Advanced Impaired Driving Prevention Technology

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Section 24220, "ADVANCED IMPAIRED DRIVING TECHNOLOGY," of the Bipartisan Infrastructure Law (BIL), enacted as the Infrastructure Investment and Jobs Act (IIJA)(P.L. 117-58), directs, in subsection (c), that "not later than 3 years after the date of enactment of this Act, the Secretary shall issue a final rule prescribing a Federal motor vehicle safety standard [FMVSS] under section 30111 of title 49, United States Code, that requires passenger motor vehicles manufactured after the effective date of that standard to be equipped with advanced drunk and impaired driving prevention technology." Further, the issuance of the final rule is subject to subsection (e), "Timing," which provides for a timing extension of up to 3 years if the Secretary determines the FMVSS cannot meet the requirements of 49 USC 30111 (a) and (b).

Subsection (e) of section 24220 also states that the Secretary:

> (2) shall, not later than the date described in subsection (c) and not less frequently than annually thereafter until the date on which the rule under that subsection is issued, submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Energy and Commerce of the House of Representatives a report describing, as of the date of submission of the report (A) the reasons for not prescribing a Federal motor vehicle safety standard under section 30111 of title 49, United States Code, that requires advanced drunk and impaired driving prevention technology in vehicles; (B) the deployment of advanced drunk and impaired driving prevention technology in vehicles; (C) any information relating to the ability of vehicle manufacturers to include advanced drunk and impaired driving prevention technology in new passenger motor vehicles; and (D) an anticipated timeline for prescribing the Federal motor vehicle safety standard described in subsection (c).

To meet this request, NHTSA submits the following.

A. Reasons for Not Prescribing an Advanced Drunk and Impaired Driving FMVSS

The National Highway Traffic Safety Administration (NHTSA) is working diligently to issue a FMVSS as directed in section 24220 of BIL that meets the requirements of 49 U.S.C. section 30111, enacted as part of the National Traffic and Motor Vehicle Safety Act (Safety Act). NHTSA published an Advance Notice of Proposed Rulemaking[1] (ANPRM) on January 5, 2024. The agency is evaluating more than 18,000 public comments as it continues to address the following key areas needed for a proposed rulemaking:

Alcohol-Detection System Readiness

[1] 89 FR 830, Advanced Impaired Driving Prevention Technology.

NHTSA is continuing to review technology for the ability and potential to detect driver impairment. The agency is working closely with industry partners as technology continues to be developed to passively[2] and accurately detect impairment. While significant advances have been made in drunk and impaired driver detection, alcohol impairment detection systems have not yet been implemented on production vehicles offered for sale to the public that would meet the requirements set forth in BIL as well as the Safety Act.

While camera-based driver monitoring systems are becoming more prevalent in the vehicle fleet, few are used to detect driver visual distraction and/or drowsiness outside of the use of partial driving automation.

Test Procedure Development

NHTSA is developing objective test methods to demonstrate the ability to measure a driver's blood alcohol concentration (BAC) level reliably, passively, and accurately as directed in BIL. Test methods also need to consider false-positive cases.[3]

Test procedure development is dependent upon the form of impairment detection and the specific detection methodology. For alcohol detection, breath-based systems appear to be the most technologically mature. NHTSA is currently in the process of developing a human surrogate test device to produce a typical breath at a specified breath alcohol concentration (BrAC). A device such as this will be important for assessing the performance of in-vehicle BrAC detection technologies. Similarly, approaches for developing a touch-based alcohol detection test procedure in a reliable and repeatable manner are underway.

Test procedure development to detect driver visual distraction and drowsiness are also being researched.

Countermeasure Evaluation

NHTSA is gathering information and researching countermeasures for impairment detection. These countermeasures depend upon both the type of impairment detected and when in the drive cycle it is detected. For example, if alcohol impairment is detected prior to vehicle movement (i.e., the beginning of the drive cycle), preventing or limiting vehicle motion is likely an effective countermeasure. However, if alcohol impairment is detected after the vehicle is set in motion, countermeasures become more challenging. For example, stopping a vehicle in-lane may lead to unintended consequences of being struck by another vehicle, or leave an impaired driver stranded in an unfamiliar area. NHTSA is carefully examining countermeasures, their potential effectiveness, and potential unintended consequences.

Similarly, NHTSA is researching countermeasures for drowsy and visually distracted

[2] NHTSA uses the term "passive" to mean that the system functions without direct action from the vehicle occupants.
[3] A false positive could occur when the system indicates a person is at the detection level for impairment, when they are not impaired or impairment is lower than the legal limit.

drivers. In addition to the ability to accurately and reliably capture driver attention, considerations as to when or how to alert a driver are being made. This determination is especially important because it may lead to unintended consequences (e.g., inadvertently teaching drivers it is "ok" to keep their eyes off of the road for a duration less than the amount that triggers an alert).

NHTSA also continues to research both consumer acceptance and related human factors issues surrounding impairment detection and associated countermeasures, recognizing that if implementation fails to account for these considerations, the American public may not benefit from these potentially lifesaving technologies.

B. Deployment of Advanced Drunk and Impaired Prevention Technology

There are two primary approaches to detect driver impairment due to alcohol, direct and indirect. Direct sensing technologies primarily aim to directly measure driver BAC (or BrAC) through either breath or touch-based sensors. To date, there are no in-vehicle technologies in production that can accurately and precisely measure BAC/BrAC at or above .08 g/dL.[4]

Indirect systems aim to infer driver state based on behavior – typically through camera-based monitoring and vehicle inputs (e.g, vehicle lane position variability). While camera-based driver monitoring systems (DMS) are becoming more prevalent in advanced driver assistance systems, NHTSA has found most of these systems are intended to detect driver drowsiness, inattention, and sudden sickness.[5] Although companies have stated they are conducting research and development on indirect sensing technologies and their ability to detect alcohol impairment, the agency is not aware of any on-road implementation to date.

C. Vehicle Manufacturers' Ability to include Advanced Drunk and Impaired Driving Prevention Technology

While significant advances have been made in impairment detection, alcohol impairment detection systems have not yet been implemented in production vehicles offered for sale to the public that would meet the requirements set forth in BIL as well as the Safety Act.

[4] The Driver Alcohol Detection System for Safety (DADSS) program expects to have a breath sensor capable of measuring ≥ .08 g/dL BAC to be available to be licensed to OEMs/suppliers by the end of 2025. Vehicle integration will require an additional 18 to 24 months before it is commercially available to the public. (Driver Alcohol Detection System for Safety | 2022 Progress Report).

[5] Prendez, D. M., Brown, J. L., Venkatraman, V., Textor, C., Parong, J., & Robinson, E. (in press). Assessment of Driver Monitoring Systems for Alcohol Impairment Detection and Level 2 Automation. National Highway Traffic Safety Administration.

NHTSA has published two assessments of impairment detection technology, one of which reviewed 331 such technologies.[6] The systems were classified as physiology-based, tissue spectroscopy based, camera-based, vehicle kinematics-based, hybrid,[7] and patent-stage systems. A key focus was to review systems that have the potential to detect alcohol-based driving impairment and precisely estimate BAC. Of the systems reviewed, no commercially available product was found to estimate the amount of alcohol or identify alcohol-based impairment in the driver during the driving task.

Based on industry stakeholder interviews and expert review of technology documentation, NHTSA research found the approaches furthest along in the development process are those measuring the presence and amount of alcohol in a person's body using BrAC and tissue spectroscopy. With regard to other approaches, camera-based DMS for alcohol-based impairment detection are still in research and development, and the efficacy of vehicle kinematic measures[8] in identifying alcohol-based impairment is currently unknown. Finally, hybrid systems are promising in their ability to discern driver impairment due to the number of different measures used in making these determinations.

D. Anticipated Timeline for FMVSS

NHTSA is focused on effectively addressing the critical and complex issues discussed above to develop a rulemaking proposal as directed by section 24220 of BIL that meets the requirements of the Safety Act. The agency is using the information gathered from the Advanced Impaired Driving Technology ANPRM in addition to all available research to inform next steps of this important rulemaking.

[6] Prendez, D. M., Brown, J. L., Venkatraman, V., Textor, C., Parong, J., & Robinson, E. (in press). Assessment of Driver Monitoring Systems for Alcohol Impairment Detection and Level 2 Automation. National Highway Traffic Safety Administration.

[7] Hybrid systems take a multi-method approach to driver state detection. Descriptions of two prototype hybrid systems indicate the use of physiological measures (breath alcohol concentration (BrAC) and sweat) along with camera-based measures to determine impairment. The effectiveness and timeline of availability of these systems for alcohol impairment detection are unknown.

[8] Vehicle kinematics-based systems estimate driver state by monitoring the driver's inputs to the steering wheel, or the overall vehicle motion (speed and steering inputs), possibly including motion relative to lane position (i.e., lane stability, standard deviation of lane position, frequency of LDW alerts, etc.).