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September 23, 2023

BY EMAIL

Cem Hatipoglu, Acting Director
NHTSA Office of Defects Investigation
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Re: LED Vehicle Headlights – Report to Congress

Dear Cem Hatipoglu,

This letter is a formal request that the NHTSA Office of Defects Investigation open an investigation and provide reports to Congress on the impacts of the auto industry's switch to LED headlights.

The Soft Lights Foundation has been notifying NHTSA of the hazards and lack of regulation associated with LED headlights for several years, without meaningful action by NHTSA. However, in the past year, several key NHTSA employees have left or changed roles. NHTSA Director Steven Cliff was replaced by Acting Director Anne Carlson in August 2022. Associate Administrator Anne Collins was replaced by Ryan Posten in May 2023. Office of Defects Investigation Director Stephen Ridella was replaced by Cem Hatipoglu in June 2023. Each of the previous NHTSA officials has declined to investigate the automakers' use of unregulated, hazardous, dangerous, and discriminatory LED headlights. With the knowledge gained in the past several years and with the changes in leadership at NHTSA, it is time to revisit the LED headlight issue.

In September 2023, NHTSA opened an investigation into an issue involving an oil pump on a Ford vehicle after having received 95 complaints on this issue.¹ In contrast, the Soft Lights Foundation submitted a petition to NHTSA on December 10, 2022, which contains thousands of complaints about LED headlights.² Comments include *"I have been blinded by these kinds of lights many times"* and *"I am a professional driver and the harsh white light makes working dangerous and hard to see while driving at night."* The petition on change.org titled Ban Blinding Headlights and Save Lives! has nearly 50,000 signatures.³ It makes little sense that NHTSA is willing to open an investigation into a faulty oil pump that does not appear to be a safety issue and has received 95 complaints, while NHTSA declines to open an investigation into the LED headlight issue that has received nearly 50,000 complaints and is an obvious safety issue. The purpose of this letter is to request that NHTSA rectify this situation and open an investigation into the auto industry's use of LED headlights.

LEDs emit visible radiation with drastically different spatial, spectral, and temporal characteristics as compared to tungsten filament sources. The primary difference between filament and LED light sources is the geometry of the emitter. Curved surface emitters such as a burning filament emit light essentially in all

¹ <https://www.carscoops.com/2023/09/feds-look-into-whether-the-oil-pumps-in-241000-ford-ecosports-can-cause-an-engine-failure/>

² <https://www.softlights.org/wp-content/uploads/2022/12/NHTSA-Petition-to-Require-Inverse-Square-Law-Lamps.pdf>

³ <https://www.change.org/p/u-s-dot-ban-blinding-headlights-and-save-lives>

directions uniformly and disperse following an inverse square law. Flat surface emitters such as LEDs emit light almost entirely in the forward direction, creating a directed energy beam that has little divergence. Within the beam, the energy changes from peak intensity in the middle of the beam to near zero intensity at the edge of the beam. NHTSA has not acknowledged these differences and has not published performance standards that address these differences in the physics characteristics of LED sources.

The toolmaker Ryobi places a warning label on their product packaging for an LED flashlight, as shown in Figure 1. It states that LED light is hazardous even at a distance. Yet, NHTSA is allowing the automakers to use exactly this type of hazardous light beam in vehicle headlights. NHTSA must justify the use of LED headlights when LED light beams are so hazardous that they require warning labels. If LED headlights are so dangerous, NHTSA may need to prohibit their use.

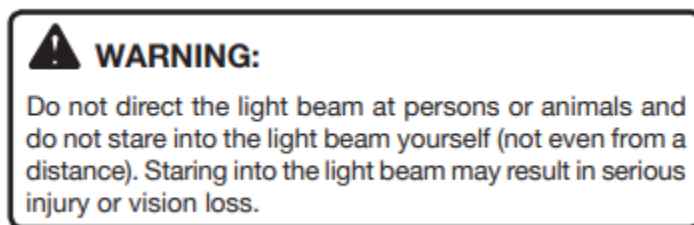


Figure 1 - Ryobi LED Warning

NHTSA FMVSS-108 does not contain the necessary regulations to protect the public from the harms of LED visible radiation. FMVSS-108 restricts the intensity of the headlamp light using the metric luminous intensity in candela. However, intensity for LED sources requires use of the metric luminance in candela per square meter. FMVSS-108 has no references to luminance and places no restrictions on peak luminance. This lack of restriction on peak luminance has allowed the auto industry to manufacture and sell vehicles and headlight systems that are unsafe. LED headlights have been documented to cause seizures, migraines, anxiety, fear, anger, eye pain, and eye injury.⁴ NHTSA must act to prevent the harm caused by LED headlights.

A research article on the use of LED lights in foggy conditions shows that LED headlights perform worse than halogen headlights.⁵ The article states that a roadway luminance exceeding 1.0 candela per square meter does not improve visibility and object detection. Compare this luminance value of 1 candela per square meter against the LED chip luminance of 70,000,000 candela per square meter. This is an astronomical difference between what our human eyes and brain need for vision and what is provided by LED headlights. The extreme luminance from LED headlights decreases vision and cognitive functioning and can cause eye pain and eye injury. NHTSA must address this issue.

The Administrative Procedure Act of 1946 (5 U.S.C. 551-559) governs the procedures of Administrative Law. Automakers are required to comply with these procedures when they wish to create, modify, or repeal an administrative rule. For example, the automakers complied with these procedures and petitioned NHTSA for authorization to use rectangular headlights in the 1970s.⁶ In the case of LED headlights, the automakers failed to comply with 5 U.S.C. 551-559 and did not petition NHTSA for authorization to use LED headlights and NHTSA has never approved the use of LED headlights nor published

⁴ <https://www.softlights.org/stories/>

⁵ <https://www.nature.com/articles/s41598-023-31883-3>

⁶ <https://www.govinfo.gov/content/pkg/FR-1975-11-24/pdf/FR-1975-11-24.pdf>

the required performance standards for LED headlights that would ensure the comfort, health, and safety of the public. To our knowledge, NHTSA has not notified the automakers that they are required to petition NHTSA for authorization to use LED headlights and NHTSA has allowed the violation of the Administrative Procedure Act to go unchecked. This oversight by NHTSA must be rectified.

The Radiation Control for Health and Safety Act (21 U.S.C. 360hh – 360ss) directs the Food and Drug Administration to “*minimize the emissions of and the exposure of people to*” radiation from electronic products, which includes the visible radiation emitted by LED products. No automaker has petitioned the FDA for approval to use LED vehicle headlights and the FDA has not published the required performance standards for LED vehicle headlights to ensure the comfort, health, and safety of the public. On May 29, 2023, the Soft Lights Foundation submitted a petition to NHTSA to request that NHTSA comply with 21 U.S.C. 360ii and liaise with the FDA to publish performance standards for LED headlights.⁷ NHTSA has not responded to this petition and has not assigned a docket number. The FDA published citizen petition FDA-2023-P-3828 on September 7, 2023, which calls for the publication of FDA performance standards for all LED vehicle lighting.⁸ The FDA has not acted on this petition. LED headlights have no legal basis for use because the automakers did not submit a petition to either the FDA or NHTSA to use LED headlights, no approval has been provided by either NHTSA or the FDA, and no performance standards have been set as required by 21 U.S.C. Part C and 49 U.S.C. Chapter 301.^{9,10} Per these statutes, NHTSA and the FDA must collaborate to publish performance standards for LED vehicle headlights, and the automakers must petition the FDA for authorization to manufacture and sell vehicles with LED headlights.

On July 28, 2023, Congressman Mike Thompson wrote to the FDA requesting that the FDA comply with 21 U.S.C. 360ii and publish performance standards for LED headlights.¹¹ This is the first known instance of a member of Congress recognizing that the FDA is required to publish performance standards for LED vehicle headlights because LEDs are an electronic product that emits electromagnetic radiation. It must be noted here that Representative Thompson submitted this request to publish performance standards to the FDA, and not NHTSA. NHTSA must take steps to acknowledge publicly that the FDA and NHTSA must collaborate on the publication of performance standards for LED vehicle headlights.

In 2022, the Soft Lights Foundation submitted several petitions, including NHTSA-2022-0109, to recall select vehicle models with LED headlights.¹² In the response and rejection, NHTSA wrote, “*In consideration of the foregoing, NHTSA does not believe that a formal investigation is warranted, and NHTSA has decided to deny Soft Lights Foundation's petitions for non-compliance orders on the subject vehicles.*” Despite all of the issues presented above, NHTSA still declined to open an investigation. This is unacceptable. An investigation is exactly what is required to establish the steps needed to protect the public from harm, as required by 49 U.S.C. Chapter 301.

There are several problematic statements in the NHTSA response and rejection letter which must be addressed. NHTSA wrote, “*While LED integral beam headlamps can be made to have a smaller footprint compared to lamps that use halogen or high-intensity discharge (HID) light sources, which can be perceived*

⁷ <http://www.softlights.org/wp-content/uploads/2023/06/NHTSA-Petition-to-Collaborate-with-FDA.pdf>

⁸ <https://www.regulations.gov/document/FDA-2023-P-3828-0001>

⁹ <https://www.law.cornell.edu/uscode/text/21/chapter-9/subchapter-V/part-C>

¹⁰ <https://www.law.cornell.edu/uscode/text/49/subtitle-VI/part-A/chapter-301>

¹¹ <https://www.softlights.org/wp-content/uploads/2023/07/Thompson.pdf>

¹² <https://www.federalregister.gov/documents/2022/12/08/2022-26658/soft-lights-foundation-denial-of-petition-for-decision-of-non-compliance-order>

to be more uncomfortable at closer distances, an agency report to Congress, “Nighttime Glare and Driving Performance,” stated that when viewed from more than approximately 100 feet, the size of a headlamp has little impact on discomfort and that no research has identified any impact of oncoming headlamp size on the visibility of the person experiencing glare.” The glare study that NHTSA refers to was published in 2007 and did not include any study of LED headlights.¹³ NHTSA’s decision to refer to a 2007 glare study that did not measure glare from any LED headlight to justify the use of LED headlights is astonishing and unacceptable. It is not possible to draw conclusions about the glare from LED headlights from a study that did not include LED headlights in the study. The street lighting company Cree published a report in 2021 stating, “Not one of the existing metrics takes into account the non-uniform emitting surface of a LED luminaire.”¹⁴ A paper by researcher Dr. Peter Veto highlights some of the issues with glare from LED sources.¹⁵ NHTSA cannot continue to ignore the glare characteristics that are specific to LED headlights and must initiate studies to fully understand the impacts of LED headlight glare.

NHTSA writes, “Under NHTSA’s self-certification system, the manufacturer is legally bound to ensure their vehicles meet all applicable FMVSSs, including FMVSS No. 108.” However, NHTSA has chosen to not provide any oversight of the automakers’ self-certification system. How can NHTSA know if the automakers are providing accurate information to NHTSA regarding LED headlights if NHTSA does not investigate? This is unacceptable. In fact, the Soft Lights Foundation has uncovered evidence that suggests that the vehicle headlights do not meet FMVSS-108 standards and the evidence suggests that LED headlights are not compliant. NHTSA writes, “In a laboratory setting, a photometer is used to measure, in candela, the amount of light emitted by a lighting device in a particular direction over multiple test points.” We believe that there is probable cause to suggest that the automakers have been able to have their vehicles meet FMVSS-108 requirements in a laboratory setting, but that the headlight systems do not meet FMVSS-108 standards in real world conditions. It is our understanding that NHTSA has not required the automakers to provide any measurement data that shows that their vehicles with LED headlights comply with FMVSS-108 once they leave the assembly line.

We believe that it can be shown, using standard handheld illuminance meters, that many OEM vehicles with LED headlights on the road exceed Table XIX requirements for maximum luminous intensity. Researcher John Bullough of Mount Sinai reported that he found that two-thirds of vehicles had at least one misaligned headlight.¹⁶ We contend that the statement that the headlights are “misaligned” is an invalid conclusion about LED headlights. We believe that LED headlights on vehicles in real world conditions simply cannot meet FMVSS-108 Table XIX requirements because of the extreme peak luminance emitted by tiny LED chips. NHTSA must initiate a study to capture real world illuminance/luminous intensity measurements for multiple manufacturers and multiple models. Any results showing more than about 2-3% of vehicles exceeding Table XIX requirements will show that LED headlights are not compliant with existing regulations.

The Soft Lights Foundation submitted a request to the Department of Transportation Office of Inspector General requesting an investigation into the LED headlight issue. The DOT OIG assigned case number EM230821-01 and stated, “The OIG exercises independent judgment in determining the best use of available resources to meet our responsibilities under the Inspector General Act. As previously stated, based

¹³ https://www.nhtsa.gov/sites/nhtsa.gov/files/glare_congressional_report.pdf

¹⁴ <http://www.softlights.org/wp-content/uploads/2022/04/Cree-Lighting-White-Paper.pdf>

¹⁵ https://peterveto.me/wp-content/uploads/2023/01/A-quest-for-new-LED-glare-metrics_Veto-Chamberlin-Sabatier-Baker_2023.pdf

¹⁶ <https://jalopnik.com/you-re-not-imagining-it-blinding-headlights-are-a-real-1850112863>

on our review of the material provided, we have determined that we do not have primary oversight over your concerns and our file is closed.” It hardly seems useful to have an Office of Inspector General that does not actually investigate. Since the DOT OIG has declined to investigate, we call upon NHTSA to perform their own investigation.

NHTSA’s decision to not open an investigation into the switch from point source tungsten filament headlights to Lambertian source LED headlights which require FDA performance standards is unacceptable. Given the information presented above, the need for a NHTSA investigation and report to Congress is undeniable. Therefore, we request that the Office of Defects Investigation open an investigation into the auto industry’s switch to LED headlights. A report to Congress should address the concerns presented above and should contain:

1. The requirement for the automakers to petition NHTSA for authorization to use LED headlights.
2. The requirement for NHTSA to liaise with the FDA to publish performance standards for LED headlights.
3. The need for glare studies for LED headlights.
4. A comparison of physics characteristics between point sources and Lambertian sources.
5. Studies that capture measurements of illuminance and luminous intensity for vehicles with LED headlights in a non-laboratory, real world environment.
6. The need for restrictions in FMVSS-108 for peak luminance, dispersion characteristics, spatial uniformity requirements, spectral power distribution, square wave flicker and pulse width modulation.
7. The need to address the safety concerns of the nearly 50,000 individuals that have signed the petition to NHTSA to protect them from the harms of LED headlights.
8. The need to enforce the prohibition of non-compliant aftermarket LED headlamp bulb retrofits.
9. The need for a stop sale for all vehicles with LED headlights due to the lack of regulation of LED headlights and the hazards they present.

We request that NHTSA ODI provide an initial report to Congress no later than November 1, 2023, and follow up with additional reports every 3 months.

Sincerely,

/s/ Mark Baker

President

Soft Lights Foundation

mbaker@softlights.org

cc:

Representative Mike Thompson

Representative Mark Pocan

Senator Maria Cantwell