

*The Associate Administrator for Enforcement of the National Highway Traffic Safety Administration, Jeffrey M. Giuseppe, signed the following Notice of Agency Decision on November 20, 2020, which the agency is submitting for publication in the Federal Register. While NHTSA has taken steps to ensure the accuracy of this Internet version of the Notice of Agency Decision, it is not the official version of the Notice of Agency Decision. Please refer to the official version in a forthcoming Federal Register publication, which will appear on the Government Printing Office's FDsys website ([www.gpo.gov/fdsys/search/home.action](http://www.gpo.gov/fdsys/search/home.action)) and on Regulations.gov (<https://www.regulations.gov/docket?D=NHTSA-2016-0124>). Once the official version of this document is published in the Federal Register, this version will be removed from the Internet and replaced with a link to the official version.*

**UNITED STATES DEPARTMENT OF TRANSPORTATION**

**NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION**

**[DOCKET NO. NHTSA-2016-0124; Notice of Agency Decision]**

**General Motors LLC, Denial of Consolidated Petition for Decision of Inconsequential Defect**

**AGENCY:** National Highway Traffic Safety Administration (NHTSA), Department of Transportation.

**ACTION:** Denial of consolidated petition.

**SUMMARY:** TK Holdings Inc. ("Takata") has filed defect information reports (DIRs), in which it determined that a defect exists in certain passenger-side frontal air bag inflators that it manufactured, including passenger-side inflators that it supplied to General Motors, LLC (GM) for use in certain GMT900 vehicles. GM petitioned NHTSA for a decision that, because of differences in inflator design and vehicle integration, the equipment defect determined to exist by Takata is inconsequential as it relates to motor vehicle safety in GM's GMT900 vehicles, and that GM should therefore be relieved of its notification and remedy obligations under the National Traffic and Motor Vehicle Safety Act of 1966 and its applicable regulations. After reviewing GM's consolidated petition, supporting materials, and public comments, NHTSA has concluded that GM has not met its burden of establishing that the defect is inconsequential to motor vehicle safety, and denies the petition.

**ADDRESSES:** For further information on this decision contact Stephen Hench, Office of Chief Counsel, National Highway Traffic Safety Administration, 1200 New Jersey Avenue SE, W41-326, Washington, D.C. 20590 (telephone: 202-366-5263).

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For general information regarding NHTSA's investigation into Takata air bag inflator ruptures and the related recalls: [www.nhtsa.gov/takata](http://www.nhtsa.gov/takata).

## **SUPPLEMENTARY INFORMATION:**

### **I. Background**

The Takata air bag inflator recalls ("Takata recalls") are the largest and most complex vehicle recalls in U.S. history. These recalls currently involve 19 vehicle manufacturers and over 60 million Takata air bag inflators in tens of millions of vehicles in the United States alone.<sup>1</sup> The recalls are due to a design defect, whereby the propellant used in Takata's air bag inflators degrades after long-term exposure to high humidity and temperature cycling. During air bag deployment, this propellant degradation can cause the inflator to over-pressurize, causing sharp metal fragments (like shrapnel) to penetrate the air bag and enter the vehicle compartment. To date, these rupturing Takata inflators have resulted in the deaths of 18 people across the United States<sup>2</sup> and hundreds of injuries, including lacerations and other serious consequences to occupants' face, neck, and chest areas.

In May 2015, NHTSA issued, and Takata agreed to, a Consent Order,<sup>3</sup> and Takata filed four defect information reports ("DIRs")<sup>4</sup> for inflators installed in vehicles manufactured by

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<sup>1</sup> These numbers include the approximately 5.9 million GMT900 vehicles and associated passenger inflators addressed by this decision.

<sup>2</sup> Globally, including the United States, the deaths of at least 30 people are attributable to these rupturing Takata inflators.

<sup>3</sup> The May 2015 Consent Order is available at: [https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/consent-order-takata-05182015\\_0.pdf](https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/consent-order-takata-05182015_0.pdf).

<sup>4</sup> Recall Nos. 15E-040, 15E-041, 15E-042, and 15E-043.

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twelve<sup>5</sup> vehicle manufacturers. Recognizing that these unprecedented recalls would involve many challenges for vehicle manufacturers and consumers, NHTSA began an administrative proceeding in June 2015 providing public notice and seeking comment (Docket Number NHTSA-2015-0055) that culminated in NHTSA's establishment of a Coordinated Remedy Program ("Coordinated Remedy") in November 2015.<sup>6</sup> The Coordinated Remedy prioritizes and phases the various Takata recalls to not only accelerate the repairs, but also—given the large number of affected vehicles—to ensure that repair parts are available to fix the highest-risk vehicles first.<sup>7</sup>

Under the Coordinated Remedy, vehicles are prioritized for repair parts based on various factors relevant to the safety risk—primarily on vehicle model year (MY), as a proxy for inflator age, and geographic region. In the early stages of the Takata inflator recalls, affected vehicles were categorized as belonging to one of two regions: the High Absolute Humidity ("HAH")

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<sup>5</sup> The twelve vehicle manufacturers affected by the May 2015 recalls were: BMW of North America, LLC; FCA US, LLC (formerly Chrysler); Daimler Trucks North America, LLC; Daimler Vans USA, LLC; Ford Motor Company; General Motors, LLC; American Honda Motor Company; Mazda North American Operations; Mitsubishi Motors North America, Inc.; Nissan North America, Inc.; Subaru of America, Inc.; and Toyota Motor Engineering and Manufacturing.

<sup>6</sup> See Notice of Coordinated Remedy Program Proceeding for the Replacement of Certain Takata Air Bag Inflators, 80 FR 32197 (June 5, 2015).

The Coordinated Remedy Order, which established the Coordinated Remedy, is available at: <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/nhtsa-coordinatedremedyorder-takata.pdf>. The Third Amendment to the Coordinated Remedy Order incorporated additional vehicle manufacturers, that were not affected by the recalls at the time NHTSA issued the CRO into the Coordinated Remedy, and is available at: [https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/final\\_public\\_-\\_third\\_amendment\\_to\\_the\\_coordinated\\_remedy\\_order\\_with\\_annex\\_a-corrected\\_12.16.16.pdf](https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/final_public_-_third_amendment_to_the_coordinated_remedy_order_with_annex_a-corrected_12.16.16.pdf). The additional affected vehicle manufacturers are: Ferrari North America, Inc.; Jaguar Land Rover North America, LLC; McLaren Automotive, Ltd.; Mercedes-Benz US, LLC; Tesla Motors, Inc.; Volkswagen Group of America, Inc.; and, per Memorandum of Understanding dated September 16, 2016, Karma Automotive on behalf of certain Fisker vehicles.

<sup>7</sup> See Coordinated Remedy Order at 15–18, Annex A; Third Amendment to the Coordinated Remedy Order at 14–17. These documents, among other documents related to the Takata recalls discussed herein, are available on NHTSA's website at <http://www.nhtsa.gov/takata>.

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region (largely inclusive of Gulf Coast states and tropical island states and territories), or the non-HAH region (inclusive of the remaining states and the District of Columbia). On May 4, 2016, NHTSA issued, and Takata agreed to, an amendment to the November 3, 2015 Consent Order (“ACO”), wherein these geographic regions were refined based on improved understanding of the risk, and were then categorized as Zones A, B, and C. Zone A encompasses the higher risk HAH region as well as certain other states,<sup>8</sup> Zone B includes states with more moderate climates (*i.e.*, lower heat and humidity than Zone A),<sup>9</sup> and Zone C includes the cooler-temperature states largely located in the northern part of the country.<sup>10</sup>

The ACO also required Takata to declare on a rolling basis a defect in all frontal driver and passenger-side air bag inflators that contain a phase-stabilized ammonium nitrate (“PSAN”)-based propellant without a moisture-absorbing desiccant. The first DIR was due on May 16, 2016; the second on December 31, 2016; the third on December 31, 2017; the fourth on December 31, 2018; and the fifth on December 31, 2019.<sup>11</sup>

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<sup>8</sup> Zone A comprises the following U.S. states and jurisdictions: Alabama, California, Florida, Georgia, Hawaii, Louisiana, Mississippi, South Carolina, Texas, Puerto Rico, American Samoa, Guam, the Northern Mariana Islands (Saipan), and the U.S. Virgin Islands. Amendment to November 3, 2015 Consent Order at ¶ 7.a.

<sup>9</sup> Zone B comprises the following U.S. states and jurisdictions: Arizona, Arkansas, Delaware, District of Columbia, Illinois, Indiana, Kansas, Kentucky, Maryland, Missouri, Nebraska, Nevada, New Jersey, New Mexico, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Virginia, and West Virginia. Amendment to November 3, 2015 Consent Order at ¶ 7.b.

<sup>10</sup> Zone C comprises the following U.S. states and jurisdictions: Alaska, Colorado, Connecticut, Idaho, Iowa, Maine, Massachusetts, Michigan, Minnesota, Montana, New Hampshire, New York, North Dakota, Oregon, Rhode Island, South Dakota, Utah, Vermont, Washington, Wisconsin, and Wyoming. Amendment to November 3, 2015 Consent Order at ¶ 7.c.

<sup>11</sup> NHTSA has permitted Takata to file within a few days of these deadlines to account for weekends and holidays.

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### *GM's May 27, 2016 DIRs and First Petition*

Takata timely submitted the first scheduled equipment DIRs on May 16, 2016.<sup>12</sup> Those DIRs included non-desiccated passenger inflators, designated as SPI YP (“YP”) and PSPI-L YD (“YD”) variants, that were installed as original equipment on certain GMT900 motor vehicles manufactured by GM, as well as other non-desiccated passenger inflators installed as original equipment on motor vehicles manufactured by GM that are not at issue here. The Takata filing triggered GM’s obligation to file a DIR for the affected GM vehicles.<sup>13</sup> GM submitted two DIRs on May 27, 2016. On November 15, 2016, GM submitted a Petition for Inconsequentiality and Request for Deferral of Determination Regarding Certain GMT900 Vehicles Equipped with Takata “SPI YP” and “PSPI-L YD” Passenger Inflators (the “First Petition for Inconsequentiality” or “First Petition”), pursuant to 49 U.S.C. 30118(d), 30120(h) and 49 CFR part 556. In the First Petition, GM requested that NHTSA defer its decision on inconsequentiality until GM was able to complete its testing and engineering analysis in August 2017.<sup>14</sup>

On November 28, 2016, the Agency published a notice of receipt of the First Petition in the Federal Register and granted two administrative requests.<sup>15</sup> First, as a matter of its enforcement discretion, NHTSA accepted the First Petition even though it was filed outside the regulatory thirty-day filing deadline.<sup>16</sup> Second, based on unique facts and circumstances,

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<sup>12</sup> See Recall Nos. 16E-042, 16E-043, and 16E-044.

<sup>13</sup> See 49 CFR part 573; ACO at ¶ 16; Third Amendment to Coordinated Remedy Order at ¶ 32.

<sup>14</sup> First Petition at 18.

<sup>15</sup> 81 FR 85681 (Nov. 28, 2016).

<sup>16</sup> 49 CFR 556.4(c).

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NHTSA granted GM's request for additional time to conduct research and submit information to the Agency, and allowed GM until August 31, 2017 to develop and present further evidence, data, and information before issuing a decision on the First Petition. NHTSA opened public docket no. NHTSA-2016-0124 as a repository for the Petition and supporting materials, and to receive public comments until September 14, 2017.

NHTSA further required that GM submit monthly testing updates. GM submitted such updates for December 2016 and January through July 2017, and a comprehensive submission in August 2017 that included testing, statistical analysis, and other information. GM also presented technical briefings to NHTSA on August 16, 2017 and August 23, 2017. On September 15, 2017, NHTSA sent follow-up questions to GM seeking clarification of information GM had provided, and GM submitted responses on September 29, 2017 ("GM's September 2017 Response"). GM continued providing additional updates to NHTSA at meetings on February 12, April 9, and June 8, 2018. NHTSA sent GM additional follow-up questions to the June 8 meeting on July 10, 2018, and GM submitted responses to those questions on July 20, 2018 ("GM's July 2018 Response").

GM submitted voluminous materials to the Agency over the course of about two years, including materials from Orbital-ATK ("OATK")<sup>17</sup> and Cornerstone Research ("Cornerstone").<sup>18</sup>

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<sup>17</sup> OATK was subsequently purchased by Northrop Grumman. For simplicity and continuity across NHTSA's documents regarding the Takata inflator recalls and Coordinated Remedy, NHTSA will continue to refer to the company as OATK.

<sup>18</sup> GM also retained Professor Arnold Barnett, the George Eastman Professor of Management Science and Professor of Statistics at the Massachusetts Institute of Technology, who worked with Cornerstone Research, to provide GM's statistical assessment.

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To apprise the public of this information—which the Agency was considering in rendering the instant decision—the Agency regularly posted GM’s materials on public docket no. NHTSA-2016-0124.<sup>19</sup> The Agency further offered the opportunity for public comment, and comments were both received and considered.

#### *GM’s January 10, 2017 DIRs and Second Petition*

On January 3, 2017, Takata timely submitted the second scheduled equipment DIRs.<sup>20</sup> The Takata filing triggered GM’s obligation to file a DIR for the affected GM vehicles,<sup>21</sup> and GM submitted DIRs on January 10, 2017 recalling additional GMT900 vehicles as well as other vehicles containing non-desiccated PSAN inflators supplied to GM that are not at issue here. GM notified NHTSA of its intention to file a petition for an exemption from its recall notification and remedy obligations as to the GMT900 vehicles only, and submitted a Petition for Inconsequentiality and Request for Deferral of Determination Regarding Certain GMT900 Vehicles Equipped with Takata “SPI YP” and “PSPI-L YD” Passenger Inflators Subject to January 2017 Takata Equipment DIR Filings (the “Second Petition for Inconsequentiality” or “Second Petition”). On September 11, 2017, the Agency published a notice of receipt of the Second Petition and consolidated the First Petition with the Second Petition in Docket No. NHTSA-2016-0124.<sup>22</sup>

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<sup>19</sup> Docket no. NHTSA-2016-0124 can be accessed at <https://www.regulations.gov/docket?D=NHTSA-2016-0124>. Note that limited materials, including materials subject to requests for confidential treatment, are included in the docket via incorporation by memo.

<sup>20</sup> See Recall Nos. 17E-001, 17E-002, and 17E-003.

<sup>21</sup> See 49 CFR part 573; ACO at ¶ 16; Third Amendment to Coordinated Remedy Order at ¶ 32.

<sup>22</sup> 82 FR 42718 (Sept. 11, 2017). GM also filed a Supplemental Brief in Support of Petitions for Inconsequentiality Regarding Certain GMT900 Vehicles following submission of the Second Petition, which is also

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### *GM's January 9, 2018 DIRs and Third Petition*

Takata timely submitted the third scheduled equipment DIRs on January 2, 2018.<sup>23</sup> The Takata filing triggered GM's obligation to file a DIR for the affected GM vehicles,<sup>24</sup> and GM submitted DIRs on January 9, 2018 recalling additional GMT900 vehicles as well as other vehicles containing non-desiccated PSAN inflators supplied to GM not at issue here. GM notified NHTSA of its intention to file a petition for an exemption from its recall notification and remedy obligations as to the GMT900 vehicles only, and submitted a Petition for Inconsequentiality Regarding Certain GMT900 Vehicles Equipped with Takata "SPI YP" and "PSPI-L YD" Passenger Inflators Subject to January 2018 Takata Equipment DIR Filings (the "Third Petition for Inconsequentiality" or "Third Petition"). On April 9, 2018, the Agency published a notice of receipt of the Third Petition and consolidated the Third Petition with the previously consolidated First and Second Petitions.<sup>25</sup> NHTSA also reopened the public docket to take additional comment on GM's Petition and supporting materials. The closing date for the reopened comment period was May 9, 2018.

### *GM's January 9, 2019 DIRs and Fourth Petition*

Takata timely submitted the fourth scheduled equipment DIRs on January 2, 2019.<sup>26</sup> The Takata filing triggered GM's obligation to file a DIR for the affected GM vehicles,<sup>27</sup> and GM submitted DIRs on January 9, 2019 recalling additional GMT900 vehicles as well as other

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available in the public docket.

<sup>23</sup> See Recall Nos. 18E-001, 18E-002, and 18E-003.

<sup>24</sup> See 49 CFR part 573; ACO at ¶ 16; Third Amendment to Coordinated Remedy Order at ¶ 32.

<sup>25</sup> 83 FR 15233 (Apr. 9, 2018).

<sup>26</sup> Recall Nos. 19E-001, 19E-002, and 19E-003.

<sup>27</sup> See 49 CFR part 573; ACO at ¶ 16; Third Amendment to Coordinated Remedy Order at ¶ 32.

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vehicles containing non-desiccated PSAN inflators supplied to GM that are not at issue here.

GM notified NHTSA of its intention to file a petition for an exemption from its recall notification and remedy obligations as to the GMT900 vehicles only, and submitted a Petition for Inconsequentiality Regarding Certain GMT900 Vehicles Equipped with Takata "SPI YP" and "PSPI-L YD" Passenger Inflators Subject to January 2019 Takata Equipment DIR Filings (the "Fourth Petition for Inconsequentiality" or "Fourth Petition"). On June 18, 2019, the Agency published notice of the Fourth Petition and consolidated it with the previously consolidated Petitions (collectively referred to as "the Petition" or "GM's Petition").<sup>28</sup> NHTSA also reopened the public docket to take additional comment on GM's Petition and supporting materials. The closing date for the re-opened comment period was July 18, 2019.

#### *Public Comments on GM's Petition*

NHTSA opened public docket number NHTSA-2016-0124 to provide the public an opportunity to review the data and information GM submitted in support of the Petition.

NHTSA has taken into consideration all comments posted to the docket as of November 19, 2020.

As of that date, 302 comments have been posted to the docket. No comments were filed in support of granting the Petition, and few address technical aspects of GM's Petition or data. Many comments referred either to concerns with selling unrepaired vehicles, or to the economic hardship or disadvantage experienced as a result of diminished resale or trade-in value for vehicles with unrepaired inflators. Many commenters also expressed general concern about the

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<sup>28</sup> 83 FR 15233 (June 18, 2019).

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air bags in their GMT900 vehicles. Since NHTSA concludes here that GM's Petition should be denied, those comments are not discussed here.

## **II. Motor Vehicles Involved**

GM's Petition involves certain "GMT900" vehicles that contain "SPI YP" and "PSPI-L YD" inflator variants. GMT900 is a GM-specific vehicle platform that forms the structural foundation for a variety of GM light- and heavy-duty pickup trucks and sport utility vehicles, including: Chevrolet Silverado 1500, GMC Sierra 1500, Chevrolet Silverado 2500/3500, GMC Sierra 2500/3500, Chevrolet Tahoe, Chevrolet Suburban, Chevrolet Avalanche, GMC Yukon, GMC Yukon XL, Cadillac Escalade, Cadillac Escalade ESV, and Cadillac Escalade EXT. The Petition involves approximately 5.9 million MY 2007–2014 GMT900 vehicles in Zones A, B, and C.<sup>29</sup>

## **III. Summary of GM's Petition and Supporting Information**

GM has petitioned the Agency for a decision that the Takata PSAN defect in the GMT900 vehicles is inconsequential as it relates to motor vehicle safety, and that GM should therefore be relieved of its notification and remedy obligations. GM asserts two primary arguments for why the defect should be deemed inconsequential in GMT900 vehicles. First, GM asserts that there are multiple "unique" design differences in the YD and YP variant inflators used in GMT900 vehicles that result in a reduced risk of rupture. Second, GM argues that the physical environment in GMT900 vehicles "better protects the front-passenger inflator from the

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<sup>29</sup> Fourth Petition at 2. Based on information provided to NHTSA by GM, the precise number of vehicles under petition is 5,888,421.

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extreme temperature cycling that can cause inflator rupture.”<sup>30</sup> GM’s primary arguments and supporting information are summarized below.

#### **A. Unique Inflator Design Differences and Vehicle Features**

GM claims that the YD and YP variant inflators in GMT900 vehicles are not used by any other vehicle manufacturers and that these inflator variants have a number of unique design features that result in a reduced risk of inflator rupture.<sup>31</sup> GM contends that these unique design features are “crucially” important factors that required Takata to “heavily modify the characteristics” of their inflators in order to meet GM’s standards.<sup>32</sup> As noted in GM’s petitions and information presented to NHTSA, these alleged design differences include the following:

*Thinner Propellant Wafers.* GM claims that the thinner (8mm) propellant wafers used in the GMT900 inflators have more predictable ballistic properties than thicker (11mm) wafers used in many other Takata PSAN inflator variants, which “create less excess surface area as they degrade.”<sup>33</sup> As a result, GM contends that the thinner propellant wafers used in the GMT900 vehicles age more slowly and burn more efficiently than thicker propellant wafers, resulting in a reduced risk of inflator rupture.<sup>34</sup>

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<sup>30</sup> See *id.* at 11–12.

<sup>31</sup> See *id.* at 12; Second Petition at 11–12; Third Petition at 5–8; Fourth Petition at 5–7.

<sup>32</sup> Fourth Petition at 6; see Third Petition at 6. GM’s Third Petition asserts that strict adherence to the United States Council for Automotive Research (“USCAR”) air bag performance standards “resulted in [GM] inflators with increased inflator-structural integrity, better ballistic performance, and greater resistance to moisture.” Third Petition at 6. NHTSA notes that USCAR standards are utilized across the industry and adherence to those standards is not particular to the GMT900 inflators at issue.

In all events, for the reasons discussed here, GM has failed to meet its burden to show that the defect at issue here is inconsequential to motor vehicle safety.

<sup>33</sup> Fourth Petition at 6–7; see Third Petition at 6.

<sup>34</sup> See Third Petition at 6; Fourth Petition at 6–7.

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*Larger Vent Area.* GM claims that a greater vent-area-to-propellant-mass ratio provides for more efficient burning and deployment of the GMT900 inflators, resulting in a reduced risk of inflator rupture.<sup>35</sup>

*Steel Endcap.* GM claims that the steel endcap used on the GMT900 inflators creates an improved hermetic seal compared to the aluminum endcaps used on other Takata PSAN inflators, and therefore better protects the propellant from moisture.<sup>36</sup> GM also claims that the use of steel endcaps improves the inflators' "resistance to high-internal pressures."<sup>37</sup>

*Other Design Differences.* GM observed several other design differences in its presentations to NHTSA, including tablets in a cup (for YP variants), the incorporation of a ceramic cushion (also for YP variants), and the incorporation of a bulkhead disk with an anvil (for YD variants).<sup>38</sup> While noted and discussed during presentations, these design differences were not explicitly referenced or otherwise significantly expounded upon in GM's Petition documents.

GM also asserts that the physical environment in GMT900 vehicles better protects the front-passenger inflators from extreme temperature cycling that can cause inflator rupture. GM claims that the GMT900 vehicles have larger cabin volumes than other vehicles equipped with Takata PSAN inflators, and are all equipped with solar-absorbing glass windshields and side

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<sup>35</sup> See Fourth Petition at 7.

<sup>36</sup> See *id.*

<sup>37</sup> *Id.*

<sup>38</sup> See GM's June 8, 2018 Presentation at 126; GM's August 23, 2017 Presentation at 111, 113; GM's April 5, 2017 Presentation at 84.

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glass, which results in lower internal vehicle temperatures and thus a reduced risk of inflator rupture.<sup>39</sup>

## **B. Additional Supporting Data and Information**

GM contends that the passenger inflators at issue are currently performing as designed, and will continue to function properly without risk of rupture for at least 30 to 35 years of service in the field.<sup>40</sup> In support of this argument, GM cites ballistic testing, aging studies, predictive modeling, and other analyses that it has conducted over the last several years.

### **1. Testing & Field Data Analyses**

*Testing by Takata.* GM retrieved inflators from the field by removing parts from vehicles (a “field return” part or inflator) and sent them to Takata for ballistic testing and analysis. In total, Takata conducted ballistic tests of more than 4,200 field return inflators, with the majority (1,620 YD and 2,235 YP inflators) coming from Zone A.<sup>41</sup> GM states that none of the tested GMT900 inflators have ruptured.<sup>42</sup> Takata’s testing further included CT scans of inflators to measure average and maximum wafer diameters of more than 5,000 YD and YP variant inflators, and GM also pointed to micro-CT and high-speed x-ray cinematography, which enabled researchers to view pores and fissures caused by PSAN propellant degradation.<sup>43</sup>

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<sup>39</sup> Fourth Petition at 7; Second Petition at 11–12; First Petition at 12; Third Petition at 7.

<sup>40</sup> See GM’s June 8, 2018 Presentation at 4, 32. This contention is based on 35 years of artificial aging (worst-case field exposure in Miami, Florida) of newly manufactured inflators, described *infra. Id.*

<sup>41</sup> Fourth Petition at 12–13; Third Petition at 13. GM’s Third Petition cites 1,620 YD and 2,235 YP inflators and a “vast majority” coming from Zone A GMT900 vehicles, while GM’s Fourth Petition cites 1,197 YD and 2,249 YP inflators and a “majority” coming from Zone A GMT900 vehicles.

<sup>42</sup> Fourth Petition at 12; Third Petition at 13.

<sup>43</sup> GM’s June 8, 2018 Presentation at 37; GM’s April 5, 2017 Presentation at 60–64, 70; see Exhibit A, Report of Dr. Harold Blomquist (“2020 Blomquist Report”) at paras. 88, 221 & n.120.

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*Stress-Strength Interference Analysis.* GM conducted a stress-strength interference analysis of the GMT900 vehicle inflators based on CT scans of 1,578 YD and YP inflators.<sup>44</sup> GM explains stress-strength interference analysis as the plotting of curves on a graph related to the diameter of field-returned YP and YD inflators and the diameter of non-GM inflators that have ruptured during ballistic testing; the amount of overlap between the two curves “represents the probability of rupture in a particular group of inflators.”<sup>45</sup> GM provides plots of curves with no discernable overlap,<sup>46</sup> and concludes that “even the oldest (MY 2007) Zone A Takata GMT 900 inflators are not at risk of rupture.”<sup>47</sup>

*Crash Deployment Estimates.* GM estimates that its GMT900 vehicles equipped with YD and YP inflators have been involved in approximately 66,894 crashes where the passenger air bag has deployed, all allegedly without a field rupture.<sup>48</sup> GM asserts that this data demonstrates that the GMT900 inflators are “currently performing as designed.”<sup>49</sup>

## **2. Aging Studies**

GM conducted a preliminary Aging Study (“GM Aging Study”), and later engaged a third party, OATK, to conduct a larger “long-term” Aging Study (“OATK Aging Study”) to simulate the propellant degradation process that occurs in Takata PSAN inflators.<sup>50</sup> It is the

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<sup>44</sup> Second Petition at 15–16; *see also* First Petition at 15–16.

<sup>45</sup> Second Petition at 16; First Petition at 16.

<sup>46</sup> *See* Second Petition, Exs. B & C; First Petition, Exs. B & C.

<sup>47</sup> First Petition at 3; *see* Second Petition at 15–17.

<sup>48</sup> Fourth Petition at 12; *see* GM’s June 8, 2018 Presentation at 36. The 66,894 figure is referenced in GM’s Fourth Petition, while GM’s June 8, 2018 Presentation references 68,206 deployments.

<sup>49</sup> Fourth Petition at 12.

<sup>50</sup> *See* First Petition at 3, 14–15; Fourth Petition at 13–16; GM’s August 23, 2017 Presentation at 94–97; GM’s April 5, 2017 Presentation at 80–82.

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Agency's understanding that both studies were informed by vehicle temperature studies conducted by GM (the "GM Temperature Study") and Atlas Material Testing Solutions (the "Atlas Cabin Temperature Study").<sup>51</sup> For the GM Temperature Study, GM studied the Pontiac Vibe and two GMT900 vehicle models (Silverado and Suburban).<sup>52</sup> The Atlas Cabin Temperature Study studied the Pontiac Vibe and 11 non-GM vehicles.<sup>53</sup> GM asserts these studies demonstrate that GMT900 vehicles normally achieve a relatively low peak vehicle temperature (below 60°C, or what GM refers to as the "T1" temperature range).<sup>54</sup> GM utilized these temperature studies in its aging studies as described below.

*GM Aging Study.* GM conducted a preliminary aging study of a small number of inflators, including field-return parts (both YP and YD variant inflators) to demonstrate the short-term safety of its inflators while the Petition was pending.<sup>55</sup> GM artificially aged the inflators by imposing four-hour cycles of temperature and humidity cycling per day for fifty-eight days, in closed-test laboratory chambers.<sup>56</sup> Though none of the inflators ruptured or demonstrated elevated pressure, all showed signs of wafer diameter growth.<sup>57</sup>

*OATK Aging Study.* GM retained OATK to conduct a long-term aging study to evaluate the future performance of GMT900 inflators through simulated laboratory aging.<sup>58</sup> Takata

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<sup>51</sup> See GM's June 8, 2018 Presentation at 11, 14.

<sup>52</sup> See GM's August 23, 2017 Presentation at 171.

<sup>53</sup> See *id.*

<sup>54</sup> See GM's June 8, 2018 Presentation at 11, 14.

<sup>55</sup> See First Petition at 3, 14–15; GM's August 23, 2017 presentation at 94–97; GM's April 5, 2017 Presentation to NHTSA at 80–82.

<sup>56</sup> First Petition at 14–15.

<sup>57</sup> *Id.*; see GM's August 23, 2017 Presentation at 94–97.

<sup>58</sup> Fourth Petition at 7–8; Third Petition at 8 & Ex.C.

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specially constructed YD, YP, and FD variant inflators for use in the OATK Aging Study.<sup>59</sup> The primary chambers in the inflators were loaded with three different levels of moisture: (1) no moisture added; (2) “internal moisture approximately equal to 90th percentile moisture levels in Zone A”; and (3) “moisture levels approximately two-times higher than the highest level ever measured in a GMT900 Inflator recovered from Zone A.”<sup>60</sup> The OATK Aging Study employed four-hour temperature cycles; by June 2018, OATK had conducted 1,960 cycles of testing, which GM asserts simulated 35 years of field aging.<sup>61</sup> According to GM, “all of the GMT900 Inflators in the study safely deployed without any ruptures,” leading GM to the conclusion that the YP and YD inflators are safer and more resistant to rupture than other Takata PSAN inflators.<sup>62</sup> GM asserts that the study demonstrates the GMT900 inflators “will continue to operate safely for decades, even in the highest temperature and humidity regions.”<sup>63</sup>

### **3. Predictive Modeling**

In 2018, GM presented results of a parametric mathematical model created by OATK (the “OATK Model” or “the Model”) that was designed to predict the service-life expectancy of GMT900 inflators.<sup>64</sup> It is the Agency’s understanding that this Model was informed by the GM Temperature Study and the Atlas Cabin Temperature Study, as well as the GM Aging Study and

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<sup>59</sup> Fourth Petition at 8; Third Petition at 9 & Ex.C.

<sup>60</sup> Fourth Petition at 8; Third Petition at 9.

<sup>61</sup> See GM’s August 23, 2017 Presentation at 12, 15; GM’s June 8, 2018 Presentation at 4, 81; Fourth Petition at 13; Second Petition at 32–33 (Ex.D).

<sup>62</sup> Fourth Petition at 3; Third Petition at 3, 11.

<sup>63</sup> *Id.* at 3; see Fourth Petition at 3–4.

<sup>64</sup> Fourth Petition at 16.

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the OATK Aging Study.<sup>65</sup> The Model runs a Monte Carlo simulation 32,000 times simulating air bag deployments. Each trial combines variations of several different inputs, including usage profile (meaning how the vehicle is driven, where it is parked, how often and high the air conditioning is run, and any other factors that affect the moisture and temperature environment of the inflator),<sup>66</sup> peak vehicle temperature, the environmental conditions of the city in which the inflator resides, and the age of the inflator.<sup>67</sup> The final output of the Model is the “probability of ED” for a deployed inflator with these inputs, *i.e.*, the probability that an inflator will rupture under various circumstances.<sup>68</sup> From these Model-predicted outputs, GM concludes that the GMT900 inflators “will not reach a threshold risk level within 30 years of worst case environmental field exposure in Miami [Florida].”<sup>69</sup>

#### **4. Risk Assessments**

GM also presented statistical risk assessments from third parties Cornerstone and Professor Arnold Barnett, and OATK, which attempted to quantify the future risk of rupture for the GMT900 inflator variants.<sup>70</sup> These risk assessments were based upon data and inputs from the OATK Model, the OATK Aging Study, Takata's Master Engineering Analysis File

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<sup>65</sup> See GM's June 8, 2018 Presentation at 11, 14, 48.

<sup>66</sup> 2020 Blomquist Report at para. 189.

<sup>67</sup> See GM's June 8, 2018 Presentation at 6–14.

<sup>68</sup> *Id.* at 10, 145.

<sup>69</sup> Fourth Petition at 4; GM's June 8, 2018 Presentation at 4, 8 (defining threshold risk level as 1% chance of failure upon initiation in the 1% vehicle (most severe exposure)).

<sup>70</sup> June 8, 2018 Presentation at 4; see Fourth Petition at 14. These assessments were presented at briefings to the Agency in August 2017, February 2018, and June 2018. Cornerstone attended all three briefings, while Professor Barnett only attended the August 2017 and June 2018 meetings.

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(“MEAF”) file,<sup>71</sup> and GM’s crash-data estimates.<sup>72</sup> Cornerstone concluded that the rupture risk for GMT900 inflators is “significantly lower” than that for “typical ‘benchmark’ Takata inflators in other vehicles,” and that the OATK model “offers strong evidence that a GMT900’s absolute risk” of a rupture “is extremely small.”<sup>73</sup>

GM presented several assessments regarding the per-deployment risk, or the probability that a specific air bag will rupture in a given deployment.<sup>74</sup> Based upon the outputs of the OATK Model, GM predicts the following probabilities of future inflator rupture for inflators aged 30 years under the Model:<sup>75</sup>

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<sup>71</sup> For several years, Takata has inspected, tested, and analyzed inflators returned from the field. The compiled and summarized test results for more than 387,000 inflator tests or inspections (as of July 3, 2018), including GMT900 inflators, are contained in the Takata MEAF. Takata’s MEAF file was available to the Agency in making its determination, and it is from this file that some of the information considered by the Agency was derived, and discussed herein.

<sup>72</sup> See GM’s June 8, 2018 Presentation at 17.

<sup>73</sup> *Id.* at 18.

<sup>74</sup> See, e.g., GM’s July 20, 2018 Response, Ex.C. GM sometimes refers to this as the “POF” (probability of failure), “probability of ED” (probability of energetic deployment), or “IR risk” (inflator rupture risk).

GM also asserted that the probability of rupture in a given deployment is “zero” for the YD and YP inflators in the “long-term,” but did not provide supporting information. See GM’s September 29, 2017 Response at 2. GM referred the Agency to GM’s Supplemental Brief, but NHTSA found no information that supported this assertion, and therefore it is not addressed in NHTSA’s analysis.

<sup>75</sup> GM provided hundreds of per-deployment risk estimates based on various combinations of inputs. See GM’s July 2018 Response, Ex.C. The estimates in this table reflect estimates for inflators exposed to the most extreme conditions for which GM/OATK calculated risk.

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<b>Vehicle Temperature Band</b>	<b>YD</b>	<b>YP</b>
For vehicles with cabin temperature less than 60°C (referred to by GM as “T1”)	0% ( <i>i.e.</i> , no risk of rupture)	0% ( <i>i.e.</i> , no risk of rupture)
For vehicles with a cabin temperature between 60 and 65°C (referred to by GM as “T2”)	0.87% ( <i>i.e.</i> , 1 rupture per 115 deployments)	12% ( <i>i.e.</i> , 1 rupture per 8 deployments)
For vehicles with a cabin temperature above 65°C (referred to by GM as “T3”)	66% ( <i>i.e.</i> , 2 ruptures per 3 deployments)	99% ( <i>i.e.</i> , 99 ruptures per 100 deployments)

GM asserts that all GMT900 vehicles fall within the lowest “T1” vehicle temperature range and therefore have a zero percent risk of rupture through age 30.<sup>76</sup> For vehicles that fall within the higher “T2” and “T3” vehicle temperature ranges, GM provided an estimate for the number of years until the inflator will have a 1-in-100 chance of rupturing if deployed: for the YD inflator, between 17.6 and 30-plus years; for the YP inflator, between 14.6 and 30-plus years.<sup>77</sup> GM further provided a lifetime risk estimate—namely, the probability that an individual inflator will experience at least one rupture over its lifetime when a person is seated in the front passenger seat, of not more than 1 in 50 million for the YD inflator variant, and not more than 1 in 3.4 million for the YP inflator variant.<sup>78</sup>

GM also provided “comparative risk” assessments for the GMT900 inflators.<sup>79</sup> GM contends that the comparator FD inflators—used in the Pontiac Vibe and other vehicles—were “ideal” because (1) they are from the same inflator family as the GMT900 light-duty inflator

<sup>76</sup> See GM’s June 8, 2018 Presentation at 14; see also GM’s July 20, 2018 Response, Ex.C.

<sup>77</sup> See GM’s July 20, 2018 Response, Ex. C.

<sup>78</sup> GM’s June 8, 2018 Presentation at 26.

<sup>79</sup> *Id.* at 21–23, 39; GM’s July 20, 2018 Response at 16.

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with certain design and construction similarities, but “lack the critical design elements that, in GM’s view, distinguish the GMT900 inflators from other Takata non-desiccated PSAN inflators and make the GMT900 Inflators resistant to the risk of energetic deployment,” and (2) the FD inflators “have consistently experienced ruptures during ballistic testing” and have also experienced field ruptures.”<sup>80</sup> Based upon the assertion that there have been no GMT900 ruptures in the OATK Aging Study, field returned samples (based upon MEAF data), or in the field, GM concludes that if the GMT900 inflators posed the same risk as other inflators, the probability of observing zero ruptures for GMT900 inflators given the sample size and when compared to other inflators is as follows:<sup>81</sup>

<b>When Compared To</b>	<b>YD &amp; YP (Pooled)</b>	<b>YD</b>	<b>YP</b>
FD inflators, when each variant is artificially aged ( <i>OATK Aging Study</i> )	1 in 499 billion	1 in 767,815	1 in 649,530
Other inflators (excluding the Vibe), <sup>82</sup> when weighted according to certain conditions ( <i>Field Return, MEAF data</i> )	1 in 1.5 million	1 in 1,551	1 in 347
Other 8- to 12-year old inflators in Zone A (excluding the Vibe) <sup>83</sup> ( <i>Field Data Applying Crash Deployment Estimates</i> )	1 in 10 <sup>22</sup>	1 in 41 trillion	1 in 174,267

## 5. Dealer Replacements as Risk Creation

<sup>80</sup> Third Petition at 10.

<sup>81</sup> GM’s June 8, 2018 Presentation at 21–22; see GM’s July 20, 2018 Response at 16. GM provided estimates for crash deployments that have occurred in GMT900 vehicles, and based its risk analyses on the assumption that there were no ruptures in those crash deployments. See *infra*.

<sup>82</sup> More specifically, 8–12-year-old SPI and PSPI-L inflators from non-GM vehicles (excluding the Vibe). GM’s June 8, 2018 Presentation at 39.

<sup>83</sup> More specifically, 8–12-year-old SPI and PSPI-L inflators from non-GM vehicles (excluding the Vibe) in Alabama, Georgia, Hawaii, Louisiana, Mississippi, South Carolina, and Texas. *Id.* at 39, 46.

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Finally, GM contends that because the GMT900 inflators are “not at risk of rupture,” dealers conducting repairs for the inflators under petition could “unnecessarily expose” occupants “to the risk of an improper repair”<sup>84</sup> by “disrupting critical, sensitive, fully operational safety systems in millions of customer vehicles.”<sup>85</sup>

#### **IV. NHTSA’s Analysis**

##### **A. Background**

The National Traffic and Motor Vehicle Safety Act (the “Safety Act”), 49 U.S.C. Chapter 301, defines “motor vehicle safety” as “the performance of a motor vehicle or motor vehicle equipment in a way that protects the public against unreasonable risk of accidents occurring because of the design, construction, or performance of a motor vehicle, and against unreasonable risk of death or injury in an accident, and includes nonoperational safety of a motor vehicle.”<sup>86</sup> Under the Safety Act, a manufacturer must notify NHTSA when it “learns the vehicle or equipment contains a defect and decides in good faith that the defect is related to motor vehicle safety,” or “decides in good faith that the vehicle or equipment does not comply with an applicable motor vehicle safety standard.”<sup>87</sup> The act of filing a notification with NHTSA is the

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<sup>84</sup> Fourth Petition at 16.

<sup>85</sup> Third Petition at 17; *see also* Fourth Petition at 16; GM’s June 8, 2018 Presentation at 5. Based on information provided to NHTSA by GM, the total number of vehicles under petition is 5,888,421.

<sup>86</sup> 49 U.S.C. 30102(a)(9).

<sup>87</sup> *Id.* 30118(c)(1). “[A] defect in original equipment, or noncompliance of original equipment with a motor vehicle safety standard prescribed under this chapter, is deemed to be a defect or noncompliance of the motor vehicle in or on which the equipment was installed at the time of delivery to the first purchaser.” 49 U.S.C. 30102(b)(1)(F).

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first step in a manufacturer's statutory recall obligations of notification and remedy.<sup>88</sup> However, Congress has recognized that, under some limited circumstances, a manufacturer may petition NHTSA for an exemption from the requirements to notify owners, purchasers, and dealers and to remedy the vehicles or equipment on the basis that the defect or noncompliance is inconsequential to motor vehicle safety.<sup>89</sup>

“Inconsequential” is not defined either in the statute or in NHTSA's regulations, and so must be interpreted based on its “ordinary, contemporary, common meaning.”<sup>90</sup> The inconsequentiality provision was added to the statute in 1974, and there is no indication that the plain meaning of the term has changed since 1961—meaning definitions used today are substantially the same as those used in 1974.<sup>91</sup> The Cambridge Dictionary defines “inconsequential” to mean “not important” or “able to be ignored.”<sup>92</sup> Other dictionaries similarly define the term as “lacking importance”<sup>93</sup> and “unimportant.”<sup>94</sup>

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<sup>88</sup> *Id.* 30118–20.

<sup>89</sup> *Id.* 30118(d), 30120(h); 49 CFR part 556.

<sup>90</sup> See, e.g., *Food Mktg. Institute v. Argus Leader Media*, 139 S. Ct. 2356, 2363 (2019) (quoting *Perrin v. United States*, 444 U.S. 37, 42 (1979)).

<sup>91</sup> See Pub. L. 93-492, Title I, § 102(a), 88 Stat. 1475 (Oct. 27, 1974); WEBSTER'S THIRD NEW INT'L DICTIONARY (principal copyright 1961) (defining “inconsequential” as “inconsequent;” defining “inconsequent” as “of no consequence,” “lacking worth, significance, or importance”).

The House Conference Report indicates that the Department of Transportation planned to define “inconsequentiality” through a regulation; however, it did not do so. See H.R. Rep. 93-1191, 1974 U.S.C.C.A.N. 6046, 6066 (July 11, 1974). Instead, NHTSA issued a procedural regulation governing the filing and disposition of petitions for inconsequentiality, but which did not address the meaning of the term “inconsequential.” 42 FR 7145 (Feb. 7, 1977). The procedural regulation, 49 CFR part 556, has remained largely unchanged since that time, and the changes that have been made have no effect on the meaning of inconsequentiality.

<sup>92</sup> <https://dictionary.cambridge.org/us/dictionary/english/inconsequential>.

<sup>93</sup> <https://ahdictionary.com/word/search.html?q=inconsequential>.

<sup>94</sup> <https://www.merriam-webster.com/dictionary/inconsequential>.

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The statutory context is also relevant to the meaning of “inconsequential.”<sup>95</sup> The full text of the inconsequentiality provision is:

On application of a manufacturer, the Secretary shall exempt the manufacturer from this section if the Secretary decides a defect or noncompliance is inconsequential to motor vehicle safety. The Secretary may take action under this subsection only after notice in the Federal Register and an opportunity for any interested person to present information, views, and arguments.<sup>96</sup>

As described above, the statute defines “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 accidents . . . and *against unreasonable risk of death or injury in an accident . . .*”<sup>97</sup>

This is also consistent with the overall statutory purpose: “to reduce traffic accidents and deaths and injuries resulting from traffic accidents.”<sup>98</sup>

The statute explicitly allows a manufacturer to seek an exemption from carrying out a recall on the basis that either a defect or a noncompliance is inconsequential to motor vehicle safety.<sup>99</sup> However, in practice, substantially all inconsequentiality petitions have related to noncompliances, and it has been extremely rare for a manufacturer to seek an exemption in the case of a defect. This is because a manufacturer does not have a statutory obligation to conduct a recall for a defect unless and until it “learns the vehicle or equipment contains a defect and decides in good faith that the defect is related to motor vehicle safety,” or NHTSA orders a recall

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<sup>95</sup> See, e.g., *Taniguchi v. Kan Pac. Saipan, Ltd.*, 566 U.S. 560, 569–72 (2012) (considering ordinary and technical meanings, as well as statutory context, in determining meaning of a “interpreter” under 28 U.S.C. 1920(6)).

<sup>96</sup> 49 U.S.C. 30118(d), 30120(h).

<sup>97</sup> *Id.* 30102(a)(9) (emphasis added).

<sup>98</sup> *Id.* 30101.

<sup>99</sup> *Id.* 30118(d), 30120(h).

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by making a “final decision that a motor vehicle or replacement equipment contains a defect related to motor vehicle safety.”<sup>100</sup> Until that threshold determination has been made by either the manufacturer or the Agency, there is no need for a statutory exception on the basis that a defect is inconsequential to motor vehicle safety. And since a defect determination involves a finding that the defect poses an unreasonable risk to safety, asking the agency to make a determination that a defect posing an unreasonable risk to safety is inconsequential has heretofore been almost unexplored.<sup>101</sup>

Given this statutory context, a manufacturer bears a heavy burden in petitioning NHTSA to determine that a defect related to motor vehicle safety (which necessarily involves an unreasonable risk of an accident, or death or injury in an accident) is nevertheless inconsequential to motor vehicle safety. In accordance with the plain meaning of “inconsequential,” the manufacturer must show that a risk posed by a defect is not important or capable of being ignored. This appropriately describes the actual consequence of granting a petition as well. The manufacturer would be relieved of its statutory obligations to notify vehicle owners and remedy the defect, and effectively ignore the defect as unimportant from a safety perspective. Accordingly, the threshold of evidence necessary for a manufacturer to carry its burden of persuasion that a defect is inconsequential to motor vehicle safety is difficult to satisfy. This is particularly true where the defect involves a potential failure of safety-critical equipment, as is the case here.

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<sup>100</sup> *Id.* 30118(c)(1).

<sup>101</sup> NHTSA notes that the current petition is different in that the inflators were declared defective by the supplier of the airbag, and that GM's defect notice was filed in response to the supplier's notice.

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The Agency necessarily determines whether a defect or noncompliance is inconsequential to motor vehicle safety based on the specific facts before it. The scarcity of defect-related inconsequentiality petitions over the course of the Agency's history reflects the heavy burden of persuasion as well as the general understanding among regulated entities that the grant of such relief would be quite rare. The Agency has recognized this explicitly in the past. For example, in 2002, NHTSA stated that "[a]lthough NHTSA's empowering statute alludes to the possibility of an inconsequentiality determination with regard to a defect, the granting of such a petition would be highly unusual."<sup>102</sup>

Of the three known occasions in which the Agency has previously considered petitions contending that a defect is inconsequential to motor vehicle safety, the Agency has granted only one of the petitions, nearly three decades ago, in a vastly different set of circumstances.<sup>103</sup> In that case, the defect was a typographical error in the vehicle's gross vehicle weight rating (GVWR) that had no impact on the actual ability of the vehicle to carry an appropriate load. NHTSA granted a motorcycle manufacturer's petition, finding that a defect was inconsequential to motor vehicle safety where the GVWR was erroneously described as only 60 lbs., which error was readily apparent to the motorcycle operator based upon both common sense and the fact that the 330 lbs. front axle rating and 540 lbs. rear axle rating were listed directly below the GVWR

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<sup>102</sup> Letter from J. Glassman, NHTSA, to V. Kroll, Adaptive Driving Alliance (Sept. 23, 2002), <https://www.nhtsa.gov/interpretations/ada3>.

<sup>103</sup> *See id.*

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on the same label.<sup>104</sup> Moreover, the error did not actually impact the ability of the motorcycle to carry the weight for which it was designed.<sup>105</sup>

On the other hand, NHTSA denied another petition concerning a vehicle's weight label where there was a potential safety impact. NHTSA denied that petition from National Coach Corporation on the basis that the rear gross axle weight rating (RGAWR) for its buses was too low and could lead to overloading of the rear axle if the buses were fully loaded with passengers.<sup>106</sup> NHTSA rejected arguments that most of the buses were not used in situations where they were fully loaded with passengers and that there were no complaints.<sup>107</sup> NHTSA noted that its Office of Defects Investigation had conducted numerous investigations concerning overloading of suspensions that resulted in recalls, that other manufacturers had conducted recalls for similar issues in the past, and that, even if current owners were aware of the issue, subsequent owners were unlikely to be aware absent a recall.<sup>108</sup>

NHTSA also denied a petition asserting that a defect was inconsequential to motor vehicle safety where the defect involved premature corrosion of critical structure components (the vehicle's undercarriage), which could result in a crash or loss of vehicle control.<sup>109</sup> Fiat

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<sup>104</sup> *Suzuki Motor Co., Ltd.; Grant of Petition for Inconsequential Defect*, 47 FR 41458, 41459 (Sept. 20, 1982) and 48 FR 27635, 27635 (June 16, 1983).

<sup>105</sup> *Id.*

<sup>106</sup> *Nat'l Coach Corp.; Denial of Petition for Inconsequential [Defect]*, 47 FR 49517, 49517 (Nov. 1, 1982). NHTSA's denial was erroneously titled "Denial of Petition for Inconsequential Noncompliance"; the discussion actually addressed the issue as a defect. *See id.*; *see also Nat'l Coach Corp.; Receipt of Petition for Inconsequential Defect*, 47 FR 4190 (Jan. 28, 1982).

<sup>107</sup> *Id.* at 49517-18.

<sup>108</sup> *Id.* at 49518.

<sup>109</sup> *Final Determination & Order Regarding Safety Related Defects in the 1971 Fiat Model 850 and the 1970-74 Fiat Model 124 Automobiles Imported and Distributed by Fiat Motors of N. Am., Inc.; Ruling on Petition of Inconsequentiality*, 45 FR 2134, 2137, 41 (Jan. 10, 1980).

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filed the petition preemptively, following NHTSA's initial decision that certain Fiat vehicles contained a safety-related defect.<sup>110</sup> In support of its petition, Fiat argued that no crashes or injuries resulted from components that failed due to corrosion, and that owners exercising due diligence had adequate warning of the existence of the defect.<sup>111</sup> NHTSA rejected those arguments and both finalized its determination that certain vehicles contained a safety-related defect (*i.e.*, ordered a recall) and found that the defect was not inconsequential to motor vehicle safety.<sup>112</sup> NHTSA explained that the absence of crashes or injuries was not dispositive: "the possibility of an injury or accident can reasonably be inferred from the nature of the component involved."<sup>113</sup> NHTSA also noted that the failure mode was identical to another population of vehicles for which Fiat was carrying out a recall.<sup>114</sup> The Agency rejected the argument that there was adequate warning to vehicle owners, explaining that the average owner does not inspect the underbody of a car and interior corrosion may not be visible.<sup>115</sup>

Agency practice over several decades therefore shows that inconsequentiality petitions are rarely filed in the defect context, and virtually never granted. Nonetheless, in light of the importance of the issues here, and the fact that GM's defect notification was filed in response to

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<sup>110</sup> *Fiat Motors of N. Am., Inc.; Receipt of Petition for Determination of Inconsequential Defect*, 44 FR 60193, 60193 (Oct. 18, 1979); *Fiat Motors Corp. of N. Am.; Receipt of Petition for Determination of Inconsequential Defect*, 44 FR 12793, 12793 (Mar. 8, 1979).

<sup>111</sup> *See, e.g.*, 45 FR 2134, 2141 (Jan. 10, 1980).

<sup>112</sup> *Final Determination & Order Regarding Safety Related Defects in the 1971 Fiat Model 850 and the 1970-74 Fiat Model 124 Automobiles Imported and Distributed by Fiat Motors of N. Am., Inc.; Ruling on Petition of Inconsequentiality*, 45 FR 2137-41 (Jan. 10, 1980). Fiat also agreed to a recall of certain of the vehicles, and NHTSA found that Fiat did not reasonably meet the statutory recall remedy requirements. *Id.* at 2134-37.

<sup>113</sup> *Id.* at 2139.

<sup>114</sup> *Id.*

<sup>115</sup> *Id.* at 2140.

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the notification provided by their supplier, the Agency also considered the potential usefulness of the Agency's precedent on noncompliance. The same legal standard—"inconsequential to motor vehicle safety"—applies to both defects and noncompliances.<sup>116</sup>

In the noncompliance context, in some instances, NHTSA has determined that a manufacturer met its burden of demonstrating that a noncompliance was inconsequential to safety. For example, labels intended to provide safety advice to an occupant that may have a misspelled word, or may be printed in the wrong format or the wrong type size, have been deemed inconsequential where they should not cause any misunderstanding, especially where other sources of correct information are available.<sup>117</sup> These decisions are similar in nature to the lone instance where NHTSA granted a petition for an inconsequential defect, as discussed above.

However, the burden of establishing the inconsequentiality of a failure to comply with a *performance requirement* in a standard—as opposed to a *labeling requirement*—is more substantial and difficult to meet. Accordingly, the Agency has not found many such noncompliances inconsequential.<sup>118</sup> Potential performance failures of safety-critical equipment, like seat belts or air bags, are rarely deemed inconsequential.

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<sup>116</sup> 49 U.S.C. 30118(d), 30120(h).

<sup>117</sup> See, e.g., *Gen. Motors, LLC*; cf. *Grant of Petition for Decision of Inconsequential Noncompliance*, 81 FR 92963 (Dec. 20, 2016). By contrast, in *Michelin*, we reached the opposite conclusion under different facts. There, the defect was a failure to mark the maximum load and corresponding inflation pressure in both Metric and English units on the sidewall of the tires. *Michelin N. America, Inc.*; *Denial of Petition for Decision of Inconsequential Noncompliance*, 82 FR 41678 (Sept. 1, 2017).

<sup>118</sup> Cf. *Gen. Motors Corporation*; *Ruling on Petition for Determination of Inconsequential Noncompliance*, 69 FR 19897, 19899 (Apr. 14, 2004) (citing prior cases where noncompliance was expected to be imperceptible, or nearly so, to vehicle occupants or approaching drivers).

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An important issue to consider in determining inconsequentiality based upon NHTSA's prior decisions on noncompliance issues was the safety risk to individuals who experience the type of event against which the recall would otherwise protect.<sup>119</sup> NHTSA also does not consider the absence of complaints or injuries to show that the issue is inconsequential to safety.<sup>120</sup> "Most importantly, the absence of a complaint does not mean there have not been any safety issues, nor does it mean that there will not be safety issues in the future."<sup>121</sup> "[T]he fact that in past reported cases good luck and swift reaction have prevented many serious injuries does not mean that good luck will continue to work."<sup>122</sup>

Arguments that only a small number of vehicles or items of motor vehicle equipment are affected have also not justified granting an inconsequentiality petition.<sup>123</sup> Similarly, NHTSA has rejected petitions based on the assertion that only a small percentage of vehicles or items of

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<sup>119</sup> See *Gen. Motors, LLC; Grant of Petition for Decision of Inconsequential Noncompliance*, 78 FR 35355 (June 12, 2013) (finding noncompliance had no effect on occupant safety because it had no effect on the proper operation of the occupant classification system and the correct deployment of an air bag); *Osrham Sylvania Prods. Inc.; Grant of Petition for Decision of Inconsequential Noncompliance*, 78 FR 46000 (July 30, 2013) (finding occupant using noncompliant light source would not be exposed to significantly greater risk than occupant using similar compliant light source).

<sup>120</sup> See *Combi USA Inc., Denial of Petition for Decision of Inconsequential Noncompliance*, 78 FR 71028, 71030 (Nov. 27, 2013).

<sup>121</sup> *Morgan 3 Wheeler Ltd.; Denial of Petition for Decision of Inconsequential Noncompliance*, 81 FR 21663, 21666 (Apr. 12, 2016).

<sup>122</sup> *United States v. Gen. Motors Corp.*, 565 F.2d 754, 759 (D.C. Cir. 1977) (finding defect poses an unreasonable risk when it "results in hazards as potentially dangerous as sudden engine fire, and where there is no dispute that at least some such hazards, in this case fires, can definitely be expected to occur in the future").

<sup>123</sup> See *Mercedes-Benz, U.S.A., L.L.C.; Denial of Application for Decision of Inconsequential Noncompliance*, 66 FR 38342 (July 23, 2001) (rejecting argument that noncompliance was inconsequential because of the small number of vehicles affected); *Aston Martin Lagonda Ltd.; Denial of Petition for Decision of Inconsequential Noncompliance*, 81 FR 41370 (June 24, 2016) (noting that situations involving individuals trapped in motor vehicles—while infrequent—are consequential to safety); *Morgan 3 Wheeler Ltd.; Denial of Petition for Decision of Inconsequential Noncompliance*, 81 FR 21663, 21664 (Apr. 12, 2016) (rejecting argument that petition should be granted because the vehicle was produced in very low numbers and likely to be operated on a limited basis).

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equipment are likely to actually exhibit a noncompliance. The percentage of potential occupants that could be adversely affected by a noncompliance does not determine the question of inconsequentiality. Rather, the issue to consider is the consequence to an occupant who is exposed to the consequence of that noncompliance.<sup>124</sup> These considerations are also relevant when considering whether a defect is inconsequential to motor vehicle safety.

## **B. Information before the Agency**

In support of its Petition, GM submitted thousands of pages of information and data, including work by OATK and Cornerstone on GM's behalf, which is summarized above and further discussed below. In addition, the Agency retained Harold R. Blomquist, Ph.D. to consult on scientific issues related to NHTSA's ongoing investigation into Takata PSAN air bag inflators. As part of the Agency's review of GM's Petition, Dr. Blomquist attended presentations by GM made to the Agency and provided a technical assessment of the information provided by GM.

Dr. Blomquist is a highly-regarded and well-qualified expert in the automotive engineering field, who has spent most of his career focused on issues related to "the design of energetic solid materials such as propellants, pyrotechnics, explosives and gas generants (propellants) for missile systems and automotive air bag applications."<sup>125</sup> After earning his Ph.D. from Duke University in 1980, Dr. Blomquist began working in the rocket industry for

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<sup>124</sup> See *Gen. Motors Corp.; Ruling on Petition for Determination of Inconsequential Noncompliance*, 69 FR 19897, 19900 (Apr. 14, 2004); *Cosco Inc.; Denial of Application for Decision of Inconsequential Noncompliance*, 64 FR 29408, 29409 (June 1, 1999).

<sup>125</sup> 2020 Blomquist Report at para. 8.

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Aerojet Strategic Propulsion Corporation and Olin Rocket Research Corporation, where he led propulsion research and development (“R&D”) activities.<sup>126</sup>

After ten years in the rocket industry, Dr. Blomquist transitioned to TRW Automotive in 1990, where the focus of his work was automotive air bag technologies.<sup>127</sup> For the next twenty years, Dr. Blomquist’s work at TRW included inflator design research and energetic materials (propellant, booster, and autoignition) formulation R&D. Notably, during the 1990s, Dr. Blomquist worked on replacing TRW’s azide-based propellant technology, through which he worked with inflators with PSAN oxidizers, like the Takata inflators at issue with this petition.<sup>128</sup>

Because of his work at TRW, Dr. Blomquist holds twenty-five air-bag related patents and was honored twice with product innovation awards related to airbag systems.<sup>129</sup> Further, Dr. Blomquist has published on the subject of airbags and propellants, including “a technical paper describing PSAN-based propellant and corresponding inflator [which was] presented at the national meeting of the American Institute of Chemical Engineers.”<sup>130</sup> Dr. Blomquist’s experience is more fully set forth in his Report, along with his assessments and findings concerning GM’s petition. Dr. Blomquist’s report is available in docket no. NHTSA-2016-0124.

Dr. Blomquist reviewed the technical data provided by GM in support of its Petition, as well as information available to the Agency through its ongoing investigation in EA15-001,

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<sup>126</sup> *Id.* at para. 9.

<sup>127</sup> *Id.*

<sup>128</sup> *Id.* at paras. 13–15.

<sup>129</sup> *Id.* at para. 10.

<sup>130</sup> *Id.* at para. 20.

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including presentations and information submitted by TK Global.<sup>131</sup> Ultimately, Dr. Blomquist concluded that GM's claim that design and environmental features render the GMT900 inflators less likely to rupture is unfounded.<sup>132</sup> Many of GM's enumerated features that allegedly make the GMT900 inflators uniquely resilient to rupture are, in fact, not unique to the GMT900 inflators, and other inflators that possess those characteristics have experienced field and testing ruptures, as well as abnormally high-pressure events indicative of propellant degradation.<sup>133</sup> Further, ballistic testing results for the GMT900 inflators that are subject to this petition include abnormally high-pressure events indicative of potential future rupture risk.<sup>134</sup> These findings illustrate that GM's inflators have a similar, if not identical, degradation continuum to that of the other Takata non-desiccated PSAN inflators, and test results from field-aged inflators are consistent with gradual propellant degradation and expected increasing high-pressure deployments.<sup>135</sup>

In addition, Dr. Blomquist found that the OATK Aging Study—which forms the basis for most of GM's supporting arguments—did not replicate real-world conditions.<sup>136</sup> “Similarly, OATK's predictive model is anchored in key ways to the data derived from OATK's Aging Study, so any weaknesses observed in the Aging Study may explain the Model's inability to

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<sup>131</sup> Some information reviewed by Dr. Blomquist—including certain information submitted by GM—is subject to a request for confidential treatment, and is not publicly available.

<sup>132</sup> 2020 Blomquist Report at paras. 253–56; *see generally id.* at 253–74 (Conclusions).

<sup>133</sup> *See id.* at paras. 259, 263.

<sup>134</sup> *Id.* at paras. 262, 263a.

<sup>135</sup> *Id.* at paras. 262, 269.

<sup>136</sup> *Id.* at para. 271.

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predict observed high pressure events and ruptures of field aged inflators.”<sup>137</sup> Dr. Blomquist concluded, *inter alia*, that the inflators used in GM’s vehicles under Petition here—like other Takata non-desiccated PSAN inflators—are susceptible to propellant degradation as built, and to risk of rupture.<sup>138</sup>

The Agency has independently reviewed all of the information submitted by GM and TK Global on this matter, as well as Dr. Blomquist’s Report. Based upon this information, and applying its expert judgment as the Agency charged with overseeing motor vehicle safety, NHTSA has determined that GM has not demonstrated that the defect is inconsequential to safety in the GMT900 vehicles. The Petition is therefore denied, for the reasons set forth in more detail below.

### **C. Response to GM’s Supporting Information & Analyses**

Rather than focusing on the consequence to an occupant in the event of an inflator rupture,<sup>139</sup> GM instead seeks to show that the GMT900 inflators are not at risk of rupture, contending that GMT900 inflators are “more resilient” to rupture than other Takata PSAN inflators.<sup>140</sup> As discussed above, in support of this argument, GM points to unique inflator design differences and unique vehicle features, as well as testing and field data, aging studies, predictive modeling, risk assessments, and the notion that dealer repairs create a potential risk. GM does not discuss the consequence to an occupant in the event of an inflator rupture, and the

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<sup>137</sup> *Id.* at para. 272.

<sup>138</sup> *Id.* at paras. 273.

<sup>139</sup> In fact, as GM has never observed or induced a rupture of a GMT900 inflator, GM affirmatively stated it could not determine the safety consequence of an inflator rupture in a GMT900 vehicle. *See* GM’s September 2017 Response at 7.

<sup>140</sup> *See, e.g.*, Fourth Petition at 16; GM’s August 23, 2017 Presentation at 33.

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information provided by GM does not persuasively demonstrate any specific or unique resiliency to propellant degradation or inflator rupture in GMT900 inflators. And, as discussed previously, field-return testing of GMT900 inflators show elevated deployment pressures indicative of propellant degradation and future rupture risk.

### **1. Unique Inflator Design Differences and Vehicle Features**

GM has not demonstrated that any of the features described above—either alone or in conjunction with other features or factors—prevents propellant degradation or renders the defect in GMT900 inflators inconsequential to safety.<sup>141</sup> In fact, as outlined below, other Takata inflators with similar design features have experienced ruptures and high-pressure deployments. Similarly, vehicles with lower or similar peak temperatures have also experienced ruptures and high-pressure deployments. Thus, there is no persuasive evidence that GM's claimed "unique" design advantages lead to a reduced risk of inflator rupture.<sup>142</sup>

*Thinner Propellant Wafers.* GM claims that the thinner (8mm) propellant wafers used in the GMT900 inflators have more predictable ballistic properties than thicker (11mm) wafers used in many other Takata PSAN inflator variants, which "create less excess surface area as they degrade."<sup>143</sup> As a result, GM contends that the thinner propellant wafers used in the GMT900

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<sup>141</sup> GM's assertion that strict adherence to the USCAR air bag performance standards "resulted in [GM] inflators with increased inflator-structural integrity, better ballistic performance, and greater resistance to moisture" does not change this conclusion. See Third Petition at 6. As noted above, USCAR standards are utilized across the industry, and adherence to those standards is not particular to the GMT900 inflators at issue. Moreover, gradual density reduction in both the YD and YP inflator variants demonstrate the GMT900 inflators are drafting out of conformance to SAE/USCAR 24-2 safety requirements. 2020 Blomquist Report at para. 265.

<sup>142</sup> See *id.* at para. 233.

<sup>143</sup> Fourth Petition at 6–7; see Third Petition at 6.

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vehicles age more slowly and burn more efficiently than thicker propellant wafers, resulting in a reduced risk of inflator rupture.<sup>144</sup> In support of its argument, GM relies on two comparison inflator variants—the SPI AJ and the PSPI-L FD.<sup>145</sup> Both variants use primarily 11mm wafers, are commonly installed in vehicle platforms with higher peak temperatures, and have been shown in Takata test and field data to age faster and/or show ruptures and abnormal pressures more often than many other variants.<sup>146</sup>

GM's claim that 8mm wafers age more slowly than 11mm wafers is not supported by the results of the OATK Aging Study or by testing data obtained on field aged inflators. There was no significant difference in wafer growth between 8mm wafers and 11mm wafers for the inflators in the OATK Aging Study with as-built moisture levels; accordingly, at comparable moisture and temperature conditions, the growth rates of the two sized wafers are essentially the same.<sup>147</sup> At most, the evidence tends to show that the GMT900 inflators age more slowly than the worst performing inflator variants.<sup>148</sup>

Moreover, the use of thinner wafers is not unique to the GMT900 inflator variants, as 8mm wafers are used in at least twenty-one other Takata PSPI inflator variants.<sup>149</sup> Those non-GM variants using 8mm wafers—including certain variants that share many of the attributes of the GMT900 inflators—are also susceptible to propellant degradation, and have experienced

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<sup>144</sup> See Third Petition at 6; Fourth Petition at 6–7.

<sup>145</sup> See GM's August 23, 2017 Presentation at 44–45.

<sup>146</sup> 2020 Blomquist Report at paras.60–63, 196.

<sup>147</sup> *Id.* at para. 212.

<sup>148</sup> See *id.* at paras. 195, 209–13.

<sup>149</sup> See *id.* at para. 263a.

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ruptures and abnormally high pressures during ballistic testing.<sup>150</sup> Furthermore, GM's contention is undermined by ballistic testing conducted on the YP and YD inflator variants used in the GMT900 vehicles. Thus far, four YD and YP inflators have experienced abnormally high peak pressures consistent with propellant degradation, including one field-returned YP inflator that recorded a 91 MPa peak internal pressure—a near rupture.<sup>151</sup> As more time passes, it is reasonable to anticipate that this trend will continue—as has been seen with non-desiccated PSAN inflators generally.

*Larger Vent Area.* GM claims that a greater vent-area-to-propellant-mass ratio provides for more efficient burning and deployment of the GMT900 inflators, resulting in a reduced risk of inflator rupture.<sup>152</sup> The vent area is not variable in any Takata inflator; that is, the vent area does not change during air bag deployment.<sup>153</sup> While the larger vent size of a GMT900 inflator might provide for more efficient burning during *normal* air bag deployment, the same cannot be said during an abnormal deployment of a defective PSAN inflator.<sup>154</sup> Given the sudden increase in burning surface-area that may occur during an abnormal deployment of a defective PSAN inflator, the vent area may still be overwhelmed causing steep internal pressure increases.<sup>155</sup> Because the vent area of the GMT900 inflators does not, and cannot, change to address the steep

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<sup>150</sup> See *id.* at paras. 194, 263a, 273; GM's August 23, 2017 Presentation at 43–45, 171–178.

<sup>151</sup> GM's February 12, 2018 Presentation at 5–18; GM's April 9, 2018 Presentation at 14–15; GM's June 8, 2018 Presentation at 115; 2020 Blomquist Report at paras. 96–99, 173, 246–49, 263a.

<sup>152</sup> Fourth Petition at 7. While mass (density) is relevant to propellant degradation, it is the vent-area-to-burning-surface-area ratio that is most relevant to GM's claims here. See 2020 Blomquist Report at para. 65.

<sup>153</sup> See 2020 Blomquist Report at para. 65.

<sup>154</sup> See *id.* at paras. 65, 215–22.

<sup>155</sup> See *id.* at paras. 218–20, 263c.

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internal pressure increases that occur when a defective PSAN inflator abnormally deploys, it does not render the inflators resistant to rupture.<sup>156</sup>

*Steel Endcaps.* GM claims that use of a steel endcap on the GMT900 inflators better protects the PSAN propellant from moisture by creating an improved hermetic seal compared to the aluminum endcaps used on other Takata PSAN inflators.<sup>157</sup> However, GM provided no evidence to support this argument or its statement that steel endcaps improved the inflators “resistance to high-internal pressures”<sup>158</sup> beyond an OATK investigation that pre-dated the petition—which, in any event, only illustrated that steel endcaps provide no measurable advantage over other variants with respect to moisture intrusion.<sup>159</sup>

*Other Design Differences.* As noted above, GM observed several other design differences in its presentations to NHTSA, but did not reference or elaborate on these differences in their Petition documents. In any event, the mere mention of these differences—tablets in a cup (for YP variants), the incorporation of a ceramic cushion (also for YP variants), and the incorporation of a bulkhead disk with an anvil (for YD variants)—are unpersuasive.

GM provided no data demonstrating that the behavior of tablets during deployment is a major or secondary factor in the root cause of ruptures arising from degradation, and density data in the OATK aging study “is nearly flat for all three variants at as-built and flat at mid-level

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<sup>156</sup> See *id.* at para. 218, 263c.

<sup>157</sup> Fourth Petition at 7.

<sup>158</sup> *Id.*

<sup>159</sup> See 2020 Blomquist Report at paras. 213–214, 263b.

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moisture levels at all peak temperatures.”<sup>160</sup> GM also did not provide any information supporting the relevance of a ceramic cushion to mitigating inflator rupture or abnormally high-pressure deployments.<sup>161</sup> And data provided by GM showed that, for inflator variants with a bulkhead anvil, the moisture gain in the booster propellant did not significantly change the main propellant moisture levels in inflators, which varied in the same small range across all inflator variants tested in the OATK Aging Study.<sup>162</sup> Since the bulkhead-anvil feature had no effect on the main propellant moisture levels—which would be relevant to propellant degradation, the cause of inflator rupture—GM has not demonstrated that this design characteristic results in a reduced risk of rupture.<sup>163</sup>

*Larger Cabin Volume & Solar Absorbing Glass.* GM claims that the GMT900 vehicles have larger cabin volumes than other vehicles equipped with Takata PSAN inflators, and are all equipped with solar-absorbing glass windshields and side glass, which results in lower internal vehicle temperatures and thus a reduced risk of inflator rupture.<sup>164</sup> However, GM did not provide any data demonstrating the influence of larger cabin volume on peak temperatures independent of temperature band, or any data specific to how solar absorbing glass affects interior vehicle temperatures.<sup>165</sup> In fact, at least one non-GM vehicle has a much smaller cabin, yet has a temperature profile lower than that claimed for the GMT900 vehicles; nonetheless, that

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<sup>160</sup> *Id.* at paras. 70, 223, 263d.

<sup>161</sup> *See id.* at paras. 71, 224, 263e.

<sup>162</sup> *Id.* at paras. 225–26, 263f.

<sup>163</sup> *See id.*

<sup>164</sup> First Petition at 12; Second Petition at 11–12; Third Petition at 7–8; Fourth Petition at 7.

<sup>165</sup> *See* 2020 Blomquist Report at paras. 73–74, 228, 230.

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vehicle—a mid-sized pick-up truck—experienced an inflator rupture.<sup>166</sup> Further, GM did not demonstrate that these alleged lower internal vehicle temperatures rendered the GMT900 inflators more resilient to rupture. Vehicles with similar, if not lower, peak vehicle temperatures have experienced inflator rupture and abnormally high-pressure deployments—including that of an inflator variant that is nearly identical to the GMT900 YP inflator variant.<sup>167</sup> Additionally, as explained below, at least four inflators from GMT900 vehicles have experienced abnormally high internal pressure deployments indicative of propellant degradation and increased risk of rupture. Given the evidence of degradation in GMT900 inflators and inflator variants that possess the same design features, the evidence does not demonstrate that the GMT900 vehicle environment characteristics appreciably reduce the risk of inflator rupture for defective Takata non-desiccated PSAN inflators.

GM further provided data from ballistic testing, field data, and temperature and aging studies, as well as outputs from a predictive model purporting to show that the GMT900 inflators pose a lower risk of rupture. As outlined below there are a number of compounding concerns with the information and analyses presented that render GM's arguments unpersuasive.

## **2. Testing & Field Inflator Analyses**

*Testing by Takata.* In its Third Petition, GM claims that none of the GMT900 field return inflators collected and sent to Takata for ballistic testing and analysis ruptured or demonstrated

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<sup>166</sup> See *id.* at para. 74.

<sup>167</sup> See *id.* at paras. 74, 200, 263g; GM's August 23, 2017 Presentation at 45.

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elevated deployment pressure or other signs of abnormal deployment.<sup>168</sup> In its Fourth Petition, GM amended this claim to only assert that none of the field return inflators had ruptured.<sup>169</sup> This change may be in response to MEAF data indicating that at least four inflators recovered from GMT900 vehicles in Zone A experienced abnormally high pressure during ballistic testing: three YP variant inflators and one YD inflator returned from MY 2007 GMT900 vehicles experienced high-pressure deployments. One of these even reached a pressure of 91 MPa: a near rupture.<sup>170</sup> It is true that, at present, there is no known incident of a rupture of a GMT900 inflator during ballistic testing having occurred during the pendency of GM's petition. However, this does not show that the defect here is inconsequential to safety. Instead, the testing results indicate that these inflators—even encompassing all of the design “advantages” claimed by GM—have and will continue to suffer propellant degradation in a manner similar to the other non-desiccated PSAN inflators.<sup>171</sup>

GM sought to distinguish the YP inflator that experienced the near-rupture ballistic result by categorizing it as a “Gen1” YP inflator that differs from “Gen2” YP inflators based on a shift from propellant tablets to granules, a minor decrease in the amount of tablet propellant weight, the use of a cup instead of a sleeve to hold the propellant tablets, and the addition of the ceramic cushions.<sup>172</sup> As discussed above, GM has not shown that these particular features prevent propellant degradation or provide special resiliency against inflator rupture.<sup>173</sup> Both Gen1 and

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<sup>168</sup> Third Petition at 13.

<sup>169</sup> Fourth Petition at 12.

<sup>170</sup> See 2020 Blomquist Report at paras. 246–49.

<sup>171</sup> See *id.* at paras. 246–49, 267–69, 250–52, 273–74.

<sup>172</sup> See GM Presentation to NHTSA February 12, 2018, 5–18; 2020 Blomquist Report at paras. 97, 247.

<sup>173</sup> See also 2020 Blomquist Report at paras. 97, 247, 267.

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Gen2 use the same number of 8mm wafers, have the same vent area, and experience the same in-vehicle environmental conditions; yet, the 91 MPa deployment is clear evidence that the YP variant is experiencing propellant degradation that leads to ruptures and/or abnormally high internal inflator pressures.<sup>174</sup> In addition, the nearly identical SPI DH/MG inflator variant—which shares most design attributes, the same diameter growth rate, and the same peak vehicle temperature band—exhibited a rupture rate of 1 per 6,771 during ballistic testing.<sup>175</sup> GM has not explained how these ballistic test results can be reconciled with its position that the GMT900 inflators will not rupture “within even unrealistically conservative vehicle-service life estimates.”<sup>176</sup> Given the severity of a rupture outcome, the observed propellant degradation in the GMT900 inflators and inflator variants with similar (if not identical) characteristics cannot be ignored; these test results are consistent with the notion that the GMT900 inflators have and will continue to suffer propellant degradation in a manner similar to other non-desiccated PSAN inflators.

Further, NHTSA has concerns about the size of the ballistic-testing population. GM asserts that in deploying over 4,200 inflators taken from GMT900 vehicles, none have ruptured.<sup>177</sup> By comparison, the total GMT900 population under consideration is nearly 5.9 million vehicles. Thus, the number of ballistic tests conducted is approximately 0.07% of the total GMT900 population. Even when only comparing the number of inflators tested to the

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<sup>174</sup> See *id.* at paras. 247–48.

<sup>175</sup> See *id.* at paras. 200, 248–49.

<sup>176</sup> See Fourth Petition at 4.

<sup>177</sup> *Id.* at 12.

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approximately 2 million 2007 and 2008 MY GMT900 vehicles under Petition (the oldest GMT900 vehicles covered by the Petition), the number of ballistic tests conducted is approximately 0.21% of that total population. By comparison, for example, that percentage of the GMT900 population tested is smaller than the percentage of inflators tested, as of November 2019, in a population of a non-GM mid-sized pick-up vehicle—1.81%—with one observed test rupture. Rupture risk in non-desiccated PSAN inflators increases with age/exposure; although testing may not yet have resulted in a rupture, that does not mean that ruptures will not occur in the future.

*Stress-Strength Interference Analysis.* In the First and Second Petitions, GM includes a “stress-strength interference analysis” that, it contended, suggests that propellant in MY 2007 and 2008 GMT900 inflators had not degraded to a sufficient degree to create a rupture risk.<sup>178</sup> GM explains stress-strength interference analysis as the plotting of curves on a graph related to the diameter of field-returned YP and YD inflators and the diameter of non-GM inflators that have ruptured during ballistic testing; the amount of overlap between the two curves “represents the probability of rupture in a particular group of inflators.”<sup>179</sup> GM did not discuss this assessment in its Third or Fourth Petitions, appearing to have largely abandoned it in favor of the OATK Aging Study and OATK Model discussed below. In any event, NHTSA does not find it persuasive or determinative on the question of inconsequentiality.

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<sup>178</sup> First Petition at 15–17; Second Petition at 15–17.

<sup>179</sup> Second Petition at 16.

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First, this analysis only measures the outside diameter of propellant wafers. While wafer growth and diameter are an indicator of propellant degradation, they are not the only indicator that degradation has occurred. As seen in inflators returned from the field, degradation is evidenced by the formation of pores or fissures in the propellant wafers, as well as changes in the propellant wafer density and diameter.<sup>180</sup> Therefore, reliance on wafer growth alone is of limited utility. And second, this analysis focused on propellant with an average age of eight to nine years. As the vast majority of inflators take longer than that time period to experience propellant degradation sufficient for rupture, looking at inflators of this age is also of limited value.<sup>181</sup>

*Crash Deployment Estimates.* In the Fourth Petition, GM estimates that 66,894 Takata passenger air bag inflators have deployed in GMT900 vehicles without a reported rupture.<sup>182</sup> It is true that during the pendency of GM's petition, there is no known incident of a rupture of a GMT900 inflator in the field. However, that a rupture has not yet occurred or been reported does not mean that a rupture will not occur in the future. This is particularly relevant in the case of Takata non-desiccated PSAN inflators, where the risk of rupture increases as inflators age and have more exposure to heat and humidity, and in the HAH and Zone A geographic areas described above, first becomes manifest after more than ten years in service.

Moreover, GM's assertions based on "rupture-free" crash deployment estimates provide no support for the notion that, in the event of a GMT900 inflator rupture, the result will be

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<sup>180</sup> See 2020 Blomquist Report at paras. 42, 44–45, 53.

<sup>181</sup> See *id.* at paras. 234, 266 (noting also the "wide variation of vehicle utilization by consumers" that "makes the analysis difficult to use with confidence"). Indeed, GM's analysis did not address the rupture of an inflator variant with a wafer-growth rate similar to the YP variant, which ruptured at a field age of 11.6 years in Florida. *Id.* at para. 235.

<sup>182</sup> Fourth Petition at 12.

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inconsequential to safety. As noted above, when taking into consideration the Agency's noncompliance precedent, the likelihood of a rupture is not the only relevant factor here. Indeed, an important factor is also the severity of the consequence of the defect were it to occur—*i.e.*, the safety risk to an occupant who is exposed to an inflator rupture. The known consequence of a rupturing Takata non-desiccated PSAN air bag inflators is quite severe: the spraying of metal shrapnel toward vehicle occupants. GM does not provide any information to suggest that result would be any different were such an inflator to rupture in a GMT900 vehicle.

Even if GM's crash deployment estimates were informative, GM's estimate does not prove a helpful comparison, as it includes both air bag deployments in vehicles when they were new and unlikely to have experienced propellant degradation, as well as deployments in vehicles that were older and exposed to more temperature fluctuation and environmental moisture (*i.e.*, degradation). This estimate therefore fails to account for the differences in the risk of rupture for new vehicles and older vehicles. Additionally, in estimating the number of past GMT900 air bag deployments GM utilized its own attrition model, which resulted in a higher estimated number of deployments when compared to estimates based on NHTSA's attrition models.<sup>183</sup>

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<sup>183</sup> See GM's June 18, 2018 Presentation at 36. Had GM used either the NHTSA 1995 or NHTSA-EPA 2016 attrition models when the estimating the number of GMT900 air bag deployments that have occurred in the past, GM would have estimated there to have been fewer rupture-free deployments of its inflators in the field. See NHTSA 1995 attrition model: *Updated Vehicle Survivability and Travel Mileage Schedules*, NHTSA (Report Number: DOT HS 808 339) (Nov. 1995); NHTSA-EPA 2016 attrition model: EPA, CARB, & NHTSA, Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025, EPA-420-D-16-900 July 2016, available at <https://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/Draft-TAR-Final.pdf>.

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GM's estimate also is based only on reported ruptures, and passenger air bag ruptures in the field may not always be reported (and as such)—particularly if no passenger was present in the seat at the time of rupture.

### **3. Aging Studies<sup>184</sup>**

The parameters of the OATK Aging Study are discussed above, and while the Agency appreciates the work that went into the Study, the Agency does not find the results of the Study persuasive for making an inconsequentiality determination, for several reasons. As an initial matter, certain inputs into the OATK Study are not sufficiently reliable. Temperature data from the GM Temperature Study and the Atlas Cabin Temperature Study informed the OATK Study's temperature cycles and temperature bands.<sup>185</sup> However, the GM Temperature Study included only two of the twelve vehicle models covered by the Petition, and was limited to only a handful of vehicles.<sup>186</sup> The Atlas Cabin Temperature Study also only utilized eleven non-GM vehicles and the Pontiac Vibe—no GMT900 vehicles.<sup>187</sup> In addition, for the GM Temperature Study, GM reported on one, two, or three vehicles subjected to testing for lengths of time that, at most, were only vaguely described—information that is critical to determining the reliability of the

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<sup>184</sup> As noted above, the GM Aging Study was intended to demonstrate the short-term safety of GM's inflators while the longer-term OATK Aging Study was conducted. In previously granting GM additional time to provide evidence in support of its Petition, the Agency found GM's reliance on, *inter alia*, GM's Aging Study, as "probative evidence" to support its claim of inconsequentiality. 81 FR 85681, 85684 (Nov. 28, 2016). The Agency only found this information tended to support GM's petition "at least with respect to the short-term safety" of the GMT900 inflators—it was not sufficient to prove inconsequentiality. It does not appear that GM directly relies on the results of the GM Aging Study in reaching its conclusions, and therefore we do not analyze it here.

<sup>185</sup> 2020 Blomquist Report at para. 112.

<sup>186</sup> See GM's August 23, 2017 Presentation at 171.

<sup>187</sup> See *id.*; *supra* note 51 and accompanying text; 2020 Blomquist Report at para. 108.

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study.<sup>188</sup> Furthermore, the OATK Aging Study was based on analysis of fewer than 1,000 artificially aged inflators.<sup>189</sup> As outlined above, such low sample sizes (both in input from the temperature studies, and in the number of inflators tested) limits confidence in the Aging Study results, as well as any further study or model that relies on the results of that Aging Study.

Second, importantly, the OATK Aging Study did not appear to accurately replicate the real-world degradation process observed to occur in field-aged inflators.<sup>190</sup> The underlying defect in the GMT900 inflators is a consequence of inflator propellant degradation. As seen in inflators returned from the field, degradation is evidenced by the formation of pores or fissures in the propellant wafers, as well as changes in the propellant wafer density and diameter. While the Aging Study did show changes in inflator wafer density and diameter, the density changes observed during the Study did not replicate field aging in inflators of very-high moisture content, nor did it replicate the formation of pores or fissures seen in field-aged inflators.<sup>191</sup> Additionally, the lab-aged inflators in the OATK Aging Study showed no tendency to increase in pressure when wafers were above the diameter where accelerated burning is expected,<sup>192</sup> despite this result being well-documented in most Takata inflator variants.<sup>193</sup>

A third concern is the Aging Study's presumption that fifty-six four hour cycles of laboratory accelerated aging is equivalent to one year of aging in the field. It is the Agency's

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<sup>188</sup> See 2020 Blomquist Report at para. 106.

<sup>189</sup> See First Petition, Ex.D (reflecting 891 inflators in Statement of Work); GM's August 23, 2017 Presentation at 24 ("700+ Inflators").

<sup>190</sup> See 2020 Blomquist Report at paras. 236–45, 271.

<sup>191</sup> See *id.*

<sup>192</sup> GM August 23, 2017 Presentation at 17–18.

<sup>193</sup> 2020 Blomquist Report at para. 239.

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understanding that this “equivalent year” is derived from the number of days in Miami, FL that GM presented as reaching temperatures above 90°F.<sup>194</sup> However, this presumes that propellant degradation only occurs on days or times that reach peak temperatures of 90°F, which is not correct as demonstrated by the many inflators—both in the field and in testing—that have been exposed to lower temperatures and still experienced propellant degradation and inflator rupture.<sup>195</sup> This test scheme also presumes that the temperature cycle can be condensed from a twenty-four hour day to four hours without compromising or altering the type of degradation caused to the propellant.<sup>196</sup> Based upon the information presented to NHTSA, it does not appear that this was the case.

It is also appropriate to note here that GM’s reliance on the use of “comparison inflators” throughout its research (the SPI AJ and PSPI-L FD—the latter of which was, for example, included in the OATK Aging Study) to demonstrate the safety of the GMT900 inflators is misplaced. First, arguing that the GMT900 inflators are “safer” than other inflators with the same defect does not answer the question of whether that defect is inconsequential to safety. Second, the selected comparison inflators have been shown in Takata test and field data to age faster and show ruptures and abnormal pressures more often than many other variants.<sup>197</sup> Additionally, unlike the GMT900 inflator variants, the comparison variants use primarily 11mm wafers (as opposed to 8mm wafers) and are installed on vehicles with higher peak temperatures

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<sup>194</sup> *Id.* at para. 241; *see generally* GM’s August 23, 2017 Presentation at 12.

<sup>195</sup> 2020 Blomquist Report at para. 241.

<sup>196</sup> *Id.* at para. 242; *see id.* at para.270.

<sup>197</sup> *See id.* at paras. 196–205.

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than what GM claims as the GMT900 peak temperature.<sup>198</sup> Comparing GMT900 inflators to such disparate non-GM inflators does little to quantify the risk posed by GM's inflators, and does not demonstrate that the defect is inconsequential to safety.

And finally, analysis of other inflator variants that possess the same attributes as the GMT900 inflators also weakens GM's claim that the unique inflator design differences and vehicle environment of the GMT900 vehicles render the GMT900 inflators more resilient to rupture. The non-GM SPI DH/MG inflator variant is nearly identical to GM's YP inflator in that it also uses 8mm wafers and enjoys a low peak inflator surface temperature. Data showed that diameter measurements for the (GM) YP inflators and (non-GM) DH/MG inflators were essentially the same after field aging, reinforcing the similarity of the two variants.<sup>199</sup> Notably, the DH/MG inflator variant has exhibited a rupture rate of 1 per of 6,771 ballistic tests. GM has not provided any further, persuasive information that would explain how these ballistic results can be reconciled with GM's position that its YP inflators will not rupture "within even unrealistically conservative vehicle-service life estimates."<sup>200</sup>

Similarly, the non-GM PSPI-6 YB and PSPI-6 XG inflator variants, which both use primarily 8mm wafers, can provide insight into GM's YD inflators.<sup>201</sup> The YB variant is used on two non-GM vehicle platforms, one of which provides peak vehicle temperatures slightly lower than the GMT900, and one of which provides peak vehicle temperatures slightly higher than the

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<sup>198</sup> *Id.* at para. 196.

<sup>199</sup> GM's August 23, 2017 presentation at 45; 2020 Blomquist Report at para. 199 & n.13.

<sup>200</sup> *See* Fourth Petition at 4.

<sup>201</sup> *See* 2020 Blomquist Report at paras. 201–05.

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GMT900. The non-GM platform using the YB variant that experiences higher peak vehicle temperature conditions has experienced at least one field rupture, three inflator ruptures during field-return ballistic testing, and one abnormally high-pressure result during ballistic testing.<sup>202</sup> “These results indicate that an 8mm wafer inflator variant experiencing high peak inflator temperature in Zone A can rupture at a similar age to the Vibe PSPI-L FD (with an 11mm wafer) that GM used for comparison.”<sup>203</sup> Another non-GM vehicle platform using 8mm wafers in the PSPI-6 XG variant has demonstrated ruptures or abnormally high pressures during ballistic testing at a rate of 1.06% of inflators tested, with all ruptures occurring in inflators field aged 9.4 to 10.3 years.<sup>204</sup> Even assuming this vehicle platform had a higher peak vehicle temperature than that alleged for the GMT900 vehicles, analysis of these similar inflator variants contradicts GM’s claims that thinner propellant wafers render the GMT900 inflators less susceptible to rupture and degradation.

Given the severity of a rupture outcome, the observed propellant degradation in the GMT900 inflators and inflator variants with similar (if not identical) characteristics cannot be ignored; these test results are consistent with the notion that the GMT900 inflators have and will continue to suffer propellant degradation in a manner similar to other non-desiccated PSAN inflators—and, in all events, that the risk is not inconsequential to safety.

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<sup>202</sup> *Id.*; information received by NHTSA pursuant to Standing General Order 2015-01A.

<sup>203</sup> 2020 Blomquist Report at para. 204.

<sup>204</sup> *Id.* at para. 205.

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#### **4. Predictive Modeling**

As noted above, it is the Agency's understanding that this Model was informed by the GM Temperature Study and the Atlas Cabin Temperature Study, as well as the GM Aging Study and the OATK Aging Study.<sup>205</sup> Accordingly, the concerns the Agency has with those inputs (also described above) also adversely affect the reliability of the Model as it applies to GM's arguments here. The implications of this are even more pronounced when the number of trials in the underlying simulation are too small to detect certain rupture rates: If the risk of rupture is 1 in 100,000, then based on a Monte Carlo simulation with 32,000 trials, the OATK Model output would likely predict a zero risk of rupture, clearly understating the potential risk. Even setting aside concerns regarding the inputs, given the relative rarity of high pressure and rupture events across the non-desiccated PSAN inflator population, it is difficult to place much reliability on the OATK Model outputs when evaluating the likelihood of a rupture of a YP or YD inflator variant.<sup>206</sup>

Additionally, the OATK Model outputs underestimate the risk for consumers with YP or YD inflators exposed to the most extreme conditions. The OATK Model selects 32,000 random scenarios that combine different inputs of density and pressure; some of the 32,000 selected scenarios will pose a higher risk (*i.e.*, have a combination of density and pressure that is more

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<sup>205</sup> See also *id.* at paras. 250, 272.

<sup>206</sup> See *id.* at para. 252 (observing high-pressure and rupture events in the Takata non-desiccated PSAN population "are relatively rare . . . for all vehicle platforms, with rupture rates for most variants well under 1%. Modeling at sufficient fidelity to predict low frequency events is challenging"). The Model's reliability for the purpose of advancing GM's arguments here is further called into question by its inability to produce similar probabilities for GM's YP inflators and the non-GM DH/MG inflators, which are nearly identical. See *id.*

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rupture-prone) and some will pose a lower risk (*i.e.*, be less rupture-prone).<sup>207</sup> As a result, the output will tend to reflect the risk posed by an average inflator, thereby underestimating the risk posed by inflators subjected to the most extreme conditions. These shortcomings also reflect an underestimation of how quickly an inflator degrades—undermining GM's claim that GMT900 inflators will not reach a "threshold risk level" within 30 years of worst case environmental field exposure in Miami.

## **5. Risk Assessments**

GM also presented statistical risk assessments from third parties Cornerstone and Professor Barnett, and OATK, which attempted to quantify the future risk of rupture for the GMT900 inflator variants, as described above. NHTSA does not find GM's statistical analysis persuasive, as there are multiple foundational concerns with GM's risk estimates.

First, GM's risk assessments depend upon the inputs and outputs from the OATK Model, the OATK Aging Study, and GM's crash data estimates, as well as information from the MEAF file.<sup>208</sup> Given the extent to which GM's various analyses and assessments inform one another, it is critical that the studies that fall earlier in the chain and the associated results and conclusions are sound. As described above, GM has not demonstrated the reliability and persuasiveness of those studies or the associated results and conclusions.

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<sup>207</sup> See GM's June 8, 2018 Presentation at 10–14.

<sup>208</sup> See Third Petition at 15; GM's August 23, 2017 Presentation at 22, 24–30; GM's June 8, 2018 Presentation at 11–17, 24–26.

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Second, it is a basic principle of statistics that to demonstrate an outcome with higher confidence, all other things being equal, larger sample sizes are necessary.<sup>209</sup> Given the low number of inflators tested and utilized in the earlier studies<sup>210</sup>—particularly when combined with the challenge posed by using models to predict low-frequency events—it is difficult to have confidence in GM's risk estimates, especially in the context of a decision on inconsequentiality. Moreover, GM did not provide any margins of error on their risk estimates—particularly important when evaluating the risk of a catastrophic event like an inflator rupture.<sup>211</sup>

Third, GM's comparative risk assessments (comparing the rupture rate of GMT900 inflators to those of other inflators through the OATK Aging Study, Takata MEAF data, and GM's crash estimates)<sup>212</sup> simply assert that GMT900 inflators are safer than other inflators—not that the defect is inconsequential.

And fourth, even to the extent GM's per-deployment or lifetime risk estimates inform the question of inconsequentiality, they do not reflect the compounding risk that arises from having millions of affected vehicles. The per-deployment risk is the risk that one specific air bag will rupture; the fleet-level risk is the probability that at least one air bag will rupture among the thousands of air bag deployments expected to occur in the nearly 5.9 million affected GMT900 vehicles over the coming years. GM did not provide any risk assessments that acknowledge the

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<sup>209</sup> See generally NIST/SEMATECH e-Handbook of Statistical Methods at 6.2.3.2, available at <http://www.itl.nist.gov/div898/handbook> (choosing a sampling plan with a given Operating Characteristic ("OC") Curve; *id.* at 7.2.2.2 (providing example calculation of sample-size estimate for limiting error); *id.* at 3.1.3.4 (Populations and Sampling).

<sup>210</sup> See generally *supra*.

<sup>211</sup> While GM's upper bounds on the lifetime risk could be construed as a type of margin of error, it does not take into account important sources of variation, such as the Monte Carlo simulation.

<sup>212</sup> See GM's June 8, 2018 Presentation at 20–22.

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risk presented by the GMT900 inflator population as a whole, even though the fleet-level risk would be much larger than the per-deployment risk.

NHTSA also has additional, specific concerns about GM's various risk estimates. GM's comparative risk assessments—to the extent they inform the question of inconsequentiality—are undercut by the ballistic results showing elevated pressures discussed above. That a rupture has not yet been observed does not mean that ruptures will never occur—nor that the risk to safety is inconsequential—and estimates that ignore evidence that GM's inflators are experiencing a similar manner of degradation do not provide meaningful comparison.

In addition, GM's comparative risk estimates pool the risk posed by inflators across ages and/or Zones, even though the risk of rupture varies greatly between Zones A, B, and C and as the inflators age.<sup>213</sup> This pooling typically dilutes the risk that exists in the higher risk Zone A by combining it with the lower risk Zones.<sup>214</sup> Similarly, pooling younger inflators with older inflators dilutes the estimated risk of rupture for those older inflators, particularly as inflator age plays a vital role in the underlying defect. GM's comparative assessment of estimated field crash rupture rates also assumes both that GM's crash deployment estimates are accurate and that passenger air bag ruptures are reported (as such). As discussed above, these assumptions are not supported.<sup>215</sup>

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<sup>213</sup> See GM's June 8, 2018 Presentation at 21–22, 39.

<sup>214</sup> GM's July 2018 Response (Ex.A) did provide estimates specific to Zone A; however, the response pooled the risk for the two inflator variants (YD and YP).

<sup>215</sup> There were also significant inconsistencies between the production numbers GM relied upon in arriving at these estimates and comparative registration data. See GM's July 2018 Response at 6–8. Additionally, GM's future deployment risk estimates assume that a passenger will be present in 25% of future GMT900 crashes, which is not consistent with National Automotive Sampling System General Estimates System (NASS GES) estimates.

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Similarly concerning is that GM's per-deployment risk estimate of zero percent for the GMT900 vehicles relies on the assumption that GM's vehicles have a low vehicle cabin temperature,<sup>216</sup> but data provided by GM suggested that at least one GMT900 variant fell within a higher temperature range during testing—undermining both its risk estimates and GM's argument that all GMT900 vehicles have a lower cabin temperature due to a unique vehicle environment.<sup>217</sup> GM's "lifetime risk" estimate similarly suffers from questionable temperature range assumptions.<sup>218</sup> Moreover, the YP inflators will deploy any time sensors determine a crash of sufficient force is in progress—whether a passenger is present or not.<sup>219</sup> It is therefore not accurate to assume that occupants would not be harmed by the rupture of a passenger air bag when no passenger is present; indeed, occupants have suffered injuries from Takata inflator ruptures that did not occur directly in front of them.<sup>220</sup> And just like the assessments comparing GMT900 inflator rupture rates to the OATK Aging Study and MEAF data, GM's prediction of future rupture rates implies that because ruptures have (reportedly) not yet occurred they are unlikely to occur in the future. As this assumption is not accurate, these estimates are not persuasive in supporting GM's position that the Takata PSAN defect in the GMT900 vehicles is inconsequential to safety.

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<sup>216</sup> *Id.* Ex.C (providing, *inter alia*, temperature bands and probability).

<sup>217</sup> *See* GM's August 23, 2017 Presentation 8 (reflecting average peak and maximum peak temperatures in Michigan, Florida, and Arizona).

<sup>218</sup> *See* GM's June 8, 2018 Presentation at 26 (utilizing an average probability of failure for T1 and T2 as an upper bound).

<sup>219</sup> *See id.* at 36 (reflecting 25% passenger air bag activation rate for YD, and 100% activation rate for YP in front deployment level crashes).

<sup>220</sup> Information received by NHTSA pursuant to Standing General Order 2015-01A.

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## **6. Dealer Replacements as Risk Creation**

Finally, GM's claim that dealers conducting repairs for these vehicles could "create risk" to consumers<sup>221</sup> has no bearing on the question of whether the defect is inconsequential to safety. Even if the Agency were to consider any potential risk posed by potential improper repair in analyzing the consequentiality of a rupturing inflator, GM provided no information to corroborate or support this broad, speculative statement. GM can and does ensure quality recall repairs by specifying technician qualifications and repair techniques for its franchised dealer network.

## **V. Decision**

The relief sought here is extraordinary, and GM's Petition goes far beyond the scope and complexity of any inconsequentiality petition that the Agency has considered, let alone granted. This is with respect not only to the volume of information and analyses bearing on the issue, but also the nature of the defect and associated safety risk. Indeed, the Petition concerning GMT900 inflators is quite distinct from the previous petitions discussed above, for example, relating to defective labels that may (or may not) mislead the user of the vehicle to create an unsafe condition.<sup>222</sup> Nor is the risk here comparable to a deteriorating exterior component of vehicle that—even if an average owner is unlikely to inspect the component—might (or might not) be visibly discerned.<sup>223</sup>

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<sup>221</sup> Third Petition at 17; *see also* Fourth Petition at 16; GM's June 8, 2018 Presentation at 5.

<sup>222</sup> *See Nat'l Coach Corp.; Denial of Petition for Inconsequential [Defect]*, 47 FR 49517 (Nov. 1, 1982); *Suzuki Motor Co., Ltd.; Grant of Petition for Inconsequential Defect*, 48 FR 27635 (June 16, 1983).

<sup>223</sup> *See Final Determination & Order Regarding Safety Related Defects in the 1971 Fiat Model 850 and the 1970-74 Fiat Model 124 Automobiles Imported and Distributed by Fiat Motors of N. Am., Inc.; Ruling on Petition of Inconsequentiality*, 45 FR 2134 (Jan. 10, 1980).

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Rather, the defect here poses an unsafe condition caused by the degradation of an important component of a safety device that is designed to protect vehicle occupants in crashes. Instead of protecting occupants, this propellant degradation can lead to an uncontrolled explosion of the inflator and propel sharp metal fragments toward occupants in a manner that can cause serious injury, including lacerations to the face, neck and chest, and even death.<sup>224</sup> This unsafe condition—hidden in an air bag module—is not discernible even by a diligent vehicle owner, let alone an average owner.<sup>225</sup>

Moreover, nineteen manufacturers (including GM for other populations of their vehicles) have conducted similar recalls of other non-desiccated PSAN inflators. NHTSA has been offered no persuasive reason to think that without a recall, even if current owners are aware of the defect and instant petition, subsequent owners of vehicles equipped with GMT900 air bag inflators would be made aware of the issue.<sup>226</sup> This is not the type of defect for which notice alone enables an owner to avoid the safety risk. A remedy is required.

The threshold of evidence necessary to prove the inconsequentiality of a defect such as this one—involving the potential performance failure of safety-critical equipment—is very

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<sup>224</sup> Cf. *Gen. Motors, LLC; Grant of Petition for Decision of Inconsequential Noncompliance*, 78 FR 35355-01, 2013 WL 2489784 (June 12, 2013) (finding noncompliance inconsequential where “occupant classification system will continue to operate as designed and will enable or disable the air bag as intended”).

<sup>225</sup> See *Final Determination & Order Regarding Safety Related Defects in the 1971 Fiat Model 850 and the 1970-74 Fiat Model 124 Automobiles Imported and Distributed by Fiat Motors of N. Am., Inc.; Ruling on Petition of Inconsequentiality*, 45 FR 2134 (Jan. 10, 1980) (rejecting argument there was adequate warning to vehicle owners of underbody corrosion, as the average owner does not undertake an inspection of the underbody of a vehicle, and interior corrosion of the underbody may not be visible).

<sup>226</sup> See *Nat'l Coach Corp.; Denial of Petition for Inconsequential [Defect]*, 47 FR 49517 (Nov. 1, 1982) (observing, *inter alia*, that other manufacturers had conducted recalls for similar issues in the past, and that, even if current owners were aware of the issue, subsequent owners were unlikely to be aware absent a recall).

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difficult to overcome. GM bears a heavy burden, and the evidence and argument GM provides suffers from numerous, significant deficiencies, as previously described in detail.

The “unique” inflator design differences and vehicle features to which GM points are unpersuasive. The use of thinner wafers is not unique to GMT900 inflators—other Takata inflator variants with 8mm wafers have experienced ruptures and abnormally high pressures during ballistic testing—and the results of the OATK Aging Study and testing data obtained on field aged inflators, at most, show that GMT900 inflators age more slowly than the worst performing inflator variants. Moreover, four GMT900 inflators have experienced abnormally high peak pressures consistent with propellant degradation. Larger vent areas in GMT900 inflators do not render those inflators more resistant to rupture, as the vent area does not change to address steep internal pressure increases that occur when a defective PSAN inflator abnormally deploys. GM did not demonstrate that steel endcaps provide any measurable advantage over other variants with respect to moisture intrusion. GM did not provide data demonstrating a correlation between lower peak temperatures and either solar absorbing glass or larger cabin volume, or demonstrate that alleged internal vehicle temperatures rendered the GMT900 inflators more resilient to rupture. And other design differences to which GM points—tablets in a cup, the incorporation of a ceramic cushion, and the incorporation of a bulkhead disk with an anvil—were not discussed in detail in its Petition, and in any event, either lack supporting data, or the data that GM did provide does not demonstrate that the design difference results in a reduced risk of rupture.

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GM's stress-strength interference analysis ignores other indicators of propellant degradation, and relies heavily on relatively young inflators. And GM's crash deployment estimates also raise concerns for the Agency. That a rupture has not yet occurred or been reported does not mean that a rupture will not occur in the future, and it provides no support for the notion that in the event of a rupture, the result will be inconsequential to safety. Moreover, GM's estimates incorrectly imply that older vehicles have the same risk of rupture as newer vehicles, use GM's own attrition model instead of NHTSA's, and assume consistent reporting of ruptures and injuries despite GM having done no testing or analysis to determine the impact of a rupture.

The aging studies on which GM relies are similarly deficient and unpersuasive. These studies are adversely affected by inputs from two other studies that were not specific to GMT900 vehicles (in one of which certain information was vaguely described) and were limited in sample size. The OATK Aging Study also does not appear to replicate real-world propellant degradation, including degradation that might occur on days or times that do not reach peak temperatures of 90°F, even though degraded and ruptured inflators in the field and in testing show that degradation occurs at lower temperatures. In addition, in its research, GM used certain comparison inflators despite key differences between the GMT900 inflators in wafer diameter and peak-temperature exposure. The comparison inflators have also been shown in testing and field data to age faster and show ruptures and abnormal pressures more often than many other variants, and there are other comparator candidates that have ruptured in ballistic testing—and one such inflator ruptured at least once in the field. And in any event, contending that the

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GMT900 inflators are “safer” does not answer the question of whether the defect is inconsequential to safety.

GM’s predictive modeling and risk assessments are also adversely affected by unreliable inputs, with the former also understating the potential risk and the latter further limited by sample size, the pooling of risk across inflator age and zone in comparative risk assessments (which only assert that GMT900 inflators are safer than other inflators, not that the risk to safety is inconsequential), a failure to address fleet-level risk, and assumptions about vehicle cabin temperature, potential harm to occupants, and the future occurrence and reporting of ruptures in the field. GM also did not provide any margins of error on their estimates. GM’s speculative claim that dealers conducting repairs could “create risk” to consumers is also unsupported—even if the Agency were to consider such a risk in analyzing the consequentiality of a rupturing inflator—and GM has the ability to ensure quality repairs.

Perhaps most importantly, the testing done by Takata, even with a small sample size, reflects abnormally high pressure during ballistic testing—indicative of the type of propellant degradation that leads to ruptures. Given the severity of the consequence of propellant degradation in these air bag inflators—the rupture of the inflator and metal shrapnel sprayed at vehicle occupants—a finding of inconsequentiality to safety demands extraordinarily robust and persuasive evidence. What GM presents here, while valuable and informative in certain respects, suffers from far too many shortcomings, both when the evidence is assessed individually and in its totality, to demonstrate that the defect in GMT900 inflators is not important or can otherwise be ignored as a matter of safety.

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GM has not demonstrated that the defect is inconsequential to motor vehicle safety.

Accordingly, GM's Petition is hereby denied and GM is obligated to provide notification of, and a remedy for, the defect pursuant to 49 U.S.C. 30118 and 30120. Within 30 days of the date of this decision, GM shall submit to NHTSA a proposed schedule for the notification of GMT900 vehicle owners and the launch of a remedy required to fulfill those obligations.

**Authority:** 49 U.S.C. 30101, *et seq.*, 30118, 30120; delegations of authority at 49 CFR 1.95 and 501.8.

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Jeffrey M. Giuseppe  
Associate Administrator, Enforcement

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