AUTOMOTIVE COALITION FOR TRAFFIC SAFETY

Via eRulemaking Portal (https://www.regulations.gov)

March 05, 2024

Ms. Sophie Shulman
Deputy Administrator
National Highway Traffic Safety Administration
U. S. Department of Transportation
1200 New Jersey Avenue, S.E.
West Building Ground Floor
Room W12–140
Washington, DC 20590–0001

Dear Ms. Shulman:

Re.: Advance Notice of Proposed Rulemaking ("**ANPRM**" or "**the Notice**"), "Advanced Impaired Driving Prevention Technology"
Ref.: [1] 89 Fed. Reg. 830, published January 5, 2024
[2] Docket No. NHTSA–2022–0079
[3] RIN 2127–AM50

On behalf of the Automotive Coalition for Traffic Safety, Inc. ("**ACTS**"), this responds to the above referenced ANPRM initiating rulemaking that is to gather the information necessary to develop performance requirements and require that new passenger motor vehicles be equipped with advanced drunk and impaired driving prevention technology through a new Federal Motor Vehicle Safety Standard ("**FMVSS**").

ACTS, which was established 38 years ago, is classified as a 501(c)(4) nonprofit corporation by the U.S. Internal Revenue Service. A 501(c)(4) must not be organized for profit and must be operated exclusively to promote social welfare. The earnings of a section 501(c)(4) organization may not inure to the benefit of any private shareholder or individual. To be operated exclusively to promote social welfare, an organization must

operate primarily to further the common good and general welfare of the people of the community.

The Driver Alcohol Detection System for Safety Program ("**DADSS**" or the "**Program**") is a public–private partnership between ACTS and the U.S. Department of Transportation's National Highway Traffic Safety Administration ("**NHTSA**" or "**the Agency**"), the federal entity in the U.S that regulates the safety performance of motor vehicles and items of motor vehicle equipment. The Program is developing advanced alcohol detection technology for integration into new motor vehicles that will at the time of vehicle start–up both passively and rapidly determine, with the high precision and accuracy needed, when a driver is over the legal limit and intervene to prevent or limit vehicle operation.[1] The Program was first authorized by the U.S. Congress as part of the Moving Ahead for Progress in the 21st Century Act ("**MAP–21**")[2] enacted in July 2012. ACTS manages this partnership pursuant to a cooperative agreement with NHTSA. The Program is comprised of two parts: the **DADSS Research Initiative** which is developing the DADSS technology; and the **Driven to Protect Initiative** which is developing consumer acceptance, confidence, and trust in the DADSS technology in sync with its technological readiness by conducting on–road trial deployments of the technology and demonstrations to the public, among other things.

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users ("**SAFETEA–LU**") legislation enacted in August 2005[3], directed NHTSA to conduct a study on reducing the incidence of alcohol–related[4] motor vehicle crashes and fatalities through research on advanced vehicle–based alcohol detection systems, including an assessment of the practicability and effectiveness of such systems. In support of this mandate NHTSA's Office of Human–Vehicle Performance Research tasked the Volpe National Transportation Systems Center ("**Volpe Center**" or "**Volpe**") in Cambridge, MA, a division of the U.S. Transportation Department, to identify current and emerging vehicle–based technologies that could detect and prevent alcohol–impaired[5] driving. Volpe also considered other concerns such as privacy, public acceptance, and legal issues.

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[1] See Biondo, W., Zaouk, A., and Sundararajan, S., "Driver Alcohol Detection System for Safety (DADSS)—Development of the Subsystem Performance Specifications," ESV Paper No. 17–0301, 2017.
[2] See Pub. L. 112–141.
[3] See Pub. L. 109–59.
[4] The term "alcohol–related" refers to a crash or a fatality from a crash that involves one or more drivers with alcohol in their system, i.e., a BAC greater than 0.00%.
[5] The term "alcohol–impaired" refers to a crash or a fatality from a crash that involves one or more drivers with alcohol in their system that is equal to or greater than the applicable legal limit established for that driver by a state. For drivers 21 years of age and older this is typically 0.08%. States may have lower BAC limits for commercial drivers and drivers under the age of 21.

The Volpe Center's findings were published in September 2007. See DOT HS 810 827. Volpe concluded in part that among the technology approaches it assessed:

> *"…[s]pectroscopy remains the best of the known candidates for low–cost interlocks, because it avoids the sensor–contamination and measurement–drift problems of other approaches, and because it appears possible that spectroscopic sensors can ultimately be produced almost entirely through semiconductor–fabrication techniques. These techniques are associated with a longstanding trend: the rapid decline in costs relative to device complexity that has persisted for decades."*

Volpe further concluded that the development of spectroscopic sensors was high risk and that reducing the size, cost, and measurement time, while maintaining data quality, would require, "substantial effort in technology development, testing and refinement", that could take up to 20 years to complete.

Expanding upon the work of the Volpe Center, the DADSS Program began by also conducting a technology scan to identify potential technology approaches to thoroughly analyze them for the purpose of selecting candidate approaches for further development.[6] Among the approaches identified and evaluated by the Program, two spectroscopic approaches were determined to have considerable promise in measuring driver alcohol concentrations non–invasively within the time and accuracy constraints set by the Program: (1) **distant spectrometry** using part of the infrared light spectrum where the light is transmitted toward the driver from a source that receives and analyses the reflected and absorbed spectrum, thereby allowing assessment of alcohol concentration in the driver's exhaled breath; and (2) **tissue spectrometry**, a touch–based approach allowing the measurement of alcohol in tissue through detection of light absorption at a particular wavelength from a beam of near–infrared light reflected from within the driver's tissue. Specifically, the spectroscopic sensors being developed by the Program are intended to function as follows:

> The **DADSS Breath sensor** uses detectors that simultaneously measure the concentrations of alcohol and carbon dioxide ("**CO_2**") in a driver's exhaled breath. The concentration of CO_2 in the breath provides an indication of the degree of dilution of the alcohol concentration. The diluted breath is drawn into a measurement cavity where optical detectors measure the amount of mid–infrared

[6] See Ferguson, S., Zaouk, A., and Strohl, C., "Driver Alcohol Detection System for Safety (DADSS). Background and Rationale for Technology Approaches," SAE Technical Paper 2010–01–1580, 2010, https://doi.org/10.4271/2010-01-1580.

light ("**MIR**") absorbed by the alcohol and CO_2. Using these measurements, the driver's breath alcohol concentration ("**BrAC**") is calculated.

The **DADSS Touch sensor** measures the blood alcohol concentration ("**BAC**") in the capillary blood in the dermis layer of the skin on the palmar side of a driver's hand. The driver touches a pad with an optical module, located in the steering wheel, ignition switch, or some other vehicle control requisite to initiate the driving task, and a near infrared light ("NIR") shines into the driver's skin. The portion of the NIR light that is reflected back is collected by the touch pad. This light transmits information about the skin's chemical properties, including the concentration of alcohol present.

Every generation of DADSS sensor developed by the Program is subject to extensive verification and validation testing overseen or performed at the DADSS Lab[7], including in a clinical setting involving human subjects to ensure that alcohol concentration measurements made by these sensors track the blood alcohol concentration determined using venipuncture—the "gold standard" that documents impairment by alcohol.

ACTS will not manufacture or sell the DADSS technology but will instead license the technology to product integrators such as vehicle manufacturers or motor vehicle safety system suppliers. To accomplish this, ACTS has done two things. First, ACTS has adopted the electronics industry's reference design process. A DADSS "**Reference Design**" for commercial licensing includes the schematics, specifications, minimum hardware requirements, and other documentation for the DADSS sensor being licensed. The Reference Design supports the development of next generation products using DADSS technology. Second, ACTS has established an open licensing process for all DADSS Reference Designs. "**Open Licensing**" means that the technology will be made available, on the same terms, to any automaker, supplier or product integrator interested in installing the technology into its vehicles or products.

The first–generation breath sensor was released in December 2021. This directed–breath, zero tolerance sensor is intended for use by motor vehicle fleets. The first commercial products incorporating this sensor were made available in 2023. The passive breath sensor intended for widespread deployment in consumer vehicles is

[7] ACTS has assembled a multi–disciplinary team of chemometric, engineering, legal, medical, optics, spectrographic, and other technical professionals to develop the DADSS technology. ACTS contracts with KEA Technologies, Inc. to provide technical management for the DADSS Program. KEA also oversees operations of the DADSS Lab located within its facilities in Littleton, MA as well as on–road testing nationwide, both controlled and naturalistic. Human subject testing is conducted in nearby Belmont, MA at McLean Hospital, a Harvard Medical School affiliate.

currently under development and completion of the Reference Design is on target for the end of 2025. The timeline for completing a Reference Design of the touch sensor is forthcoming. For more information see : https://dadss.org/news/updates/when-might-the-dadss-technology-be-in-u-s-cars-and-trucks/.

Widely deploying DADSS technologies capable of limiting driver BACs/BrACs to less than 0.08%—the legal limit in all 50 states except Utah's 0.05 limit—the injury prevention and cost savings over the first 15 years of use have been estimated to be:

- 85% of crash fatalities (greater than 59,000) and 84 to 88% of nonfatal injuries (greater than 1.25 million) would be avoided; and
- $342 billion in injury–related costs would be saved, with the greatest injury and cost benefit realized among drivers who have recently reached the legal drinking age.[8]

Unless accepted by drivers and the public, the DADSS technology will never realize its full potential to save lives and deliver the economic benefits to society as intended. If not accepted, drivers will not buy the DADSS technology, and even if they do, they may seek to disable it or not use it in the manner originally intended. Since its inception, the DADSS Program has pursued a driver–centric approach to the development of the technology. However, product design alone will not assure acceptance ("**User Acceptance**"). Acceptance of new technology is also influenced by the social, legal, and cultural environments in which the technology is implemented ("**Social Acceptance**" and collectively with User Acceptance, "**Acceptance**").

Enclosed please find ACTS' response to select questions contained in the Notice that have been presented by the Agency to help it gather the information necessary to develop an informed and robust Notice of Proposed Rulemaking ("**NPRM**") on advanced drunk and impaired driving technology. ACTS' response addresses those questions in the Notice that relate specifically to:

- the performance specifications, testing methods and protocols, or design intent of the DADSS technology (and no others); or
- Acceptance of the DADSS technology (and no others) by drivers, consumers, and the public.

[8] See Carter, P. M., Flannagan, C. A., Bingham, C. R., Cunningham, R. M., & Rupp, J. D. (2015). Modeling the injury prevention impact of mandatory alcohol ignition interlock installation in all new US vehicles. *American journal of public health*, *105*(5), 1028–1035. https://doi.org/10.2105/AJPH.2014.302445

ACTS' response also highlights the availability of additional information about the Program and its work which generally may be found at www.dadss.org.

In closing, recognizing that the Agency must promulgate an NPRM, and take notice and comment on it as a requisite step before issuing a final rule, ACTS anticipates supplementing this response as additional information becomes available. In the interim, should you or your staff have any questions concerning the information provided with this submission, please feel free to contact me.

Sincerely,
Automotive Coalition for Traffic Safety, Inc.

Robert Strassburger
President & CEO

Enclosures
Attachment A—ACTS Response to Selected Questions
Attachment B—DADSS Program Publications

ATTACHMENT A

ACTS Response to Select Questions Contained in Advance Notice of Proposed Rulemaking Regarding Advanced Impaired Driving Prevention Technology, 89 Fed. Reg. 830 (05 January 2024), Docket No. NHTSA–2022–0079

Introduction

Herein is ACTS' response to select questions contained in NHTSA's ANPRM initiating rulemaking to implement Section 24220 of the Bipartisan Infrastructure Law ("**BIL**") enacted in November 2021 to establish a new FMVSS that would require that new passenger motor vehicles be equipped with advanced drunk and impaired driving prevention technology.

ACTS' response addresses those questions in the ANPRM that relate specifically to the DADSS technology, the development of which is being undertaken by the DADSS Program which is overseen and managed by ACTS. Specifically, ACTS is providing comment on the following:

- The design intent established by the Program for the DADSS technology;
- The performance specifications adopted by the Program for the DADSS technology to drive its development consistent with the design intent established;
- The testing methods and protocols used by the Program to validate and verify that the performance exhibited by DADSS device prototypes conform with the specifications adopted by the Program; and
- Efforts by the Program to build consumer acceptance, confidence, and trust in the DADSS technology in sync with its readiness.

Conversely, ACTS is not responding to questions that are outside the scope of the DADSS Program, namely questions that:

- Seek information about the readiness and capabilities of other advanced drunk and impaired driving prevention technologies that might be possible compliance options for any FMVSS established because of this rulemaking proceeding; or that
- Seek an opinion as to the policy or policies to be established by the instant rulemaking proceeding that would govern the performance requirements and deployment of such technology, including the DADSS technology.

Finally, ACTS anticipates supplementing this response as additional information becomes available. DADSS Program updates are available at www.dadss.org.

ATTACHMENT A

ACTS Response to Select Questions Contained in Advance Notice of Proposed Rulemaking Regarding Advanced Impaired Driving Prevention Technology, 89 Fed. Reg. 830 (05 January 2024), Docket No. NHTSA–2022–0079

ACTS Response to Select Questions.

Questions on Technologies Aimed at Passively and Accurately Detecting Whether the BAC of a Driver of a Motor Vehicle Is Equal to or Greater Than .08 g/dL

Q2.2. Although the legal thresholds for DUI/DWI laws focus on BAC/BrAC, BAC/BrAC are typically not used in isolation by law enforcement to determine impairment. BrAC/BAC may provide additional evidence of impairment after an officer has observed driving behavior, the appearance of the driver (*e.g.,* face flushed, speech slurred, odor of alcoholic beverages on breath), the behavior of the driver, and any statements the driver has made about alcohol or drug use. Additionally, an officer may have administered the Standard Field Sobriety Test. Considering this, should regulatory options use BAC/BrAC in isolation to determine whether drivers are above the legal limit? If so, why?

ACTS RESPONSE: While field sobriety tests and/or other observed factors are helpful in indicating the possibility of (alcohol) impairment, currently only BAC and BrAC are generally considered acceptable for the explicit determination of a subject being excessively impaired (above the legal threshold). Consequently, the Program is developing alcohol detection systems that rely on these metrics because either one are the most objective metrics available for assessing alcohol impairment.

The DADSS Program technologies are designed to measure and quantify precise alcohol concentrations from a driver. There is much evidence showing the strong agreement between blood alcohol concentration (BAC) and breath alcohol concentration (BrAC).[1]

[1] Jones, A. W., & Cowan, J. M. (2020). Reflections on variability in the blood–breath ratio of ethanol and its importance when evidential breath-alcohol instruments are used in law enforcement. *Forensic Sciences Research*, 5(4), 300–308.

Furthermore, the relationship between breath alcohol concentration and observable symptoms of impairment has been well established and serves as the legal basis of BAC driving limits.[2,3,4]

Q2.3. Are commenters concerned about using the legal limit (.08 g/dL) when there are indications that some individuals exhibit intoxication that would impact driving at lower or higher levels, depending on a number of factors discussed in the introduction? Why or why not? Might drivers with a BAC greater than 0 g/dL but less than .08 g/dL interpret the fact that their vehicle allows them to drive as an indication that it is safe for them to drive after drinking? If so, are there ways to mitigate this possible unintended consequence?

ACTS RESPONSE: Human alcohol impairment is a complex phenomenon, including effects on perception and judgement even at low to moderate levels of alcohol consumption. While the actual individual effects of alcohol on a subject can and do vary, the current societal (legal) environment utilizes a *per se*[5] limit approach for determining if a subject is to be determined as "unacceptably impaired."

The DADSS Program mission, as authorized by Congress, is to develop technology to assess a driver's fitness to drive with respect to the current legal limit, which is 0.08 g/dL.[6] However, since the ingestion of alcohol begins to impact subjects before the legal limit is exceeded, with increasing levels of alcohol consumption resulting in greater (negative) effects on perception and judgement, both the DADSS breath and touch systems are being designed with the requirement to have accurate BAC results across a broad range of BAC concentrations from completely sober levels to well above the legal limit.

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[2] "Drunk Driving | Statistics and Resources | NHTSA." [Online]. Available: https://www.nhtsa.gov/risky-driving/drunk-driving. [Accessed: 24-Oct-2022].

[3] "Blood Alcohol Content (BAC): What It Is & Levels." [Online]. Available: https://my.clevelandclinic.org/health/diagnostics/22689-blood-alcohol-content-bac. [Accessed: 25-Sep-2023].

[4] K. N. Olson, S. W. Smith, J. S. Kloss, J. D. Ho, and F. S. Apple, "Relationship Between Blood Alcohol Concentration and Observable Symptoms of Intoxication in Patients Presenting to an Emergency Department," *Alcohol*, vol. 48, no. 4, pp. 386–389, Jul. 2013.

[5] *Per se* laws generally establish that once a driver is shown to have a BAC at or above the legal limit set by a state (typically 0.08 g/dL), that driver is considered impaired by law, and no further evidence of impairment is needed. Currently all states have a *per se* law.

[6] See 23 U.S.C. 163(a).

Q2.5. Is a BrAC detection that correlates to a BAC of .08 g/dL or above sufficiently accurate?

ACTS RESPONSE: While BAC is considered the "gold standard" for assessing subject alcohol levels, medical and scientific research have demonstrated that BAC and BrAC are highly correlated (r = 0.948).[7,8] Based on such information, ACTS believes that adequately developed and engineered systems capable of assessing either BAC or BrAC are sufficiently accurate and provide the most objective assessment possible.

Q2.6. Would a standard that allows or requires systems that approximate BAC using BrAC (at any concentration) meet the Safety Act's requirement that standards be objective? Would the technology detect BAC?

ACTS RESPONSE: The DADSS Program is developing two technologies, one that relies on BAC and one that relies on BrAC. As indicated in our response to question 2.5, and the studies referenced there, both BAC and BrAC are objective measures that can be used interchangeably with confidence. In general terms, this is similar to how body temperature from different locations of the body (e.g., temporal or oral) can be used accurately and appropriately as long as the source (body compartment) of the reading is known.

Q2.7. NHTSA is seeking input on how a .08 g/dL BAC detection test procedure could be developed and executed in a FMVSS. For example, are dosed humans required or would a test device to simulate human dosing be required? What type of accuracy could be attained? Would static test procedures accurately simulate dynamic performance? In a BrAC evaluation, how would variance in vehicle cabin volume be accounted for?

ACTS RESPONSE: Dosing human subjects as part of verification and validation testing conducted during product development by vehicle manufacturers or safety system suppliers or for compliance testing by NHTSA is simply not practical as it is very expensive, time consuming, and requires specialized training and oversight. Part of the DADSS Program is to develop repeatable, objective test equipment and processes—ones that will have demonstrated correlation to human subjects testing. Therefore, the DADSS Program

[7] FORENSIC SCIENCES RESEARCH 2020, Vol. 5, No. 4, 300-308 *Reflections on variability in the blood–breath ratio of ethanol and its importance when evidential breath-alcohol instruments are used in law enforcement*. Alan Wayne Jones and Johnny Mack Cowan

[8] R is a correlation coefficient that measures the strength of the relationship between two variables. The value of r can range from –1 and 1. An r = 0 means there is no correlation.

includes human subject test testing as a necessary part of its research and development efforts to help ensure that the test tools and protocols it is developing yield results that are representative of the results that would be generated from human subject testing. This is no different than the long–standing use of anthropomorphic test devices—test dummies—as surrogates for humans in crash testing.

Specifically, the DADSS technology is being comprehensively validated using a three–pronged approach. First, the technology is tested in a laboratory setting where the sensors are rigorously exposed to a variety of conditions consistent with automotive system testing processes, including at extreme temperatures (DADSS systems are tested at a temperature range of –40° to +85°C [–40° to +185°F]) and over a wide range of alcohol concentrations (DADSS sensors are tested at BAC concentrations from 0.0 g/dL up to 0.12. Under laboratory conditions, alcohol concentrations can be very tightly controlled so sensor accuracy and precision can be measured with the utmost precision.

Next, the sensors are tested in clinical (hospital) settings with research participants who are given carefully controlled doses of alcohol and have their blood drawn at a set interval for quantification of blood alcohol concentration. These studies show that the sensors work with humans and allow for comparing the results to the "gold standard"—venous blood measurements.

Finally, the DADSS systems are installed in cars and are tested in real word situations. In–vehicle testing shows how the complete systems perform in real–world situations. The DADSS systems will be required to undergo this rigorous validation testing and pass strict performance requirements before will they be released for consumer use.

For the Breath System, the Program is developing an automated testing device intended to be used in place of human testing. This device is called the in–Vehicle Simulated Breath (VSB) test device and is an instrument that is placed in the driver's seat of a car and "breathes" like a human. It can simulate both passive (the normal breathing a driver does sitting still) or directed breaths (puffs of air that a driver could aim at the system). The device can be adjusted so that it can provide either sober or alcohol–containing breaths tuned to precise BrAC levels. The VSB is intended to be used much like a crash test dummy in crash testing to ensure that the system being tested reliably and consistently measures the amount of alcohol in a driver, if any, while representing the human population (e.g., 5th to 95th percentile occupants and seating positions).

The DADSS Program is exploring different means for accounting for differing vehicle cabin volumes and to take into consideration the possibility of a convertible with the top down. For example, if the DADSS system is not able to detect a breath passively before the driver is ready to start the car, the system would prompt the driver to provide a quick puff of breath directed at the sensor similar to blowing out a candle.

Q2.8. What precision/accuracy should BAC detection technology be required to meet?

ACTS RESPONSE: Development of minimum performance requirements (MPR) for the Breath and Touch alcohol assessment systems are an important part of the technical activities within the DADSS Program that drive achievement of the design intent for the technologies. The final Reference Design(s) will include requirements for BAC/BrAC measurement capability, as well as specifications for the overall system integration into light duty vehicles. The final MPR will not only address sensor accuracy and precision but will also consider customer experience and acceptance.

No technology is 100% precise and accurate, but for the technology to be effective in saving lives, it must prevent as many impaired drivers from driving as possible while having the absolute minimum inconvenience to sober drivers. The DADSS Directed Breath technology, during on–road testing, has exhibited acceptably high sensitivity[9] and specificity[10] performance. We continue to work to improve the sensitivity and specificity performance of the passive Breath and Touch sensors.

The Passive Breath and Touch technologies are being developed with similar specification requirements.

Q2.9. For a BAC-based sensor, NHTSA seeks comment on when during a vehicle's start-up sequence an impairment detection measurement should occur. For example, should an initial measurement of BAC/BrAC be required upon vehicle start-up, or before the vehicle is put into drive, and why? What is a reasonable amount of time for that reading to occur?

ACTS RESPONSE: Given the Program's goal to develop technology capable of virtually eliminating alcohol–impaired driving and the associated deaths, injuries, and family grief,

[9] Sensitivity is a measure of how well a sensor correctly identifies a driver over the alcohol concentration limit set for the sensor.

[10] Specificity is a measure of how well a sensor correctly identifies a driver who is not over the alcohol concentration limit set for the sensor.

the DADSS Program is scoped to consider that an alcohol assessment would be completed prior to applying motive power. For the purpose of its research and development, this start–up sequence may begin as soon as when the driver approaches the vehicle (or with driver door opening or closing) and concludes with the driver putting the vehicle into motion (e.g., shifting from PARK into a motive gear to initiate movement). ACTS believes this is a reasonable and appropriate requirement for any mandated (alcohol) impairment assessment system.

The Program is conducting studies to evaluate how long drivers typically take between getting into the car and starting to drive. DADSS sensors can measure the presence of alcohol rapidly and can make one or more measurements in succession providing a confident assessment of a driver's level of alcohol impairment, if any, prior to beginning a trip.

Q2.11. NHTSA requests comments on operational difficulties in using touch-based sensing (*e.g.,* consumer acceptance in colder climates when gloves may interfere) or in using breath-based sensing (*e.g.,* mouthwash, vaping, alcohol-drenched clothing, or other false positive indicators).

ACTS RESPONSE: Consideration of various environments and possible 'interfering' conditions are part of the DADSS Program activities.

The design intent is to minimize the impact of interferents to ensure effectiveness as well as public acceptance. One objective of the Program's three–pronged testing protocol is to be able to design the sensors to recognize when they are detecting such contaminants and train the measurement algorithm to account for such contaminants accordingly.

The DADSS system algorithm is being developed so that it can tell the difference between breaths from the driver and from passengers. Because carbon dioxide in human breaths is rapidly diluted in a vehicle cabin, breaths from passengers which are farther away from the system contain less carbon dioxide allowing the system to distinguish between the driver's breath and a passenger's breath.

Some hand sanitizers and mouth wash contain ethyl alcohol, so they could have the potential to interfere with the DADSS Breath Sensor. The sensor algorithm is being developed to distinguish between alcohol that is in the background in the car and alcohol that is exhaled by the driver.

Q2.12. What can be done to mitigate physical destruction and misuse? Examples may include having a sober passenger press the touch sensor or breathe toward the breath sensor. If mitigations exist, how might these mitigations impact the effectiveness of alcohol detection systems?

ACTS RESPONSE: Hardening the DADSS sensors against circumvention, tampering and device damage or destruction, while maintaining acceptable customer experience, is part of the Program activities.

DADSS researchers are conducting studies to identify ways in which drivers may attempt to defeat the system and are refining the design to minimize that possibility. One of the requirements of the DADSS Program is to have system circumvention and prevention features in place in the Reference Design.

As vehicle–integrated technology, the OEM can employ strategies to reduce vulnerability to tampering. The DADSS Program will address tampering and circumvention with comprehensive recommendations to car manufacturers as part of the final design and development of the Breath and Touch systems. The Program is developing subsystems for both the Breath and Touch systems that can identify circumvention attempts.

Q2.13. Are there cybersecurity threats related to impairment detection systems? If so, what are they? Are there potential vulnerabilities that might allow outside actors to interfere with vehicles' impairment detection systems or gain unauthorized access to system data? How can cybersecurity threats be mitigated? Are there impairment detection methods or technologies that are less vulnerable than others?

ACTS RESPONSE: Like with any other critical vehicle system, cybersecurity is an important aspect that will be fully considered before implementation. Cybersecurity risk will tend to be minimized in DADSS systems as they have been designed to make an assessment before the trip begins. While vehicle warning or interventions are not primary objectives of DADSS Program activities—Program activities are scoped under the premise that: 1) The system is contained within the vehicle, with no external communication required for assessment or initial (primary) interaction with the driver; and 2) storage of data, if any, would be limited to only what is necessary and/or required for system operation. Any stored sensitive data would be deleted within a short period of time (likely after a very small number of ignition cycles). It is important for NHTSA to address cybersecurity resilience, data security, and privacy as part of its rulemaking proceeding.

Q2.14. What temporal considerations should NHTSA include in any performance standards it develops (*i.e.,* should NHTSA specify the amount of time a system needs to make a first detection upon startup before it will enable driving)? What amount of time is reasonable?

ACTS RESPONSE: If integrated DADSS technology is to prevent the vehicle from being put into motion, to maximize consumer acceptance, the determination needs to be made within normal start up times that customers expect. DADSS sensors can measure the presence of alcohol rapidly and can take multiple measurements in succession providing a confident assessment of alcohol impairment before the driver even starts the vehicle.

Furthermore, the Program is conducting a series of naturalistic studies with instrumented vehicles to clearly identify the distribution of time a typical driver requires from the moment they enter the vehicle (e.g. door opening) until applying motive power. The purpose of these studies is to develop a clear requirement as to the time available for the sensors to assess the driver's fitness to drive.

Questions on Other Approaches To Reduce Impaired Driving

Q7.1. As vehicle technologies continue to develop with potential to reduce impaired driving, what steps or approaches should NHTSA consider now, including potential partnerships with States or other entities?

ACTS RESPONSE: States are critical frontline partners in the nation's efforts to eliminate alcohol–impaired driving. While DADSS is developing and deploying in–vehicle technology, it will be critically important to continue current countermeasures described in Section IV[11] of the Notice, including state programs on education and law enforcement, for the foreseeable future.

Knowing how important public acceptance of any new technology is, the DADSS Program is comprised of two parts: the **DADSS Research Initiative** which is developing the DADSS technology; and the **Driven to Protect Initiative** which is developing consumer awareness, confidence, and trust in the DADSS technology in sync with its technological readiness by conducting on–road trial deployments of the technology and demonstrations to the public, among other things.

[11] See 89 Fed. Reg. 840 (January 5, 2024) beginning at the top of the right–hand column of the page.

The Program continues to work to form key partnerships through its Driven to Protect Initiative with U.S. states, including Virginia and Maryland, and private fleet companies to test the technology in trial deployments. The Program recently announced a partnership with the State of Connecticut.[12] Breath sensors have been integrated into vehicles for on–road testing, allowing research scientists and engineers to collect data from sober drivers and observe driver behavior in natural settings, while increasing the public's awareness and benefit of the DADSS technology.

Question About Consumer Acceptance

Q9.1. NHTSA requests comment on legitimate consumer acceptance issues related to advanced drunk and impaired driving technologies and suggestions for how the agency might be able to craft future proposed performance requirements to remedy any consumer acceptance issues.

ACTS RESPONSE: Unless accepted by drivers and the public, the DADSS technology will never realize its full potential to save lives and deliver the economic benefits to society as intended. If not accepted, drivers will not buy the DADSS technology, and even if they do, they may seek to disable it or not use it in the manner originally intended. To ensure effectiveness and public acceptance, these breakthrough technologies are being designed to be passive, fast, accurate, reliable, and affordable. Unlike existing alcohol detection technologies which are not passive, DADSS is a driver assistance system designed for seamless integration into new vehicles with minimal to no impact with normal driving behavior.

Consumer acceptance is an important requirement for a NHTSA rulemaking and for the adoption of any new vehicle technologies. The research paper titled, "In-vehicle technology to prevent drunk driving: Public acceptance required for successful deployment"[13] describes the consumer acceptance research conducted by the Program to date and the findings from this research which are line with the findings of similar efforts by others such as the Insurance Institute for Highway Safety and the Pew Center.

[12] A Successful Launch for Driven to Protect | Connecticut - Dadss - Driver Alcohol Detection System
[13] In-vehicle technology to prevent drunk driving: Public acceptance required for successful deployment - ScienceDirect

ATTACHMENT A

ACTS Response to Select Questions Contained in Advance Notice of Proposed Rulemaking Regarding Advanced Impaired Driving Prevention Technology, 89 Fed. Reg. 830 (05 January 2024), Docket No. NHTSA–2022–0079

General Questions for the Public

Q10.1. NHTSA seeks comment on any reliability or durability considerations for alcohol impairment detection technology that may impact functionality over its useful life.

ACTS RESPONSE: As ACTS is a consortium of major automakers, the DADSS Program seeks to develop technology that is robustly capable of measuring BAC or BrAC, while meeting (or exceeding) the market requirements for vehicle safety systems. The DADSS technologies are being designed to withstand harsh conditions, function without maintenance or recalibration, and last for the useful life of the vehicle, which the Program has defined as 15 years or 301,750 kilometers (187,500 miles). DADSS sensors are tested at extremely cold and hot temperatures (–40° to +85°C [–40° to +185°F]). Overall, DADSS seeks to provide automotive–grade Reference Designs that are acceptable to consumers.

ATTACHMENT B

ACTS Response to Select Questions Contained in Advance Notice of Proposed Rulemaking Regarding Advanced Impaired Driving Prevention Technology, 89 Fed. Reg. 830 (05 January 2024), Docket No. NHTSA–2022–0079

LIST OF DADSS PROGRAM PUBLICATIONS

Listed below are various publications related to the DADSS Program authored by Program researchers.

2023

Allen, T. et al. (2023). Driver Alcohol Detection System for Safety (DADSS)—Risk Based Approach to Alcohol Sensing Outcomes Modeling. *27th International Technical Conference on Enhanced Safety of Vehicles*. Paper No. 23–0291.

Kingsley, K., da Silva, F.P., & Strassburger, R. (2023). In-vehicle technology to prevent drunk driving: Public acceptance required for successful deployment. *Transportation Research Procedia 72 2433–2440*.

Zaouk, A.K., Willis, M., Traube, E.C., Strassburger, R., & Ferguson, S.A. (2023). Driver Alcohol Detection System for Safety (DADSS) – A vehicle safety technology approach to reducing alcohol-impaired driving – A status update. *27th International Technical Conference on Enhanced Safety of Vehicles*. Paper No. 23–0287.

2020

Ferguson, S.A., & Draisin, N.A. (2020). Strategies for accelerating the implementation of non-intrusive alcohol detection systems in the vehicle fleet. *Traffic Injury Prevention, 22*, 13–19.

2019

Fournier, R., Zaouk, A.K., Willis, M., Strassburger, R., & Spicer, R. (2019). Assessing System Implementation Readiness of the Driver Alcohol Detection System for Safety (DADSS) To Reduce Alcohol-Impaired Driving in a Real-World Driving Pilot Deployment Project. *26th International Technical Conference on Enhanced Safety of Vehicles*. Paper No. 19–0263.

Ljungblad, J., Hök, B., Ahlenius, M., & Eriksson, G. (2019). Vehicle Integrated Non-Dispersive Infrared Sensor System for Passive Breath Alcohol Determination. *26th International Technical Conference on Enhanced Safety of Vehicles*. Paper No. 19–0296.

Lukas, S.E., et al. (2019). Driver Alcohol Detection System for Safety (DADSS) – Human Testing of Two Passive Methods of Detecting Alcohol in Tissue and Breath Compared to Venous Blood. *26th International Technical Conference on Enhanced Safety of Vehicles*. Paper No. 19–0268.

Willis, M., Zaouk, A.K., Bowers, K., Chaggaris, C.P., Spicer, R., Bahouth, G., Strassburger, R., & Traube, E.C. (2019). Driver Alcohol Detection System for Safety (DADSS) – Pilot Field Operational Tests (PFOT) Vehicle Instrumentation and Integration of DADSS Technology. *26th International Technical Conference on Enhanced Safety of Vehicles*. Paper No. 19–0262.

Zaouk, A.K., Willis, M., Traube, E.C., & Strassburger, R., (2019). Driver Alcohol Detection System for Safety (DADSS) – A Non-Regulatory Approach In The Research And Development Of Vehicle Safety Technology To Reduce Alcohol-Impaired Driving – A Status Update. *26th International Technical Conference on Enhanced Safety of Vehicles*. Paper No. 19–0260

2018

Gardner, C.M. (2018). Transmission versus reflectance spectroscopy for quantitation. *Journal of Biomedical Optics, 23*.

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Biondo, W.A., Zaouk, A.K., & Sundararajan, S. (2017). Driver alcohol detection system for safety (DADSS): development of the subsystem performance specifications. *25th International Technical Conference on the Enhance Safety of Vehicles*. Paper No. 15–0301.

Ljungblad, J. (2017). High performance breath alcohol analysis.

Ljungblad, J., Hök, B., Allalou, A., & Pettersson, H. (2017). Passive in-vehicle driver breath alcohol detection using advanced sensor signal acquisition and fusion. *Traffic injury prevention*, *18*(sup1), S31–S36.

Lukas, S.E., Zaouk, A.K., Ryan, E.T., McNeil, J.F., Shepherd, J.M., Willis, M., Dalal, N., & Schwartz, K.A. (2017). Driver alcohol detection system for safety (DADSS): preliminary human testing results. *25th International Technical Conference on the Enhance Safety of Vehicles*. Paper No. 15–0304.

Steeg, B.V., Treese, D., Adelante, R., Kraintz, A., Laaksonen, B.D., Ridder, T.D., Legge, M., Koslowski, N., Zeller, S., Hildebrandt, L., Koeth, J., Cech, L.S., Rumps, D., Nagolu, M., & Cox, D. (2017). Development of a solid state, non-invasive, human touch based blood alcohol sensor. *25th International Technical Conference on the Enhance Safety of Vehicles*. Paper No. 15–0036.

Zaouk, A.K., Willis, M., Dalai, N., Traube, E. & Strassburger, R. (2017). Driver Alcohol Detection System for Safety (DADSS)—A Status Update. *25th International Technical Conference on the Enhance Safety of Vehicles*. Paper No. 15–0271.

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Ljungblad, J., Hök, B., & Ekström, M. (2016). Development and Evaluation of Algorithms for Breath Alcohol Screening. *Sensors (Basel, Switzerland)*, *16*(4), 469.

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Hök, B., Pettersson, H., & Ljungblad, J. (2015). Unobtrusive Breath Alcohol Sensing System. *24th International Technical Conference on the Enhance Safety of Vehicles*. Paper No. 15–0458.

Zaouk, A.K., Wills, M., Traube, E.C., & Strassburger, R. (2015). Driver Alcohol Detection System for Safety (DADSS)—A Status Update. *24th International Technical Conference on the Enhance Safety of Vehicles*. Paper No. 15–0276.

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Ferguson, S.A., Zaouk, A.K., Dalal, N., Strohl, C.L., Traube, E.C., & Strassburger, R. (2011). Driver Alcohol Detection System for Safety (DADSS) - Phase I Prototype Testing and Findings. *22nd International Technical Conference on the Enhance Safety of Vehicles*. Paper No. 11–0230.

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