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Proposed Rule

Federal Motor Vehicle Safety Standard No. 108; Lamp, Reflective Devices and Associated Equipment

A Proposed Rule by the National Highway Traffic Safety Administration on 06/29/2009

Action

Denial Of Petition For Rulemaking.

Summary

This document denies a petition for rulemaking submitted by General Motors on December 20, 2001. The petitioner requested that the agency amend the Federal motor vehicle safety standard (FMVSS) on lamps, reflective devices, and associated equipment to require the installation of daytime running lamps on passenger cars, multipurpose passenger vehicles, trucks, and buses that have a gross vehicle weight rating under 4,536 kilograms (10,000 lbs). NHTSA has reviewed the petition and performed an extensive analysis of real world crash data. Based on the results of our study we were unable to find solid evidence of an overall safety benefit associated with daytime running lamps and are therefore denying the petition for rulemaking. The agency maintains its neutral position with respect to the safety benefits from the use of daytime running lamps.

Table of Contents

Tables

FOR FURTHER INFORMATION CONTACT:

For non-legal issues, you may call Mr. Markus Price, Office of Crash Avoidance Standards (Phone: 202-366-0098; FAX: 202-366-7002).

For legal issues, you may call Mr. Ari Scott, Office of the Chief Counsel (Phone: 202-366-2992; FAX: 202-366-3820).

You may send mail to these officials at: National Highway Traffic Safety Administration, 1200 New Jersey Avenue, SE., Washington, DC 20590.

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Summary

This document denies a 2001 petition from General Motors (GM) requesting that the National Highway Traffic Safety Administration (NHTSA) mandate the installation of daytime running lamps (DRLs) on all vehicles with a gross vehicle weight rating (GVWR) under 4,536 kilograms (10,000 lbs). The rationale for denying the petition is that, overall, studies of the effectiveness of DRLs have not indicated that they are an effective means of preventing crashes. While GM presented studies that appear to indicate a degree of effectiveness, NHTSA's own studies contradict that finding. Furthermore, for reasons described in detail below, a careful analysis of the various studies of DRL effectiveness indicates flaws in the studies GM cites and that NHTSA should place greater weight on its own studies. Given the information currently available, the agency has been unable to determine if there are any demonstrable safety benefits associated with mandating DRLs, and therefore has decided that leaving them as a manufacturer option is the best course of action.

II. Background

Federal Motor Vehicle Safety Standard (FMVSS) No. 108; *Lamps, reflective devices, and associated equipment*, establishes lighting requirements for motor vehicles. Daytime Running Lamps (DRLs) are steady burning lamps that illuminate when the regular headlamps are not required for driving. While FMVSS No. 108 does not require DRLs, it does specify requirements that they must meet if a vehicle manufacturer voluntarily decides to install them.[1]

The requirements for DRLs were first established on January 11, 1993 inresponse to a petition from General Motors (GM) that asked the agency to facilitate the introduction of DRLs on motor vehicles. At that time, GM's view was that an amendment "would allow manufacturers to install DRLs on new vehicles without being in violation of the multitude of State laws" which at that time had "the unintended effect of prohibiting them." Also, GM did not believe that there was justification for mandating DRLs as standard equipment because there was not yet evidence of a "national safety need" in the United States. As a result of GM's petition, FMVSS No. 108 was amended to permit, but not require, DRLs that comply with various marking and performance requirements.[2]

III. Petition

On December 20, 2001, GM petitioned the agency requesting that DRLs be made required equipment on passenger vehicles, trucks and buses that have a gross vehicle weight rating under 4,536 kilograms (10,000 lbs). In support of its petition, GM provided information from a study that reported a 5 percent decrease in daytime multiple vehicle crashes and a 9 percent reduction in vehicle to pedestrian crashes.[3] GM claimed that this report "demonstrates that DRLs are preventing crashes and injuries, and saving lives." The data supporting this study were collected in 12 States from the years 1994 to 1997, using vehicle registration as a measure of exposure, and the ratio of crash rates estimated by the Poisson regression statistical method (described in detail below).

As an update to the 2000 study, GM most recently sponsored a study written by Steffey, Lau, and Ray of Exponent, Inc in 2008.[4] This study examined vehicles manufactured by GM, Saab, Toyota, Subaru, Volkswagen and Volvo. Crash data were analyzed from 18 States between the years 1996 and 2005. This study used two mathematical methods to determine if there was a link between DRLs and crash rates, the ratio of odds ratio method and the ratio of crash rates. This study reported the impact of DRLs on various types of vehicle crashes including head-on, rural area, highway, rain/fog, angle, urban area, sideswipe, pedestrian, and motorcycle.

The Steffey *et al.* (2008) study reported a statistically significant reduction in crashes associated with DRLs. For passenger cars, it reported a reduction in daytime head-on multi-vehicle crashes of 12.35 percent using the ratio of crash rates method. This study also reported a significant reduction in rural area daytime multi-vehicle crashes of 9.1 percent for passenger cars using this method.[5] Similar results were reported for light trucks. Similar to the 2001 GM study, this study reported a 5 percent decrease in daytime multiple vehicle crashes, but contrary to the 2001 study, a non-significant increase in vehicle to pedestrian crashes of 2.5 was observed. No statistically significant results were found for fatal crashes.

This study also analyzed the data using the ratio of odds ratio technique. GM stated that this methodology produced findings that correlated DRLs with a reduction in certain crash types. However, NHTSA's analysis found, with regard to the overall crash rates experienced by vehicles equipped with DRLs, the Steffey *et al.* study's analysis using the ratio of odds ratios method did not produce a statistically significant decrease in the crash rates of those vehicles.[6]

IV. Discussion and Analysis

After carefully reviewing the data in GM's petition, NHTSA has come to the conclusion that the evidence linking DRLs to lower incidents of crashes is not persuasive. To begin, NHTSA believes that one of the statistical techniques used in the two GM studies, the ratio of crash rates method, is less effective in this case than the ratio of odds ratio method used in the three NHTSA studies (to be fair, this methodology was also employed in the Steffey *et al.* study). Additionally, certain correlations in the GM study raise questions as to the validity of its findings. Contrary to this,

NHTSA's studies do not show that DRLs are an effective means of crash avoidance. Given these issues, NHTSA does not believe that the case has been made to incorporate a change to require DRLs.

A. NHTSA Studies and Comparison

In 2000, NHTSA published a study that examined the effectiveness of DRLs installed on passenger cars manufactured in the 1990s.[7] In that study, no statistically significant results were found using the ratio of odds ratio method. In 2004, NHTSA again reported on the effectiveness of DRLs on crashes within the U.S.[8] Again, using a broader data set and a different control group, no results using the ratio of odds ratio method produced statistical significance.

In 2008, NHTSA completed a new study on the effectiveness of DRLs.[9] The data source is FARS (2000-2005), and State data from 9 States (2000-2005). The results of this NHTSA study (2008) are inconclusive regarding overall DRL effectiveness. When both light truck and cars are evaluated together, the result of DRL installation is a non-statistically significant decrease in two vehicle, all severity crashes of 0.3 percent (−2.5-3.1, 0.95 confidence). A statistically significant decrease of 5.7 percent (0.7-10.7, 0.95 confidence) in two vehicle type crashes for light trucks is somewhat offset by a non-significant 2 percent (−5.4-1.4, 0.95 confidence) increase in passenger car crashes of the same type and severity. Further complicating attempts to find a definitive pattern of safety impact that DRLs have, this study finds a non-significant increase of 12.2 percent (−50.1-25.7, 0.95 confidence) in light truck-motorcycle crashes. Contrarily, it also reports that a non-significant decrease of 1.2 percent (−18.5-20.9, 0.95 confidence) is observed for passenger cars of the same crash type. Continuing, this study was also unable to find a clear pattern of effectiveness between States. An overview of the results finds some positive and some negative results depending on crash type and crash severity. When all crashes are considered, a non-significant decrease of 0.1 percent is observed, demonstrating the overall safety benefits of DRLs in this study are inconclusive.

The agency is aware of some groups' concerns that DRLs may have a detrimental impact on motorcycle safety. The concern is that as motorcycles have historically been the only class of vehicles using DRLs, as other vehicle classes begin to use DRLs the unique conspicuity provided to motorcycles by DRLs will be diminished. Neither the GM, nor the agency's studies are able to establish new evidence with respect to this concern. Therefore, the potential "masking effect" is still unknown and was not considered in this denial notice analysis.

The agency believes that the result derived based on the ratio of odds ratios are more plausible and defendable than those based on crash rates used in GM's study. The Steffey *et al.* study found a4.28 percent decrease in nighttime multi-party car crashes as a result of DRL installation. It also found a 3.67 percent decrease in single vehicle light truck crashes. Additionally, the report found that DRLs would reduce nighttime fatal crashes by 11.4 percent for passenger cars and daytime single-vehicle

crashes by 9.4 percent for light trucks.[10] These results cast doubt on the validity of the GM study because we do not believe these crash types are plausibly affected by DRL installation. The authors claim these numbers "serve as useful control groups and benchmarks for comparison."[11] The agency respectfully disagrees, and believes this may demonstrate the lack of control for changes that may have occurred during the study period. Another limitation regarding this GM study is the different time period for which vehicle registration was recorded compared to the times that the crashes occurred. The registration numbers were recorded as a snapshot in time on July first, but the crashes occurred throughout the entire year. This time difference may cause inaccuracies in the number of vehicles in the exposure group.

B. Differences in Statistical Methodology

As discussed above, numerous studies exist that attempt to quantify the crash risk relative to the installation of DRLs. Among these studies, various statistical techniques have been used for determining the effectiveness in real world crashes, including the ratio of odds ratios method (used in the NHTSA studies), and the ratio of crash rates method (used in the GM studies). NHTSA believes that the ratio of odds ratios is the most effective means for the analysis in these studies.

The primary statistical technique used in the studies submitted by GM in support of its petition is the ratio of crash rates method. This was used in the 2001 GM study, and was also used in certain parts of the 2008 Steffey *et al.* study. This technique compared the ratio of crashes to the number of vehicles of that type registered. This collision rate is calculated and compared for both vehicles with DRLs and for vehicles without DRLs. This comparison reportedly represents the effectiveness of the DRL. This is mathematically represented as follows:

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Continuing, this expression is modeled using a Poisson regression model to estimate the overall DRL effect across all model pairs. Because this method uses vehicle registration as the measure of exposure, it may not reflect the actual on-road exposure of vehicles in use that, in actuality, may be involved in a crash. For example, this methodology would assign equal weight to a vehicle driven five miles per day as to a vehicle driven 25 miles per day, despite the fact that the latter vehicle is far more exposed to the risk of a crash.

The ratio of odds ratios method, which was used in NHTSA's studies and in some parts of the Steffey et al. study, avoids using vehicle registration as a method of exposure. This method compares the ratio of target crashes in the daytime with control crashes in the daytime. It continues by calculating the ratio of target crashes at night compared to the control crashes at night. The ratio of these ratios is then considered the odds of a vehicle becoming involved in a DRL relevant crash. This ratio is calculated for both a group of DRL-equipped vehicles, and for a group of vehicles

which do not have DRLs installed. A comparison of the two groups' odds then determines the effectiveness of the DRL. This method is demonstrated as follows:

DRL-Equipped Vehicles Back to Top

Light condition	Target crashes	Control crashes
Daytime	N_1	N_2.
Nighttime	N_3	N_4.

Non-DRL Vehicles Back to Top

Light condition	Target crashes	Control crashes
Daytime	N_5	N_6.
Nighttime	N_7	N_8.

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The value of R represents the relative odds of daytime target crashes involvements between DRL-equipped vehicles and non-DRL vehicles. The agency believes the ratio of odds ratio is the optimal method because it has a strong confounding-factor-control ability. With regard to the previous example, the ratio of odds ratios would factor in a higher expected crash rate for the vehicle driven 25 miles per day than the vehicle driven five.

The ratio of odds ratios avoids using crash rates because the true exposure data generally do not exist. In GM's case, with regard to the portion of the study that utilized the ratio of crash rates method, vehicle registrations were used as the exposure data. However, registration data do not differentiate driving between DRL and non-DRL vehicles. They do not separate daytime and nighttime driving. Consequently, vehicle registrations are not considered to be an appropriate exposure measure for a DRL study. The contradicting results from the GM study demonstrate this. In contrast, the ratio of odds ratios method compares the ratio of target crashes (DRL-relevant) to control crashes (non DRL-relevant) in the daytime.

The Steffey *et al.* study incorporated both of the methodologies in arriving at its conclusions. Using the ratio of crash rates method, the study found an overall decrease in crash rates of 4.61 percent, which was noted as statistically significant.[12] However, using the ratio of odds ratios method, the same report found a non-significant decrease in the crash rates of 1.36 percent.[13] Given the significant divergence in results from the different methodologies, we feel that the results from the ratio of crash rates methodology should be assigned less weight in NHTSA's analysis of the safety effect of DRLs.

V. Conclusion

The agency's 2008 DRL study is a more robust study than previous attempts by the agency to quantify the effectiveness of DRLs. This newest study was unable to find solid evidence of overall safety benefits associated with DRLs installed on passenger vehicles using the ratio of odds ratio statistical technique. While DRLs may be beneficial for certain scenarios, the agency has been unable to document overall safety benefits due to DRL installation which could serve as a basis for mandating them. NHTSA is therefore denying this petition from GM. However, the agency is willing to re-examine the DRL issue if additional data is presented demonstrating overall safety benefits. Any such study should consider using the ratio of odds ratios technique as used in the latest NHTSA study, or provide compelling evidence that an alternative technique is superior at predicting the effectiveness of DRLs. In the meantime, the agency remains neutral with respect to a policy regarding the inclusion of DRLs in vehicles. Although we do not find data that provides a definitive safety benefit that justifies Federal regulation, we are not making recommendations that vehicle manufacturers should change their policies regarding DRLs. Manufacturers should continue to make individual decisions regarding DRLs in their vehicles.

Authority:

49 U.S.C. 322, 30111, 30115, 30117 and 30166; delegation of authority at 49 CFR 1.50.

Issued: June 23, 2009.

Nathaniel Beuse,

Director, Office of Crash Avoidance Standards.

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Footnotes

1. *See* 49 CFR 571.108, S7.10.1, Table I-a.

Back to Context

2. *See* 59 FR 3501 January 11, 1993.

Back to Context

3. Docket No. NHTSA-2001-8876-11.

Back to Context

4. Docket No. NHTSA-2001-8876-15.

Back to Context

5. Docket No. NHTSA-2001-8876-15 Steffey *et al.*, p. 21.

Back to Context

6. Docket No. NHTSA-2001-8876-15 Steffey *et al.* page 38.

Back to Context

7. DOT HS 808 645 Table 24 25 Available at *http://www.nhtsa.dot.gov/people/ncsa/pdf/DRL7_RPT.pdf*.

Back to Context

8. DOT HS 809 760 Appendix B Available at *http://www-nrd.nhtsa.dot.gov/Pubs/809760.PDF*.

Back to Context

9. HS 811 029.

Back to Context

10. Docket No. NHTSA-2001-8876-15 Steffey *et al.*, p. 24-25.

Back to Context

11. Docket No. NHTSA-2001-8876-15 Steffey *et al.* p. 20.

Back to Context

12. Steffey *et al.*, p. 34.

Back to Context

13. Steffey *et al.*, p. 38.

Back to Context