Safety Research & Strategies, Inc.
340 Anawan Street / Suite 200
Rehoboth, MA 02769
Ph. 508-252-2333, Fax 508-252-3137
www.safetyresearch.net

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The Honorable Bart Stupak
Chairman, Subcommittee on Oversight and Investigations
2125 Rayburn House Office Building
Washington, D.C. 20515

Toyota Sudden Unintended Acceleration

Thank you Chairman Stupak and the honorable members of the Subcommittee on Oversight and Investigations for holding this important hearing, and for the opportunity to testify before you today.

I am the president and founder of Safety Research & Strategies, a research and advocacy firm specializing in automotive and product safety. In addition to providing research to attorneys, engineers, corporations and government, we leverage our understanding of safety issues to advocate for consumers on important safety matters – this is part of my company's mission.

I have been invited to help the Subcommittee understand how the Toyota unintended acceleration problem unfolded and to address concerns related to the electronics in these vehicles. For the record I am submitting Safety Research & Strategies' report ***Toyota Sudden Unintended Acceleration***, which provides a detailed examination of these issues. We released this report on February 5 and an addendum on February 19, 2010, to provide the Committee and the public with context for this crisis that has been in the making for years. I am also submitting a preliminary report, Toyota ***Electronic Throttle Control Investigation***, which we commissioned with automotive technology professor Dr. David Gilbert of Southern Illinois University Carbondale (SIUC). Dr. Gilbert's preliminary report provides critical insight into the fail-safe detection capabilities of the electrical circuitry designed to prevent unintended acceleration of some electronic throttle controlled vehicles manufactured by Toyota.

Our report examines the complexities and inconsistencies within the public record on Sudden Unintended Acceleration (SUA) incidents involving Toyota vehicles. We have concluded that neither Toyota nor the National Highway Traffic Safety Administration (NHTSA) has identified all of the causes of SUA in Toyota and Lexus model vehicles, nor has the automaker implemented remedies that address the types of complaints consumers are reporting.

We are extremely concerned about the unintended acceleration circumstances that many drivers and witnesses have reported in their Toyota and Lexus models. They are rooted in the fact that many of these incidents do not relate to the recalls Toyota has initiated and nearly half of the more than 2,263 complaints we have examined involve vehicles outside of any recall campaign.

The experience of Rhonda Smith of Sevierville, Tennessee – a Lexus that raced to more than 100 miles per hour, accelerated and decelerated, and tried to start itself after being shut down – belies the floor mat and or "sticky pedal" recalls and is certainly not "driver error." The Smiths are not alone in their experience. Jeffery Pepski of Plymouth, Minnesota, who petitioned NHTSA to investigate this defect in Lexus vehicles, also experienced sudden unintended acceleration at highway speed, and fought to bring it under control as he pulled up on the pedal with his foot. His vehicle was only equipped with original equipment carpet mats, and his pedal had not been entrapped.

Years of mounting evidence – including eight NHTSA investigations – six at the request of consumers – and countless unintended acceleration incidents that were summarily dismissed by Toyota as driver error or floor mats has yielded only a couple of small recalls. It took a horrific crash on August 28, 2009, that killed California Highway Patrol Officer Mark Saylor, his wife, young daughter and brother-in-law for this issue to reach the tipping point.

It was a watershed moment in a crisis, caused by Toyota's neglect and failure to address the root causes, and by the National Highway Traffic Safety Administration's failure to thoroughly investigate consumer claims despite the steady stream of complaints. Many could not understand why a highly experienced California Highway Patrol officer couldn't safely bring the vehicle under control and to a stop. Was the floor mat really the cause? The evidence in NHTSA's public record is ambiguous. If the floor mat was to blame, Toyota is guilty of failing to acknowledge the very serious and real consequences of pedal entrapment for at least two years, since the agency pointed out in a 2007 investigation that drivers could not easily stop a runaway vehicle. The very fact that a mis-positioned or incorrect floor mat could cause create such a significant outcome speaks volumes to the slim margin of safety in these vehicles.

If the floor mat did not confine the pedal, then Toyota and Lexus owners have real cause to worry that their vehicles have an unidentified defect constituting a severe safety hazard.

Based on our surveillance of the complaint data, extensive interviews with consumers who experienced SUA, and with the benefit of a scientific statistical analysis of the complaints, we chose to focus our attention on the Electronic Throttle Control System (ETCS) – often called drive-by-wire – found in many Toyota vehicles.

Following an SUA incident consumers frequently report that Toyota dealers and Toyota's Field Technical Specialists could find no vehicle-related problems. Specifically, they report the absence of Diagnostic Trouble Codes (DTCs) – error codes – in the vehicle computer.

Toyota has consistently argued that its Electronic Throttle Control design and failsafe systems were built with multiple redundancies and that the electronic throttle can not malfunction without its diagnostic system catching the error and employing one of four failsafe modes. In response to NHTSA the company flatly rejected the very concept of unintended acceleration stating:

> "With regard to allegations of unintended acceleration, Toyota does not believe that uncontrollable acceleration can occur without the driver applying the accelerator pedal … If an abnormal condition occurs, such as the ETC sending the signal to the throttle body to open the throttle without applying the accelerator pedal due to a failure of a component

> or a malfunction of the system, or if the throttle simply were to open on its own, the system goes into failsafe mode."[1]

Because drivers' real-world experiences ran counter to Toyota's unshakeable belief that its system was infallible, we examined the malfunction detection and fail-safe capabilities of Toyota vehicles equipped with Electronic Throttle Control. The research we commissioned in this area is still preliminary. However, because of the urgent nature of this problem and the significance of the findings, we are disclosing the results thus far.

What we have learned from Dr. Gilbert's preliminary study shows that there are conditions in the Toyota and Lexus models tested in which the redundancy of electronic circuitry in the Electronic Throttle Control is lost – particularly in the Accelerator Pedal Position Sensor (APPS). Losing circuit redundancy in the system creates a loss of the fail-safe modes that Toyota has programmed and notably the system will not detect an error – no "Diagnostic Trouble Codes" are set. Once this happens, you've now "loaded the gun" so to speak. In this state, lacking a redundant failsafe, various scenarios can be introduced in which the Electronic Control Module (ECM) can read a wide-open-throttle condition without any input from the driver, again without setting any error codes. Simply increasing the voltage to the APPS while in a compromised state can induce an uncommanded wide-open throttle condition, again resulting in no detectable codes. These scenarios can occur because the Toyota failsafe parameters are broad – the design allows a wide window of opportunity for problems to occur that are not seen as abnormal.

Dr. Gilbert's testing demonstrates that vehicles can react to sensor errors in ways that appear consistent with consumer complaints of unintended acceleration. We must emphasize that it will take additional research to determine the connection between the two. However, his work provides an important baseline for understanding a potential electronic root cause of unintended acceleration in Toyota vehicles.

How did we get before this committee today? Like many large-scale defect-related tragedies, there is rarely a singular cause or event at the root of a problem; rather, a number of issues align. Firestone tire/Ford Explorer rollovers that dominated the news at the beginning of the decade were the result of design and manufacturing defects in the tires, combined with an application on a rollover-prone vehicle that was sensitive to tires. In addition, the tire's long wear on the best-selling SUV ensured wide exposure.

There are many parallels between that crisis and Toyota's problems today. It is becoming increasingly apparent that Toyota SUA incidents stem from multiple causes. Complaints have been found across many years, makes and models of Toyota vehicles, under a range of driving conditions. Consumers' descriptions of SUA incidents do not all fit the current recall descriptions. Many consumers report sudden full-throttle occurrences when parking at low speeds with the brake applied. Others describe on-highway events in which the vehicle continues to increase in speed without pedal application. In many cases floor mats are secured or simply absent. Further, Toyota dealer and field service representatives' inspections report no physical impairments, such as a "sticky pedal."

Toyota initially blamed customers for improperly installing accessory floor mats and resisted taking widespread action. In 2005 and 2007, the automaker launched two small recall campaigns. The first corrected an accelerator that could stick in Lexus IS250 vehicles; the second replaced

[1] DP05002; Toyota Response; November 15, 2005

all-weather floor mats in a limited group of 2007 and 2008 Lexus and Camry vehicles. More recently, under growing public pressure, Toyota has initiated much larger recalls to redesign floor mats, shorten the accelerator pedal, and in some vehicles, install a brake override feature. The automaker has also launched a second recall for sticky accelerator pedals.

Toyota has been slow to accept its responsibility in creating this safety hazard. That floor mats could so easily entrap the accelerator pedal suggests design flaws that could encompass the mat, the floor arrangement on the driver's side, the pedal mechanism itself, the pedal placement or any combination of these factors.

An accelerator pedal that is slow to return to idle requires repair, but does not cause Sudden Unintended Acceleration incidents many consumers report.

NHTSA's investigations have been too brief and cursory to find other causes. Its decisions to open or close probes, based on shifting and narrow premises, have contributed to a continuing safety issue. That may be the result of a lack of electronic expertise or the resources to fully investigate the electronic causes, or a bias against non-mechanical causes, rooted in the 25-year, and frequently controversial, history of SUA.

In 1995 I photographed a display on a board in front of the Office of Defects Investigation in NHTSA. On the board was a larger poster analyzing ODIs goals and areas that needed improvement. Bullet point five under Existing Problems reads: "Have passive screen areas: certain complaint issues (engine stalling, transmission park to reverse, sudden acceleration, etc.) are frequently reported but passively screened because ODI has not successfully pursued recalls in those areas."

The Sudden Unintended Acceleration debate was born in the 1980s, when angry Audi owners, claiming that their vehicles could suddenly accelerate, were crashing their vehicles with alarming frequency. Audi blamed drivers unfamiliar with its vehicles. Drivers could not be persuaded that they had made an error. Five recalls ensued. Whether you believe that Audi was unfairly maligned or that the regulators failed, the lessons of the past are not necessarily instructive to the problems of the present. The Bowden cable, the linchpin of mechanical throttle designs, is rapidly becoming an obsolete technology. Vehicles are now complicated interfaces where mechanicals systems are controlled by increasingly sophisticated electronics. Any examination of SUA must fully explore the interactions between the two, as well as simpler, easy-to-understand causes. This has not yet been done for the Toyota SUA incidents.

We understand that it is difficult to tease out the factors that contribute to sudden acceleration. Nonetheless, Toyota and the regulators must look more closely at the vehicle control systems, including the electronic throttle control assembly and the associated sensors. Random, intermittent electronic faults are hard to detect, but they do occur – the electrical contacts, electromagnetic interference, and the programming of the electronic controls and sensors are all possible points of breakdown or interruption in an electronic system.

Regardless of the causes of sudden unintended acceleration in Toyota and Lexus vehicles, the automaker's first step should be measures to protect the public. The implementation of a brake-to-idle feature across all model lines and years is a significant step in that direction. This design, found in many other manufacturers' vehicles with electronic throttles, will bring the engine to idle if both the brake and the accelerator pedals are applied. A significant number of motorists who experienced frightening SUA events reported that no amount of braking would stop the vehicle once it took off. The brake override allows drivers to regain control of a runaway vehicle.

So far, Toyota has only been willing to add a brake-to-idle feature on some Camry, Avalon and Lexus ES 350, IS 350 and IS 250 models as an "extra measure of confidence." This is inadequate.

We want to be clear: this problem is Toyota's own creation. For years the company has ignored or blamed its consumers. Instead of listening carefully to the safety issues consumer have presented them, Toyota has turned them away, assuring them that nothing is wrong. The company now has a duty to immediately address the unintended acceleration problems and provide its customers vehicles with appropriate failsafe designs.

With respect to NHTSA's role, we are pleased to see the new administration's willingness to step up its enforcement role and to look at the electronic issues that appear to be playing a role in unintended acceleration. It is also imperative that the Office of Defects Investigation have support from the agency's counsel to pursue the challenges they face with complex defects and that NHTSA examine its defect surveillance strategies in ways that will help them efficiently and productively use the many sources of data available to them.