TOYOTA

TOYOTA MOTOR NORTH AMERICA, INC.
6565 Headquarters Drive | Plano, TX 75024

December 18, 2023

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

RE: 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 No. NHTSA-2023-0038

Dear Acting Administrator Carlson:

Toyota Motor North America, Inc., and Toyota Motor Corporation (collectively, "Toyota"), provide these comments in response to the September 8, 2023, Notice of Initial Decision that the National Highway Traffic Safety Administration (NHTSA) published in the *Federal Register* (88 *Fed. Reg.* 62140) stating that certain frontal driver and passenger air bag inflators manufactured by ARC Automotive Inc. and Delphi Automotive Systems LLC contain a safety defect.

As the Agency is aware from our ongoing interactions, safety is a top priority at Toyota. Toyota employs a large and experienced field quality organization to identify and address customer concerns that may arise regarding the use of our products. This includes ongoing monitoring for potential air bag issues, such as inflator ruptures, and taking the appropriate actions for our customers, including the filing of a safety recall where a safety defect has been identified. Further, Toyota reports potential air bag inflator ruptures as required under NHTSA's Standing General Order 2015-01A. Toyota has not reported any air bag inflator rupture about the involved inflators for over 8 years, as it has not received an allegation of one.

Toyota agrees with the Agency that air bag inflator ruptures have the potential to lead to severe safety consequences. As evidenced in Toyota's efforts over many years working collaboratively with the Agency and with other manufacturers in the Takata matter, Toyota takes air bag inflator ruptures seriously where such a safety defect has been identified and has expended extraordinary effort and resources over many years to help remove those inflators from Toyota owners' vehicles.

However, as will be further explained in these comments, based on Toyota's review of its records and the other available information within the time allotted by the Agency, Toyota has found no information indicating that an inflator rupture safety defect exists in the involved ARC inflators that have been equipped in Toyota vehicles.

Toyota did not have Insight into NHTSA's Defect Theories or Analyses for Most of the Investigation.

While the Agency notes that its investigation has been ongoing since 2015, the involvement of different manufacturers was not consistent across the 8-year investigation. Toyota, in particular, was not involved at the outset of the investigation. The original Information Requests under PE15-027, opened in 2015, involved driver inflators and were not sent to Toyota, whose involved vehicles contain only front passenger inflators produced by ARC.

Subsequently, when front passenger inflators were added to the investigation, Toyota was only involved sporadically to the extent that it was sent certain Information Requests that were also sent to other involved manufacturers. Toyota received Information Requests from NHTSA in 2016, 2021, and 2022 after the Agency upgraded PE15-027 to EA16-003 in 2016. In these Information Requests, Toyota was asked to provide:

- in 2016—production data for vehicles equipped with the involved front passenger inflators, results of field data searches for inflator ruptures (of which there were none[1]), and information on any design and quality control testing that was conducted;

- in 2021[2]—an update on the production data for vehicles equipped with front passenger inflators, design information on how the inflators are installed in Toyota vehicles, information on any development tests conducted, high/low estimates on how many successful deployments have occurred in involved Toyota vehicles in the field, and an assessment of the probability that future field deployments will be successful; and

- in 2022—an update to NHTSA's previous requests for estimates on past and future airbag deployments in involved Toyota vehicles in the field.

As is reasonable for Information Requests associated with investigations, available information and data flowed from Toyota to the Agency. However, little information was provided back to enable Toyota to engage in further investigation. Toyota did not have access to the Agency's thinking on potential defect theories or whether there were aspects of the inflator design or the manufacturing process that could be further evaluated.

In fact, Toyota later learned that, beginning in 2017, NHTSA formed a collaboration group with ARC and certain other vehicle manufacturers to investigate potential root causes for the few known ruptures in non-Toyota vehicles. However, Toyota was not invited to participate in this activity. Further, Toyota also later learned that there may have been informal meetings that NHTSA held with other manufacturers to discuss next steps to further investigate the limited number of ruptures, to which Toyota was also not invited.

The reason for this limited involvement is not known. While Toyota answered NHTSA's Information Requests that were sent to all involved manufacturers, little actionable investigative data was provided back to Toyota until 2023. Toyota did, however, inquire with its air bag

[1] *See* Toyota's December 16, 2016 response to an Information Request issued in connection with EA16-003.
[2] It appears that other involved vehicle manufacturers received this set of questions in an Information Request in or around September 2020. Toyota later received this request approximately 8 months later on May 27, 2021.

module supplier, for example, when it received Information Requests from the Agency. Toyota asked questions, such as whether there were any component test anomalies in modules destined for Toyota vehicles, and learned that there were no unusual events.

With no available field data,[3] and no reported ruptures in quality and development testing,[4] Toyota had very limited information about what exactly was under investigation before NHTSA issued its Recall Request Letter to ARC in April of this year and subsequently provided a Confidential File under an August 24, 2023 Protective Agreement.

The Confidential File Does Not Provide Enough Information to Identify a Safety Defect.

After a Protective Agreement was signed and executed by the relevant parties on August 24, 2023, NHTSA provided a large Confidential File, totaling nearly 650 gigabytes of data in over 266,000 files, to the involved manufacturers, including Toyota. Since that time, Toyota has been engaging in a diligent review of the available information in the Confidential File. However, given the time available between August 24, 2023, and today, Toyota's review of the File could not be an exhaustive one.[5]

While the Confidential File is voluminous (as is to be expected for an 8-year investigation), Toyota notes that the information contained within the File is generally the confidential versions of each manufacturer's response to the Information Requests that NHTSA sent over the years. In other words, the contents of the Confidential File are limited by the questions and data that the Agency sought to collect from the involved manufacturers.

What generally is not present is the Agency's analyses of the raw data that it received from the various manufactures in response to these requests. In addition, relevant analyses from the collaboration group that NHTSA formed with certain involved manufacturers also appears to be missing. As a result, it would not be accurate to understand that the Confidential File that NHTSA provided contains all of the investigative file and information that form the basis of NHTSA's Initial Decision. Toyota has not been able to locate, for example, any NHTSA analyses of comparative rupture rates for competitor inflators,[6] or any analysis of any potentially relevant design/manufacturing differences among the inflators within the 52 million population.

With essentially access to only the underlying data responding to the questions NHTSA posed, it has been exceedingly difficult for Toyota to attempt to recreate, in less than four months, any analyses that the Agency may have done over the course of its 8-year investigation. However, based on the review it was able to conduct, Toyota has found no information indicating that a safety defect exists due to inflator rupture within its involved vehicles.

At a high level, the Confidential File reveals that, while the ARC inflators in question might be of certain "types" that share general characteristics (i.e., being "hybrid, toroidal inflators"), it is

[3] *See* footnote 16, below, describing Toyota's latest field data search.
[4] *See* further discussion, below, for more details on Toyota's review of applicable quality and development testing.
[5] Toyota's comments regarding the Confidential File are based on this preliminary review of information submitted to NHTSA by multiple manufacturers over the course of NHTSA's investigation. The information from the Confidential File is presumed to be accurate.
[6] NHTSA would likely have this information available because NHTSA has been collecting inflator rupture reports from the entire industry using standing general orders since 2015.

not accurate to describe these inflators as all of one or two identical designs that were subsequently copied 52 million times.

As the Agency is aware, air bag inflators are part of an overall occupant protection system that each vehicle manufacturer designs to achieve high degrees of protection for vehicle occupants in the event of a crash. Air bag inflators, in and of themselves, do not perform any safety purpose. Instead, their purpose is to inflate an air bag of a specific size and shape, within a certain amount of time, so as to—in conjunction with other important safety features, such as seat belts—create a system to limit the forces that would be imparted on the vehicle occupant in a crash. As evidenced by the relevant test procedures in FMVSS No. 208,[7] and the Agency's NCAP tests, safety is measured in terms of overall vehicle performance in protecting the occupant and not in terms of what the air bag inflator achieves.

In short, air bag inflators—even in situations where they might have a specific model designation from the inflator supplier—cannot be considered identical, as each implementation of the inflator requires it to provide different performance in order to inflate the specific air bag, within the appropriate time, as necessary for that vehicle and its occupant protection system. To appropriately provide the specified inflation for a particular vehicle, it is necessary for inflators for different systems to have different overall dimensions, different exit orifice sizes, different gas pressure at different points of the inflation process, among other characteristics.[8]

Further, information from the Confidential File generally reveals that the involved air bag inflators were produced for decades under varying production conditions. Not only were four different ARC manufacturing facilities producing the involved inflators at different points in time since the year 2000, the Agency also includes in the Initial Decision a separate company (Delphi) that produced the inflators at their facilities in the early 2000s.[9] Speaking only about the four ARC manufacturing facilities, the production conditions at those facilities also varied based on different manufacturing equipment, with different configurations, and different processes over time.[10]

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[7] *See generally*, 49 CFR Part 571.208.

[8] Examples of these design differences can be found in greater detail in the Joint Comments of Safety Professionals from Autoliv, FCA US, Ford, General Motors, Hyundai, Kia, Maserati NA, Tesla, Toyota, and Volkswagen Group of America Relating to NHTSA's 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 "Joint Comments"), where a collective effort was undertaken to outline some of the design differences that would be relevant to a robust analysis of a potential defect in 52 million inflators. One example is different exit orifice sizes. NHTSA's Initial Decision indicates that "[u]pon normal deployment of an air bag in a crash, any debris, if larger than the 5-millimeter diameter of the exit orifice of the inflator center support, can become lodged in that exit orifice and block the air flow required to fill the air bag cushion." However, the available information indicates that orifice sizes range from at least 4.3 mm to 5.8 mm. It is possible that significant differences in orifice sizes can have an impact on whether the alleged condition could occur. The surface area of a given piece of debris would need to be significantly larger to block a 5.8 mm diameter hole, versus a 4.3 mm diameter hole. Inflators in the involved Toyota models have a 5.8mm orifice.

[9] Toyota did not use involved inflators manufactured by Delphi.

[10] Examples of these production differences are outlined in more detail in the Joint Comments, where a collective effort was undertaken to identify some of the production differences that would be relevant to a robust analysis of a potential defect in 52 million inflators.

Additionally, in our preliminary review of available information on passenger inflators within the Confidential File, we observed that incidents occurring during lot acceptance testing (LAT)[11] (which all occurred in components destined for other manufacturers' vehicles) show that those events were generally concentrated in certain production facilities, on certain manufacturing lines and equipment, during certain production periods.

As one example, a 2019 summary file[12] prepared by the Agency appears to provide a list of LAT events along with suspected root causes such as exit orifice blockage or a specific weld operation in production. Events with exit orifice blockage and a specific weld operation suspected root causes appear to be concentrated on certain inflators produced at facilities in Mexico and Tennessee and further concentrated on specific manufacturing lines. There are no such events attributed to the facility in China, and a mid-2019 presentation prepared by the Agency even notes a lack of evidence of an anomaly for the production from China.[13] Toyota has not found any subsequent documentation or analyses to show why these conclusions from that time are no longer valid.[14]

Without further information about the analyses that the Agency may have conducted, it is unclear how the data in the Confidential File can identify a safety defect in the 52 million air bag inflators of disparate designs, produced under these disparate conditions. Toyota was not able to locate the Agency's analyses addressing these differences. The analyses we found do not show why the differences are immaterial and not in conflict with the Agency's conclusions in the Initial Decision.

The Information Available to Toyota does not Support a Conclusion that a Safety Defect Exists in the Involved Inflators Equipped in Toyota Vehicles.

In support of this investigation, Toyota also conducted diligent searches of its field data and made inquiries with its suppliers in order to identify whether any field or testing rupture incident occurred on involved Toyota vehicles or involved parts that were destined for Toyota vehicles. As previously mentioned, Toyota conducted a search in 2016 in response to an Information Request and identified no relevant cases.[15] Recently, Toyota refreshed this search of the relevant

[11] In addition to reporting field incidents, as NHTSA describes in its Initial Decision, ARC was also required to report to the Agency any inflator rupture occurring during other tests such as lot acceptance testing. There have been no ruptures in such testing for inflator lots that were used in Toyota vehicles.

[12] *See* file "_Technical Meetings\20190617 Meeting\Microsoft_Excel_Worksheet.xlsx" in the NHTSA Confidential File.

[13] *See* file "_Technical Meetings\20190617 Meeting\PAB – 20190617 – Final.pptx" in the NHTSA Confidential File.

[14] The Agency's materials from this time also indicate that production lots with LAT incidents were quarantined, investigated, and/or scrapped, presumably consistent with ARC practices in the event of a LAT failure. *See* file "\ARC - IR Letter Responses\2020 IR Letter Response\CONFIDENTIAL\CONF BUS INFO - ARC Automotive Response to 8-18-2020 IR in EA 16-003 + certs.pdf." In addition, it is also unclear whether the 52 million involved inflators covered by NHTSA's Initial Decision include inflators that have already been recalled by other manufacturers due to field or LAT incidents.

[15] For details of that search, *see* Toyota's December 16, 2016 response to an Information Request issued in connection with EA16-003.

records to ensure a more up-to-date view of the data. Based on Toyota's latest search,[16] Toyota has identified no cases that allege that an involved Toyota vehicle has experienced an air bag inflator rupture.

To get a more detailed picture of the testing that was conducted on involved parts that were destined for Toyota vehicles, Toyota also identified relevant testing that it conducted during vehicle development, and it also inquired of its suppliers. Toyota conducted 47 deployments of air bags with the involved inflators between June 2015 and June 2018 as part of testing in support of compliance with FMVSS No. 208 and other evaluations such as for the purpose of assessing performance for NCAP. Toyoda Gosei (TG), Toyota's Tier 1 supplier,[17] conducted 325 "part validation" and "confirmation of performance" tests for involved parts that were destined for Toyota vehicles. All of these tests by Toyota and TG were successful deployments. In addition, ARC informed Toyota that no passenger inflator ruptures occurred during any inflator lot acceptance testing, or any other testing performed by ARC, at any ARC facility, for parts produced for Toyota vehicles.

Specifically for the testing conducted at ARC, Toyota requested and received the pressure curve data for approximately 9,200 "tank tests" that were performed as a part of lot acceptance testing for the involved inflators that were destined for Toyota vehicles. Tank testing on a sampling of parts is performed at regular intervals in ARC's production process to confirm that the inflator performance meets the necessary specifications for the air bag and occupant protection system for which it is destined. Toyota reviewed the pressure curve data for these tests in an attempt to identify any data that could indicate a potential propensity for rupture.

Lot acceptance testing at ARC's manufacturing facilities included tank testing at a frequency of 5 tests per day for each production day over a period of the more than three years that the inflators were produced for all the involved inflators destined for Toyota vehicles. These tests were performed at various temperatures under different fill conditions. Tank testing is a process where an inflator is fired within a sealed tank in order to record pressure buildup within the tank over time. This process measures the amount and speed of gas being expelled from the inflator to show whether it will meet the specifications needed for the air bag design for which it is intended.

To specify the necessary performance for an air bag inflator in each implementation in a Toyota vehicle, pressure curves for tank testing are established to show how the pressure buildup (as a result of the inflator ignition within the tank) should increase over time. The pressure buildup needs to generally follow an established shape (a curve) and, as applicable, should not exceed certain upper or lower boundaries over time. Different curves are established for each part number (i.e., different for each air bag in each vehicle) and for each temperature condition under which the part number may be tested.

[16] To support this conclusion, Toyota searched its systems for the available Toyota field reports, dealer field reports, warranty claims, consumer complaints, and legal claims and notices as of November 13, 2023, for allegations of inflator rupture involving vehicles equipped with ARC inflators covered by NHTSA's Initial Decision.

[17] Toyoda Gosei incorporated involved air bag inflators (sourced from ARC) into air bag modules that were supplied for Toyota to integrate into these vehicles.

In evaluating the approximately 9,200 tank tests on Toyota-bound inflators performed by ARC, Toyota looked for potential anomalies, such as signs where the pressure built up over time slowly, potentially indicative of debris that could be restricting gas flow through the inflator exit orifice.[18] In this evaluation, Toyota found no pressure curves that exhibited these types of anomalies.

As an example, the figure below shows all of the daily tank tests that were performed for one particular part number at one particular temperature (a subset of the 9,200 tests). The figure shows the pressure build up over time during the course of each tank test for this subset of tests. The red dotted lines generally show the upper and lower bounds that are the specified requirements for this particular test.[19] Further, they indicate the shape that is expected for the pressure curve with regard to these tests. As can be seen, all of the tests for this part, under this temperature condition, show an expected and consistent result. Similar observations were made for all of the other tank test pressure curve data from the ARC testing.

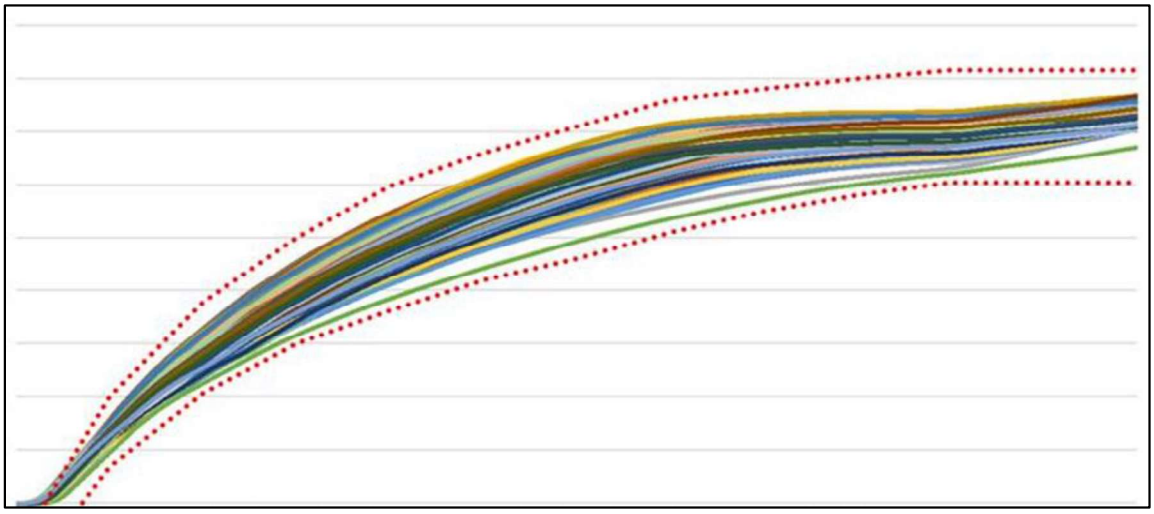

Figure: Chart showing the pressure curves for one part under one temperature condition.[20]

Conclusion

Toyota does not believe that sufficient information exists to conclude that there is an inflator rupture safety defect across the 52 million inflators that are covered by NHTSA's Initial Decision. Further, Toyota does not have sufficient information to conclude that such a safety

[18] NHTSA's main defect theory, as explained in their Recall Request Letter and their Initial Decision, is that debris occurring during the friction welding process during inflator manufacture can potentially dislodge during inflator deployment and block the exit orifice, leading to a pressure buildup of gas within the inflator body and a potential inflator rupture. In ARC's response to NHTSA Recall Request Letter dated May 11, 2023, ARC explains that this defect theory has not been confirmed to have occurred on any of the seven U.S. incidents that NHTSA references in its Recall Request Letter (and subsequently in its Initial Decision) and, instead, that different root causes (not related to friction welding debris) were confirmed in two of the seven incidents.

[19] The upper and lower bounds are set for each inflator part number and temperature condition based on values for specific points in time during the tank test. This figure shows those points connected in a curve.

[20] The x-axis is time and the y-axis is pressure.

defect exists in the involved inflators that were supplied to Toyota for use in involved Toyota vehicles.[21]

As noted above, the Confidential File and other existing information indicate that there are meaningful design and manufacturing differences that make it difficult for anyone to arrive at a science-based and data-driven conclusion identifying an inflator rupture safety defect. As a result, it is unclear that NHTSA's direction in its Initial Decision is one that would help to maximize the safety outcome for Toyota customers as well as the motoring public.

As always, Toyota welcomes the opportunity to further work with the Agency towards the end of finding the appropriate solution for this and any field issue.

Sincerely,

Cory Hoffman
General Manager
Customer Campaigns and Compliance

[21] Even assuming NHTSA's defect theory (that there is potential welding debris that could block the exit orifice in an involved inflator), NHTSA asserted, in its statements during the October 5, 2023, public meeting, that the issue could lead to an inflator rupture in only 1 out of 370,000 crashes that are severe enough to trigger air bag deployment (assumed as a change in velocity of 15 mph). Further detail of the data behind these estimates were shared by NHTSA on December 4, 2023, after a request for the underlying supporting information. It appears that NHTSA projects that there will be three (3) inflator ruptures that could occur over the entire 52 million subject inflator population over the service life of the involved vehicles (the last year of which is 2056). This future rupture number was not noted in the Recall Request Letter to ARC or during the October 5th Public Meeting.

Specific to Toyota, NHTSA estimated that, for the approximately 521,000 involved Toyota vehicles they analyzed in their spreadsheet, there have been almost 14,000 air bag deployments with zero ruptures. Taking the projection out to 2056, NHTSA estimated that there will be less than 21,400 deployments. *See* file "\Supplementto Investigation File 12-4-20232023120611391 9\Supplement to Investigation File 12-4-2023\Confidential - Estimated air bag deployments and rupture rate and derivation of assumption - Contains CBI.xlsx" in the NHTSA Confidential File.