[4910-EX-P]

DEPARTMENT OF TRANSPORTATION

Federal Motor Carrier Safety Administration

[Docket No. FMCSA-2023-0098]

Agency Information Collection Activities; Approval of a New Information Collection Request: Safety Impacts of Human-Automated Driving System (ADS) Team Driving Applications

AGENCY: Federal Motor Carrier Safety Administration (FMCSA), Department of Transportation (DOT).

ACTION: Notice and request for comments.

SUMMARY: In accordance with the Paperwork Reduction Act of 1995, FMCSA announces its plan to submit the Information Collection Request (ICR) described below to the Office of Management and Budget (OMB) for review and approval. This notice invites comments on a proposed information collection titled *Safety Impacts of Human-Automated Driving System (ADS) Team Driving Applications*. It is a driving simulator study with a series of questionnaires that will quantify the safety implications of team driving applications between humans and ADS-equipped commercial motor vehicles (CMVs). The study will assess the safety benefits and disbenefits of human-ADS team driving applications and support the analysis of potential requests for relief from FMCSA's hours of service (HOS) regulations.

DATES: Comments on this notice must be received on or before **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].**

ADDRESSES: Written comments and recommendations for the proposed information collection should be sent within 30 days of publication of this notice to www.reginfo.gov/public/do/PRAMain. Find this information collection by selecting

"Currently under 30-day Review - Open for Public Comments" or by using the search function.

FOR FURTHER INFORMATION CONTACT: Brian Routhier, Office of Research and Registration, DOT, FMCSA, West Building 6th Floor, 1200 New Jersey Avenue SE, Washington, DC 20590-0001; 202-366-1225; brian.routhier@dot.gov.

SUPPLEMENTARY INFORMATION:

Title: Safety Impacts of Human-Automated Driving System (ADS) Team Driving Applications.

OMB Control Number: 2126-00XX.

Type of Request: New ICR.

Respondents: Commercial motor vehicle drivers

Estimated Number of Respondents: 80

Estimated Time per Response: 17 hours

Expiration Date: This is a new ICR.

Frequency of Response: One response

Estimated Total Annual Burden: 508.5 hours

BACKGROUND:

Over the past 15 years, ADS technology has advanced rapidly through innovation. As more manufacturers and technology companies move toward higher levels of automation (i.e., SAE International Level 4 (L4)), it is not fully clear how human drivers will team with ADS-equipped trucks. L4 ADS-equipped CMVs are capable of all functions and controls necessary for driving without human monitoring in limited conditions, and the human driver will not be asked to take over control of the vehicle. L4 ADS will not operate outside of the conditions for which it was designed. Currently, there are at least four use cases where a human may team with an ADS-equipped CMV:

1. In-vehicle driver teams with an ADS CMV;

2. In-vehicle driver teams with a following ADS-equipped CMV;
3. In-vehicle driver teams with a remote assistant to monitor and control an ADS CMV; and
4. Remote driver teaming with ADS CMV.

Each of the teaming use cases above offers different potential human factors benefits and challenges. However, it is unclear how each human-ADS teaming use case will affect safety, productivity, and efficiency. Each teaming combination may positively or negatively affect a driver's cognitive workload, level of fatigue, alertness, or distraction compared to the case of a traditional driver in a truck without ADS. For example, the in-vehicle drivers and remote assistants/drivers in the above teaming use cases may experience varying workloads and differences in the development of fatigue.

Previous research conducted by FMCSA found a paucity of extant research related to ADS-equipped CMVs. To date, most commercial ADS on U.S. roadways are in passenger vehicles, and ADS-equipped CMVs are only recently being implemented in real-world operations. Therefore, FMCSA needs more data on ADS-equipped CMVs to understand the human factors surrounding team driving applications between humans and ADS-equipped CMVs.

The purpose for obtaining data in this study is to quantify safety implications of the four human-ADS teaming use cases described above. Specifically, this project will provide data to assess the safety benefits and disbenefits associated with human-ADS teaming scenarios: (i) driver use, workload, fatigue, alertness, and distraction when teaming with an ADS; (ii) remote assistant/driver use, workload, fatigue, alertness, and distraction while actively monitoring and/or controlling an ADS-equipped truck; (iii) driver re-engagement to the driving task after taking over from ADS or remote driver control; and (iv) fleet acceptance and future integration possibilities. Additionally, data from this study will support the analysis of potential requests for relief from FMCSA's

HOS regulations under 49 U.S.C. 31315 and 49 CFR part 381. Answers to these research questions will provide insight into the potential safety implications and human factors associated with human-ADS team driving applications.

The study includes data collection from a series of questionnaires and a driving-simulator focused experiment. The collected survey data will support the simulator experiment data. The survey data will be used in two ways: in the assessment of driving performance data as covariates in the model (to control for certain demographic variables, such as age, gender, and experience, and to control for previous perceptions of safety technologies) and to answer research questions on the human factors and the relationship the safety benefits of each of the four human-ADS team driving applications. Data on workload, fatigue, alertness, inattention, and performance will be collected from the simulator experiment. Eligible drivers will hold a valid commercial driver's license, currently drive a CMV, be 21 years of age or older, and pass the motion sickness history screening questionnaire.

We anticipate 80 participants in total will complete the driving simulator study. Data will be collected over one study session lasting up to 17 hours. Questionnaire data will be collected prior to the simulator study, during the simulator study, and after the simulator study. All questionnaires will be preloaded in an app format for drivers to complete on a tablet.

The analysis methodology uses a multifaceted approach to address research questions on driver workload, fatigue, alertness, distraction, and rate of safety-critical events. The principal statistical method for analyzing the data will include mixed models to account for multiple, correlated data points from a single participant. Eye-tracking data will be used to assess driver workload, fatigue, alertness, distraction, and reaction time. These data will be described using summary statistics and advanced plotting techniques to visually compare drivers and remote drivers during in-vehicle driving, vehicle

monitoring, and remote assistance/driving. A generalized linear mixed model (GLMM) will be used to assess differences in average fatigue, workload, alertness, distraction, and reaction times between in-vehicle driving and remote driving operation types. In the transportation safety field, GLMMs are often used to analyze driver behavior and assess relationships between driving scenarios and behaviors. Finally, rates of safety-critical events, including unintentional lane deviations (which are surrogates for fatigue and alertness), will be analyzed using a Poisson or negative binomial mixed-effect regression model. Poisson or negative binomial regression models are standard practice for the assessment of events over a unit of exposure in the field of transportation safety.

FMCSA published the 60-day *Federal Register* notice on June 8, 2023, and the comment period closed on August 7, 2023 (88 FR 37597). A total of three comments were received from the public. The first comment was submitted by the American Property Casualty Insurance Association (APCIA). APCIA supported the study, indicating that the study will provide important data on how human-ADS teaming may affect driver workload, fatigue, and alertness. Additionally, APCIA's comment discussed the challenges associated with developing insurance policies for ADS-equipped CMVs, which will be dependent on access to information to identify vehicles with ADS and their functions. FMCSA agrees that results from this study will provide important data on how human-ADS teaming applications affect drivers' workload and attention; however, it is not within the scope of this study to examine how the public and insurers can access information on a CMV's ADS and its functions.

The second comment was submitted by an individual. This comment expressed concerns for the safety of ADS-equipped CMVs and how ADS-equipped trucks will be compliant during a roadside inspection. FMCSA is actively engaged in many research and administrative activities to help improve the safety of CMV drivers and the general public, including research on ADS-equipped CMVs. There are many research questions

that need to be answered before ADS-equipped CMVs are deployed at scale. Some of these research questions are focused on the ADS technology itself to ensure that the ADS technology functions as intended and incorporates the appropriate redundant failsafe systems. Other research questions focus on the human factors associated with how drivers will interact and team with ADS and how law enforcement will ensure the safe operation of ADS-equipped CMVs. Results from this study, and other studies focused on ADS-equipped CMVs, will help to ensure the safety of ADS and drivers on the road.

The final comment was submitted by the Autonomous Vehicle Industry Association (AVIA). AVIA supported the study as a means to gather additional information that could be used, in part, to inform decisions in response to potential requests for relief from FMCSA's HOS under 49 U.S.C. 31315 and 49 CFR part 381. Additionally, AVIA requested that FMCSA amend the language in the study to align with terminology used in SAE J3016. Specifically, AVIA recommended replacing the term "remote monitor" with "remote assistant" and "remote operator" with "remote driver." FMCSA agrees that the use of consistent terminology is important when describing ADSs. FMCSA has revised those phrases to align with SAE J3016.

PUBLIC COMMENTS INVITED: You are asked to comment on any aspect of this information collection, including: (1) whether the proposed collection is necessary for the performance of FMCSA's functions; (2) the accuracy of the estimated burden; (3) ways for FMCSA to enhance the quality, usefulness, and clarity of the collected information; and (4) ways that the burden could be minimized without reducing the quality of the collected information.

Issued under the authority of 49 CFR 1.87.

Thomas P. Keane,
Associate Administrator,
Office of Research and Registration.

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