximate, purely pro forma inputs to a "ballpark" calculation, rounding them in this way cannot enhance the accuracy or reinforce the reliability of that calculation. Using the rates as actually calculated instead of these rounded rates has a modest but non-negligible effect on the result: it reduces the expected future ruptures from 3.03 to 2.75 (see Table 6). Dr. Glassbrenner's unnecessary rounding is one instance of an oddly perfunctory, back-of-the-envelope approach that pervades NHTSA's analysis in support of the major recall it is proposing in this matter.

B. Correction of NHTSA's reliance on an overall simple average survival rate instead of readily available vehicle-class-specific survival rates

10. As described in the Initial Decision, again for no particular apparent reason, Dr. Glassbrenner chose to use the simple "average of the car and class 1-2a light truck attrition models from NHTSA's 2016 CAFE Model"[53] rather than apply to cars the survival rate schedule for cars and to light trucks the survival rate schedule for light trucks. Dr. Glassbrenner has provided no statistical or practical justification for this shortcut, and none is apparent to me. Instead, it appears to be another instance of the perfunctory character of NHTSA's analysis.

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[51] NHTSA Workbook sheet "Derivation of 0.4%" cell B6, sheet "DAB – CBI" columns AE–AF and BN-BO, and sheet "PAB – CBI" columns W–X and BF–BG.

[52] For readability, the calculated estimates reported in this letter are rounded to no more than three significant digits (e.g. 0.00272%). In the underlying calculations, I retained the full available precision of each input quantity.

[53] Initial Decision fn. 16.

11. Instead of this ill-conceived shortcut, I used the more detailed underlying survival rates from which it was calculated, I first classified the vehicle models listed in the NHTSA Workbook according to the body types assigned to them in NHTSA's FARS[54] database, as shown in Table 3.

Table 3: NHTSA FARS Body Type

Classification	FARS Body Type[55]
Car	01–08
SUV	14–16
Van	20–22
Pickup	33–34

12. Using this FARS-based classification, I then applied to each subject vehicle model the specific corresponding survival rate schedule to obtain more accurate estimates of composition of the subject fleet over time than Dr. Glassbrenner's gross approximation. The net effect was a slight increase in the estimated future ruptures from 2.75 to 2.82 (see Table 6).[56]

C. Correction of NHTSA's assignment to passenger cars of the 0.4% deployment rate for light trucks

13. The Initial Decision indicates that Dr. Glassbrenner calculated a deployment rate of 0.4% for light trucks alone,[57,58] and then applied that light-truck rate to cars as well as light trucks[59] rather than calculate a separate deployment rate for cars alone. This shortcut imputation of a deployment rate for cars is unnecessary.

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[54] NHTSA, "2020 FARS/CRSS Coding and Validation Manual," DOT HS 813 251, March 2022.

[55] NHTSA, "2020 FARS/CRSS Coding and Validation Manual," DOT HS 813 251, March 2022, p. 292–294.

[56] As noted above in Table 1, NHTSA did not need to estimate how many vehicles were on the road using production figures and *estimated* survival rates, since they could have used the *actual* annual registration data from S&P Polk, which is certainly readily available to NHTSA.

[57] Initial Decision fn. 16.

[58] NHTSA Workbook sheet "Derivation of 0.4%."

[59] NHTSA Workbook sheet "Derivation of 0.4%" cell B6, sheet "DAB – CBI" columns AE–AF and BN-BO, and sheet "PAB – CBI" columns W–X and BF–BG.

Rather, it appears to be yet another instance of NHTSA's perfunctory analysis in this matter. I used publicly available data as follows to correct this shortcut:

a. Using information from NHTSA's annual Traffic Safety Facts for 2015 ("TSF 2015") and 2020 ("TSF 2020"), I replicated Dr. Glassbrenner's determination that "about 1.7% of registered light trucks get into a frontal crash."[60,61]

b. Using the same sources, I obtained a corresponding rate of 2.5% for cars.[62]

c. On the provisional assumption that that the prevalence of towed frontal impacts to cars having a delta-V of 15 mph or greater is the same as the 25% prevalence for light trucks, I then calculated the deployment rate for cars as 0.619% = 2.5% × 25%.[63]

14. This additional adjustment to the Glassbrenner calculation results in a further slight increase in the projected number of expected future ruptures from 2.82 to 2.84 (see Table 6).[64]

D. Correction of NHTSA's use of the same 0.4% deployment rate for driver-side and passenger-side airbags alike

15. As noted in the Initial Decision, Dr. Glassbrenner calculated a deployment rate of 0.04% for light trucks[65] and applied that rate to both DABs and PABs[66]

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60 NHTSA Workbook sheet "Derivation of 0.4%" cell A4.

61 1.7% = 2,228,000 light trucks in front impacts / (3,196,668 light trucks in 2015 property damage crashes / 2,509 involvement rate per 100,000 registered vehicle years × 100,000) from TSF 2015 Table 45 and TSF 2020 Table 3.

62 2.5% = 3,300,000 cars in front impacts / (4,438,039 cars in 2015 property damage crashes / 3,331 involvement rate per 100,000 registered vehicle years × 100,000) from TSF 2015 Table 43 and TSF 2020 Table 3.

63 NHTSA Workbook sheet "Derivation of 0.4%" cell A5.

64 To check the sensitivity of this calculation to the assumption of a 25% prevalence of towed frontal impacts to cars having a delta-V of 15 mph or greater, I repeated the calculation using alternative prevalence estimates at increments of 5% from 30% to 50%. The corresponding projected numbers of expected future ruptures ranged from 2.85 to 2.87.

65 Initial Decision fn. 16 and NHTSA Workbook sheet "Derivation of 0.4%" cell B6, sheet "DAB – CBI" columns AE–AF and BN-BO, and sheet "PAB – CBI" columns W–X and BF–BG.

66 NHTSA Workbook sheet "Derivation of 0.4%."

rather than calculate separate deployment rates. However, it is my understanding that throughout the relevant period, PABs were designed to deploy only when the right-front seat was occupied (by a passenger of sufficient weight),[67] and NHTSA crash data indicates that the right-front seats of crash vehicles are occupied in approximately 19.8% of cases.[68,69] This is yet another flaw in NHTSA's perfunctory analysis in this matter. Correcting the Glassbrenner calculation for this low rate of occupancy of right-front seats reduces the projected number of expected future ruptures from 2.84 to 2.09 (see Table 6).

E. Correction of NHTSA's failure to account for the reduction in average vehicle-miles traveled ("VMT") as vehicles age

16. It is well known that older vehicles are driven less than newer vehicles on average. This phenomenon is quantified in the Miles Driven assumptions of NHTSA's 2016 CAFE Model[70,71] (see Table 4 below and Attachment B).

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[67] 49 CFR § 571.208.

[68] NHTSA, "Fatality and Injury Reporting System Tool (FIRST)," (https://cdan.dot.gov/query). Selected: Vehicle Body Type: Passenger Car ; or Light Truck - Pickup ; or Light Truck - Utility ; or Light Truck - Van ; or Light Truck - Other; Person Type: Driver ; or Occupant for 2007-2021.

[69] 19.8% = (181,937+10,846,272+18,645,421 right-front occupants) / (582,181+43,729,207+105,214,508 drivers) in reported crashes.

[70] NHTSA, "CAFE Compliance and Effects Modeling System," workbook "parameters_2016-05-12.xlsx" sheet "Vehicle Age Data" in "Central Input.7x" (https://www.nhtsa.gov/file-downloads?p=nhtsa/downloads/CAFE/2016-Draft-TAR/Central-Analysis/) on (https://www.nhtsa.gov/corporate-average-fuel-economy/cafe-compliance-and-effects-modeling-system, last accessed November 20, 2023).

[71] Note that NHTSA's calculations rely already on a different part of the same 2016 CAFE Model (Survival Rates; Initial Decision fn. 16), but do not incorporate the Miles Driven schedule from that model (reproduced in Attachment B).

Table 4
NHTSA Miles-Driven Assumptions from 2016 CAFE Model (Excerpt)[72]

Vehicle Age	Miles Driven			
	Cars	Vans	SUVs	Pickups
1	15,861	16,035	16,035	17,436
. . .				
10	7,493	9,409	9,409	7,373
. . .				
20	4,114	3,923	3,923	5,214

For example, according to this NHTSA model, the average annual vehicle-miles traveled ("VMT") for a one-year-old car is 15,861, for a 10-year-old car 7,493, and for a 20-year-old car 4,114. These NHTSA estimates also differ among categories of vehicles. The corresponding year-one VMT estimates for light trucks (i.e., vans, SUVs, and pickups) are 16,035 for vans and SUVs and 17,436 for pickups. In year 20 vans and SUVs are driven *less* than cars, but pickups are driven *more* than cars.

17. It is reasonable to assume, all else being equal, that a vehicle's annual risk of an airbag-deployment triggering impact and, therefore, of an airbag deployment, will decline approximately proportionately to its declining annual mileage. However, neither Dr. Glassbrenner's estimate of 2.6 million past deployments nor her projection of an expected three future ruptures account for this vehicle-age effect on VMT.

18. Using the VMT schedule from the 2016 CAFE Model, I calculated the projected total VMT for each subject vehicle model and model year in each relevant calendar year throughout the projected service life of the entire subject fleet. Based on this determination of VMT for the fleet, the overall average annual VMT for subject DAB vehicles through September 2023 was 11,171, compared to only 4,800 from October 2023 through 2056. For the subject PAB vehicles, the overall average

[72] See Attachment B.

annual VMT through September 2023 was 13,712, compared to only 6,384 from October 2023 through 2056 (see Table 5).[73] These gross VMT disparities reflect the self-evident fact that the subject vehicles were younger through September 2023 than they will be from October 2023 through 2056, thus accruing a higher annual average VMT through September 2023 than they will accrue from October 2023 through 2056. It is reasonable to assume that the VMT disparities will be reflected in corresponding disparities in rates of airbag deployments.

19. Dr. Glassbrenner's calculation of a 0.4% deployment rate appears to have been based on the entire 2015 fleet of light trucks, regardless of age.[74] Accordingly, Dr. Glassbrenner's 0.4% rate reflects the specific cross-section of vehicle ages in the 2015 light-truck fleet and, therefore, the specific cross section of annual VMT in that fleet. Using TSF 2020 information for calendar year 2015, the average annual VMT for light trucks in 2015 was 10,677,[75] well below the average annual VMT of 11,406 for DAB and 14,726 for PAB in light trucks (see Table 5). Thus, Dr. Glassbrenner's application of a uniform 0.4% deployment rate to the subject fleet is a serious flaw in NHTSA's calculations in support of its Initial Decision, which results in a material underestimate of past deployments of the subject inflators, a material overestimate of the rate of ruptures, and a gross overestimate of the expected number of future ruptures during the remaining service life of the subject fleet.

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[73] The differences between the average annual VMT for DAB and PAB vehicles reflects the fact that the subject inflators in DAB are generally in older vehicles than are those in PAB. NHTSA Workbook sheets "DAB – CBI" and "PAB – CBI."

[74] NHTSA Workbook sheet "Derivation of 0.4%." Neither this worksheet nor Dr. Glassbrenner's remarks at the Public Meeting contain any indication that she applied any limitation on the model years of the light trucks from the 2015 fleet included in this calculation.

[75] 10,677 = 2,509 LT involvement rate per 100,000 registered vehicle years / 235 involvement rate per 100 million VMT × 1,000) from TSF 2020 Table 3 for LT in 2015.

Table 5
Alternative Driver and Passenger Airbag Deployment Projections Based on Vehicle Years and Vehicle Miles Travelled (VMT)

Metric	Past (through 9/2023)	Future (10/2023 – 2056)
Driver Airbags (DAB)		
Inflator Years	551,534,849	141,970,833
	80%	20%
Estimated Deployments Based on Inflator Years	2,206,139	567,883
	80%	20%
Inflator VMT (millions)	6,158,846	687,284
	90%	10%
Estimated Deployments Based on Inflator VMT	2,828,816	320,192
	90%	10%
Average Annual VMT	*11,167*	*4,841*
- Light Trucks	*11,368*	*5,041*
- Cars	*10,790*	*4,538*
Passenger Airbags (PAB)		
Inflator Years	91,252,195	110,505,338
	45%	55%
Estimated Deployments Based on Inflator Years	365,009	442,021
	45%	55%
VMT (millions)	1,252,450	701,215
	64%	36%
Estimated Deployments Based on Inflator VMT	639,245	345,801
	65%	35%
Average Annual VMT	*13,725*	*6,346*
- Light Trucks	*14,721*	*7,037*
- Cars	*10,790*	*5,823*

20. I have corrected Dr. Glassbrenner's flawed calculation as follows to account for the vehicle-age effect on VMT:

a. For each subject make, model, model year, and calendar year, I multiplied the Glassbrenner estimate of the number of subject vehicles, as corrected per §§ V.A–D above, by the corresponding annual average VMT estimate from the CAFE Model VMT schedule for each vehicle type (car, van, SUV and pickup).

b. For cars and light trucks separately, I calculated the estimated total VMT through September 2023.

c. Using back-calculated VMT for 2015 based on Table 3 of TSF 2020,[76] I translated the Glassbrenner-style deployment rates per 100 vehicle years of 0.425 for light trucks[77] and 0.619 for cars[78] to deployment rates per million VMT of 0.40 for light trucks[79] and 0.58 for cars.[80]

21. Cumulatively, these adjustments to Dr. Glassbrenner's calculation yield a total of 3.0 instead of 2.6 million past deployments through September 2023, and a rupture rate of 0.00024%. Extending this calculation to the period October 2023 – 2056 yields a projected 393,913 future deployments and an expected 0.93 future ruptures (see Table 6).

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[76] See ¶ 13.a above.
[77] NHTSA Workbook sheet "Derivation of 0.4%" at cell B6.
[78] See ¶ 13.c above.
[79] 0.40 = 0.00425 × 235 involvement rate per 100 million VMT / 2,509 involvement rate per 100,000 registered vehicle years × 1,000 from TSF 2020 Table 3 for LT in 2015.
[80] 0.58 = 0.00619 × 312 involvement rate per 100 million VMT / 3,331 involvement rate per 100,000 registered vehicle years × 1,000 from TSF 2020 Table 3 for cars in 2015.

Table 6
Cumulative Corrections to NHTSA Projection
of Expected Future Ruptures[81]

Nature of Correction	Estimated Deployments		Expected Ruptures
	Past (through 9/2023)	Future (10/2023 – 2056)	Future (10/2023 – 2056)
NHTSA/Glassbrenner Model	2,571,148	1,009,905	3.03
… undo rounding of rupture and deployment rates	2,531,848	1,073,024	2.75
… and use vehicle-class-specific survival rates	2,723,393	1,098,876	2.82
… and use vehicle-class-specific deployment rates	3,216,967	1,305,358	2.84
… and use PAB-specific deployment rates	2,813,144	841,268	2.09
… and account for vehicle-age effect on annual VMT	2,951,000	393,913	0.93
… and assume 3 past ruptures instead of 7	"	"	0.40

VI. The effect on NHTSA's projection of expected future ruptures of the subject inflators—as corrected—of assuming an historical incidence of three rather than seven past inflator ruptures

22. The Initial Decision states that the "agency is currently aware of seven confirmed subject inflator ruptures in the United States."[82] You have asked me to determine the sensitivity of the projection of the expected number of future ruptures by assuming, alternatively, that there have been *three* (rather than seven) ruptures properly within the scope of this matter.[83] On that assumption, the expected number of future rupture events would be 0.40 (see Table 6).

[81] My workbook that implements these calculations can be made available to NHTSA upon request to GM.
[82] Initial Decision at 6.
[83] I understand that this alternative assumption of *three* ruptures arises from currently available information concerning the reported rupture events in a 2011 Chevrolet Malibu, a 2002 Chrysler Town and Country, and two 2015 Chevrolet Traverse vehicles.

VII. Other comments on NHTSA's analysis

23. At the Public Meeting, Dr. Glassbrenner stated as follows (italics added):[84]

> We can never predict with certainty what will happen in the future, but the data helps us better understand likely outcomes. Given the remaining population of these inflators in vehicles, based on available information, it is reasonable to assume that *ruptures will continue to occur*.

Although Dr. Glassbrenner recognizes that "[w]e can never predict with certainty what will happen in the future," she states her conclusion without any measure of uncertainty or margin of error, and her statement could easily be misunderstood as "predict[ing] with certainty" that a *non-zero* (though unpredictable) number of inflator ruptures *will* occur in the future under the status quo. In fact, a non-zero *expected* number of future ruptures does *not* imply with certainty that a non-zero number of ruptures *will* occur in the future. Instead, from a statistical perspective, Dr. Glassbrenner's summary statement should be interpreted as follows:[85] it is reasonable to model the occurrence of ruptures in the future in terms of a probabilistic event-generating process with a non-zero *expected* number of events, which *may* yield a non-zero actual number of rupture events in the future but also may—with non-zero probability—yield *zero* rupture events in the future.[86] Put differently, Dr. Glassbrenner's statement cannot validly be interpreted as asserting as an established fact that at least one rupture will certainly occur in the future under the status quo; nor *could* she validly assert that her analysis supports that claim.

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[84] Public Meeting Transcription at 59:1–2.

[85] From a statistical perspective, there is little room for dispute about the more nuanced paraphrase I propose here; I doubt that Dr. Glassbrenner would disagree.

[86] For example, under the well-known and commonly used Poisson probability model, an event-generating process with an expected value of exactly 0.93 occurrences (see the next-to-last row of Table 6) has a 39.5% chance of producing *zero* occurrences; an event-generating process with an expected value of exactly 0.40 occurrences (see the last row of Table 6) has a 67.0% chance of producing *zero* occurrences; that is, it is *twice as likely as not* that the observed number of events will be *zero*.

24. In the event of a recall, it is unrealistic to suppose that either the suppliers of the replacement inflators, or the vehicle manufacturers, or NHTSA could guarantee with *certainty* that the replacement inflators—and the workmanship required to install them—would be free of *any* defect or malfunction capable of causing harm.[87] Thus, a valid assessment of the net benefit of a recall should compare the expected number of rupture events (such as 0.93 or 0.40) under the status quo not to an alternative of exactly *zero* harmful events but, rather, to the prospect of an unknown number of harmful events *hoped* to be (close to) zero.

25. While this observation does not per se imply any specific, non-zero reference level to which to compare 0.93 or 0.40, the long-term defect rate of a "Six Sigma" business process[88]—no more than 3.4 defects per million "opportunities" at risk of a defect[89]—is illustrative of what has been described as "virtually error-free," "near perfect" performance within the realm of what is achievable in practical reality.[90]

26. So, for example, if the per-deployment malfunction rate of the replacement inflators achieved the Six Sigma defect rate ceiling of 3.4 defects per million opportunities, the implied maximum expected number of malfunctions among

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[87] For example, the February 2023 recall 23V-125 was due to "replacement frontal passenger airbag inflator may have been installed in the incorrect orientation during a previously executed recall repair," (https://static.nhtsa.gov/odi/rcl/2023/RCLRPT-23V125-5488.PDF).
For example, Honda had at least three recalls (17V-545, 18V-268, and 19V-378) related to potential problems in "vehicles that had passenger frontal airbag inflator recall repairs completed at certain dealerships," (https://static.nhtsa.gov/odi/rcl/2017/RCLRPT-17V545-2272.pdf, https://static.nhtsa.gov/odi/rcl/2018/RCLRPT-18V268-1610.PDF, and https://static.nhtsa.gov/odi/rcl/2019/RCLRPT-19V378-7804.PDF).

[88] The American Society for Quality ("ASQ") defines "Six Sigma" as "a method that provides organizations tools to improve the capability of their business processes. … 'Six Sigma quality' is a term generally used to indicate a process is well controlled (within process limits ±3s from the center line in a control chart, and requirements/tolerance limits ±6s from the center line)." (https://asq.org/quality-resources/six-sigma, last accessed December 4, 2023.)

[89] ASQ notes that "Six Sigma quality performance means 3.4 defects per million opportunities." (https://asq.org/quality-resources/six-sigma, last accessed December 4, 2023.)

[90] Pyzdek, Thomas, and Paul Keller. 2018. *The Six Sigma Handbook*. 5th Edition. McGraw-Hill at 3 and Incident Prevention, "How Six Sigma Can Improve Your Safety Performance," October 11, 2012, (https://incident-prevention.com/blog/how-six-sigma-can-improve-your-safety-performance/, last accessed December 1, 2023).

393,913 future deployments[91] would be 1.34,[92] that is, *greater* than the expected numbers of future rupture events under the status quo as described above (i.e., 0.93 or 0.40).[93]

I am, of course, available to answer any questions you or your colleagues may have about any aspect of my comments above.

Sincerely,

M.L. Marais

M. Laurentius Marais, PhD

[91] See ¶ 21 above.
[92] 1.34 = 393,913 × 3.4 / 1,000,000.
[93] For the NHTSA/Glassbrenner estimate of 2,571,148 deployments through September 2023, the Six-Sigma expected number of malfunctions would be 8.7, *greater* than the 7 ruptures listed in the Initial Decision.

Attachment A: Documents Reviewed

Documents Reviewed

1. Department of Transportation, National Highway Traffic Safety Administration "Initial Decision That Certain Frontal Driver and Passenger Air Bag Inflators Manufactured by ARC Automotive Inc. and Delphi Automotive Systems LLC Contain a Safety Defect; and Scheduling of a Public Meeting," ((https://www.nhtsa.gov/sites/nhtsa.gov/files/2023-09/ARC-Initial%20Decision-9-5-23-signed.pdf)

2. Public Meeting: Initial Decision That Certain ARC and Delphi Air Bag Inflators Contain a Safety Defect, October 5, 2023 (https://www.nhtsa.gov/events/public-meeting-arc-delphi-air-bag-inflators) and Public Meeting Transcription (https://www.regulations.gov/document/NHTSA-2023-0038-0003).

3. NHTSA, "CAFE Compliance and Effects Modeling System," workbook "parameters_2016-05-12.xlsx" sheet "Vehicle Age Data" in "Central Input.7x" (https://www.nhtsa.gov/file-downloads?p=nhtsa/downloads/CAFE/2016-Draft-TAR/Central-Analysis/) on (https://www.nhtsa.gov/corporate-average-fuel-economy/cafe-compliance-and-effects-modeling-system, last accessed November 20, 2023)

4. NHTSA "Traffic Safety Facts, 2015 and 2020," (https://crashstats.nhtsa.dot.gov/#!/DocumentTypeList/12)

5. National Highway Traffic Safety Administration, "Defect Information Report, TK Holdings Inc. PSDI, PSDI-4, and PSDI-4K Driver Air Bag Inflators" May 18, 2015 (https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/recall_15e-040.pdf)

6. Undated letter from Stephen A. Ridella, Ph.D. at NHTSA to Mr. Steven Gold at ARC Automotive, Inc.

7. Letter from Mr. Steven Gold at ARC Automotive, Inc. to Stephen A. Ridella, Ph.D. at NHTSA, May 11, 2023

8. Porta, Miquel S. 2008. *A Dictionary of Epidemiology*. Oxford University Press

9. Recall 23V-125, https://static.nhtsa.gov/odi/rcl/2023/RCLRPT-23V125-5488.PDF).

10. Recall 17V-545, https://static.nhtsa.gov/odi/rcl/2017/RCLRPT-17V545-2272.pdf

11. Recall 18V-268, https://static.nhtsa.gov/odi/rcl/2018/RCLRPT-18V268-1610.PDF

12. Recall 19V-378, https://static.nhtsa.gov/odi/rcl/2019/RCLRPT-19V378-7804.PDF

13. American Society for Quality, "What is Six Sigma?" (https://asq.org/quality-resources/six-sigma, last accessed December 4, 2023

14. Pyzdek, Thomas, and Paul Keller. 2018. *The Six Sigma Handbook*. 5th Edition. McGraw-Hill

15. Incident Prevention, "How Six Sigma Can Improve Your Safety Performance," October 11, 2012, (https://incident-prevention.com/blog/how-six-sigma-can-improve-your-safety-performance/, last accessed December 1, 2023).

Attachment B: Attrition Models from NHTSA's 2016 CAFE Model

Attrition Models from NHTSA's 2016 CAFE Model[94] and Extensions[95]

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	**Model Parameters Varying with Vehicle Age**															
2																
3		Survival Rates							Miles Driven							
4																
5	Vehicle Age	Cars	Vans	SUVs	Pickups	Class 1/2a Average	ZEVs	Class 2b/3	Cars	Vans	SUVs	Pickups	Class 1/2a Average	ZEVs	Class 2b/3	Car-LT Average Survival Rate
6	0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	15,861	16,035	16,035	17,436	16,502	16,502	21,654	1.0000
7	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	15,861	16,035	16,035	17,436	16,502	16,502	21,654	1.0000
8	2	0.9878	0.9776	0.9776	0.9776	0.9776	0.9776	0.9941	13,684	14,337	14,337	15,810	14,828	14,828	23,307	0.9827
9	3	0.9766	0.9630	0.9630	0.9630	0.9630	0.9630	0.9809	13,479	14,114	14,114	15,428	14,552	14,552	21,063	0.9698
10	4	0.9614	0.9428	0.9428	0.9428	0.9428	0.9428	0.9685	13,218	14,071	14,071	14,693	14,279	14,279	18,402	0.9521
11	5	0.9450	0.9311	0.9311	0.9311	0.9311	0.9311	0.9557	12,977	13,832	13,832	13,686	13,783	13,783	15,486	0.9381
12	6	0.9298	0.9152	0.9152	0.9152	0.9152	0.9152	0.9353	12,521	13,315	13,315	12,486	13,039	13,039	12,477	0.9225
13	7	0.9113	0.8933	0.8933	0.8933	0.8933	0.8933	0.9137	11,465	12,568	12,568	11,174	12,103	12,103	9,538	0.9023
14	8	0.8912	0.8700	0.8700	0.8700	0.8700	0.8700	0.8867	10,203	11,636	11,636	9,831	11,034	11,034	9,411	0.8806
15	9	0.8689	0.8411	0.8411	0.8411	0.8411	0.8411	0.8593	8,842	10,568	10,568	8,537	9,891	9,891	7,991	0.8550
16	10	0.8397	0.7963	0.7963	0.7963	0.7963	0.7963	0.8257	7,493	9,409	9,409	7,373	8,730	8,730	6,912	0.8180
17	11	0.7999	0.7423	0.7423	0.7423	0.7423	0.7423	0.7931	6,264	8,208	8,208	6,418	7,612	7,612	6,131	0.7711
18	12	0.7556	0.6916	0.6916	0.6916	0.6916	0.6916	0.7508	5,266	7,011	7,011	6,390	6,804	6,804	5,616	0.7236
19	13	0.7055	0.6410	0.6410	0.6410	0.6410	0.6410	0.7064	4,906	5,865	5,865	6,064	5,931	5,931	5,339	0.6732
20	14	0.6527	0.5833	0.5833	0.5833	0.5833	0.5833	0.6589	4,644	4,817	4,817	5,906	5,180	5,180	5,375	0.6180
21	15	0.5946	0.5350	0.5350	0.5350	0.5350	0.5350	0.6083	4,604	4,540	4,540	5,857	4,979	4,979	5,192	0.5648
22	16	0.5311	0.4861	0.4861	0.4861	0.4861	0.4861	0.5525	4,497	4,404	4,404	5,708	4,839	4,839	4,864	0.5086
23	17	0.4585	0.4422	0.4422	0.4422	0.4422	0.4422	0.5016	4,394	4,274	4,274	5,568	4,706	4,706	4,854	0.4503
24	18	0.3832	0.3976	0.3976	0.3976	0.3976	0.3976	0.4479	4,296	4,151	4,151	5,440	4,580	4,580	4,591	0.3904
25	19	0.3077	0.3520	0.3520	0.3520	0.3520	0.3520	0.3972	4,203	4,034	4,034	5,321	4,463	4,463	4,371	0.3298
26	20	0.2414	0.3092	0.3092	0.3092	0.3092	0.3092	0.3512	4,114	3,923	3,923	5,214	4,353	4,353	4,182	0.2753
27	21	0.1833	0.2666	0.2666	0.2666	0.2666	0.2666	0.3098	4,030	3,819	3,819	5,116	4,252	4,252	4,031	0.2250
28	22	0.1388	0.2278	0.2278	0.2278	0.2278	0.2278	0.2716	3,951	3,721	3,721	5,030	4,158	4,158	3,819	0.1833
29	23	0.1066	0.2019	0.2019	0.2019	0.2019	0.2019	0.2394	3,877	3,630	3,630	4,954	4,071	4,071	3,488	0.1542
30	24	0.0820	0.1750	0.1750	0.1750	0.1750	0.1750	0.2112	3,807	3,546	3,546	4,888	3,993	3,993	3,159	0.1285
31	25	0.0629	0.1584	0.1584	0.1584	0.1584	0.1584	0.1916	3,741	3,467	3,467	4,833	3,922	3,922	3,033	0.1107
32	26	0.0514	0.1452	0.1452	0.1452	0.1452	0.1452	0.1711	3,681	3,396	3,396	4,788	3,860	3,860	2,910	0.0983
33	27	0.0420	0.1390	0.1390	0.1390	0.1390	0.1390	0.1543	3,625	3,330	3,330	4,754	3,805	3,805	2,815	0.0905
34	28	0.0337	0.1250	0.1250	0.1250	0.1250	0.1250	0.1389	3,574	3,271	3,271	4,730	3,758	3,758	2,718	0.0793
35	29	0.0281	0.1112	0.1112	0.1112	0.1112	0.1112	0.1266	3,528	3,219	3,219	4,717	3,718	3,718	2,631	0.0697
36	30	0.0235	0.1028	0.1028	0.1028	0.1028	0.1028	0.1153	3,486	3,173	3,173	4,715	3,687	3,687	2,631	0.0631
37	31	0.0000	0.0933	0.0933	0.0933	0.0933	0.0933	0.1052	3,449	3,134	3,134	4,712	3,660	3,660	2,631	0.0466
38	32	0.0000	0.0835	0.0835	0.0835	0.0835	0.0835	0.0969	3,449	3,134	3,134	4,712	3,660	3,660	2,631	0.0417
39	33	0.0000	0.0731	0.0731	0.0731	0.0731	0.0731	0.0856	3,449	3,134	3,134	4,712	3,660	3,660	2,631	0.0365
40	34	0.0000	0.0619	0.0619	0.0619	0.0619	0.0619	0.0635	3,449	3,134	3,134	4,712	3,660	3,660	2,631	0.0310
41	35	0.0000	0.0502	0.0502	0.0502	0.0502	0.0502	0.0436	3,449	3,134	3,134	4,712	3,660	3,660	2,631	0.0251
42	36	0.0000	0.0384	0.0384	0.0384	0.0384	0.0384	0.0271	3,449	3,134	3,134	4,712	3,660	3,660	2,631	0.0192
43	37	0.0000	0.0273	0.0273	0.0273	0.0273	0.0273	0.0147	3,449	3,134	3,134	4,712	3,660	3,660	2,631	0.0136
44	38	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3,449	3,134	3,134	4,712	3,660	3,660	2,631	0.0000
45	39	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3,449	3,134	3,134	4,712	3,660	3,660	2,631	0.0000
46	40	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3,449	3,134	3,134	4,712	3,660	3,660	2,631	0.0000
47																
48	Notes:															
49	1) P = average(B,F)															

[94] NHTSA, "CAFE Compliance and Effects Modeling System," workbook "parameters_2016-05-12.xlsx" sheet "Vehicle Age Data" in "Central Input.7x" (https://www.nhtsa.gov/file-downloads?p=nhtsa/downloads/CAFE/2016-Draft-TAR/Central-Analysis/) on (https://www.nhtsa.gov/corporate-average-fuel-economy/cafe-compliance-and-effects-modeling-system, last accessed November 20, 2023).

[95] Highlighted Age 0 row was added to conform with Dr. Glassbrenner's assumption of no attrition for vehicles age 0 as well as age 1 (see fn. 40 above).