Soft Lights Foundation

9450 SW Gemini Drive
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December 17, 2021

BY EMAIL

Catherine McEvilly, General Counsel
Honda North America
cathy_mcevilly@ahm.honda.com

Re: Flat Surface Spatially Anisotropic Radiation Devices

Dear Catherine McEvilly,

The Soft Lights Petition to ban blinding LED radiation devices is approaching 30,000 signatures. Here are a few of the most recent comments.[1]

"These new bright headlights are dangerous and blinding to other drivers."

"I'm tired of being blinded with these bright lights! It's painful!"

"I can barely drive at night anymore. I'm afraid of an accident because I am constantly blinded by LED lights aimed into my vehicle"

The National Highway Transportation Safety Administration has never approved spatially anisotropic radiation from a flat surface for use as a vehicle headlight. Honda Motor America's use of LED radiation devices as vehicle headlights is thus illegal and Honda is therefore liable for the physical and psychological injuries caused by issues related to the use of LED headlights.

The substance emitted by LEDs is spatially anisotropic visible radiation with orders of magnitude difference between the peak radiance at zero degrees along the center axis of the LED chip and angles greater than zero degrees. Mathematically, the shape of the radiation is a Lambertian which is created because the source of the radiation is a flat surface.[2] The radiation energy from an LED is different at every point in space, which is very different than the spatially uniform energy of *light* as used in regulatory filings. Because the radiation emitted by LEDs is spatially anisotropic, and because the peak radiance is so dense, this LED radiation causes eye damage and reduced vision, interferes with the nervous system, and triggers pain, epileptic seizures, migraines, psychiatric trauma, and thoughts of suicide. In addition, because NHTSA does not regulate the necessary spatial, spectral, and temporal properties of LED radiation devices, LED radiation devices used as headlights have hazardous and discriminatory spectral power distributions and flicker properties.

[1] https://www.change.org/p/u-s-dot-ban-blinding-headlights-and-save-lives
[2] https://ieeexplore.ieee.org/document/8879542

Figure 1 is a diagram showing the categorization of radiation and shows that *light* and *illumination* are spatially isotropic radiation from a spherical emitter in the human visible portion of the electromagnetic spectrum. The spatially anisotropic radiation emitted by flat surface LEDs do meet the regulatory meaning for *light*, and thus LEDs are not suitable or regulated for the purpose of illumination, including vehicle headlights.

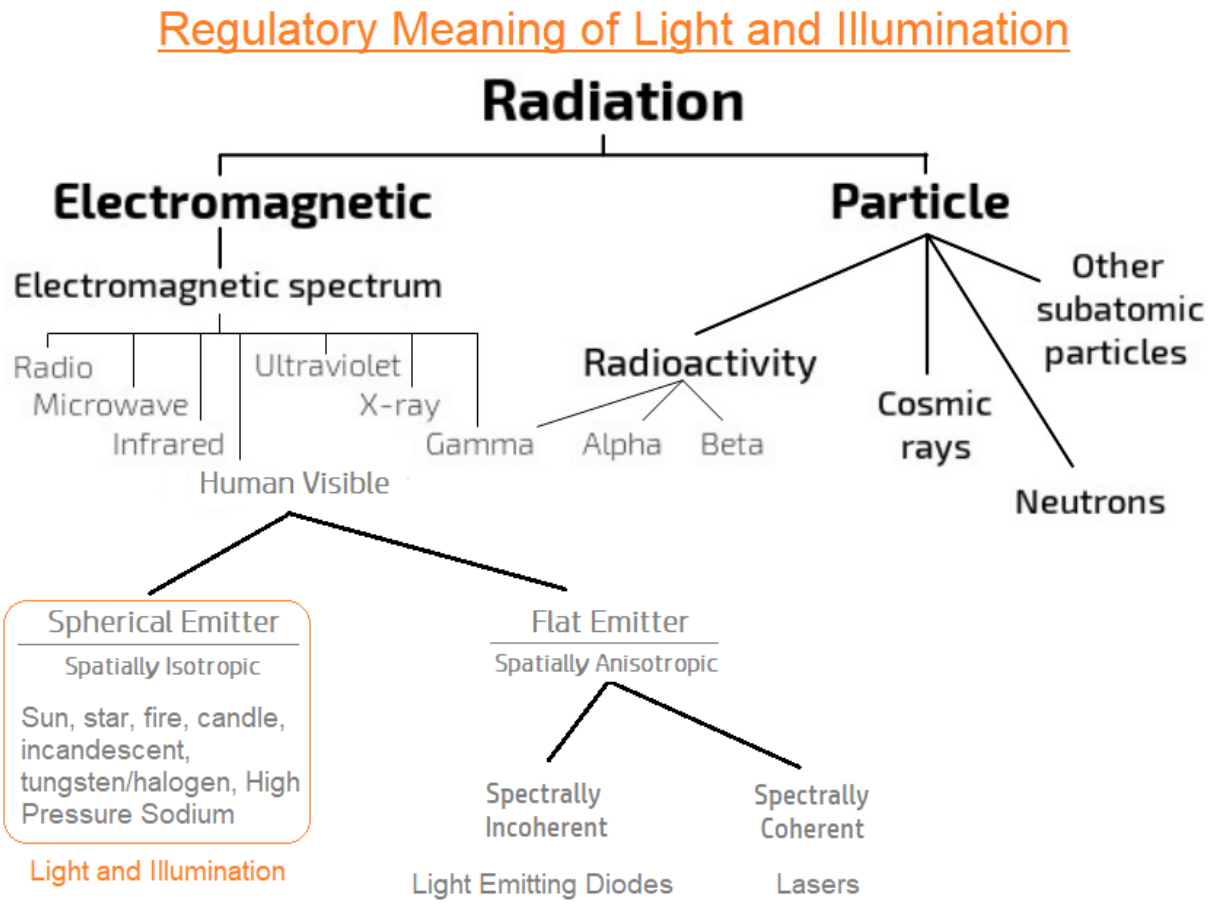

Figure 1 - Radiation Types

The National Highway Transportation Safety Administration publishes FMVSS-108 which regulates vehicle headlights. FMVSS-108 was originally written in 1967 and is applicable to *spatially isotropic radiation from a spherical surface in the human-visible portion of the electromagnetic spectrum*. FMVSS-108 is not applicable to radiation particles, microwaves, x-rays, or spatially anisotropic radiation from flat surfaces such as from lasers or LEDs. NHTSA has never approved any type of visible radiation device where the radiance is non-uniform for use as a vehicle headlight.

Figure 2 is a photo taken in October, 2021 of a vehicle with LED headlights. This vehicle is not necessarily a Honda but is representative of the glare and danger presented by LED headlights. Both OEM and aftermarket LED headlights are illegal.

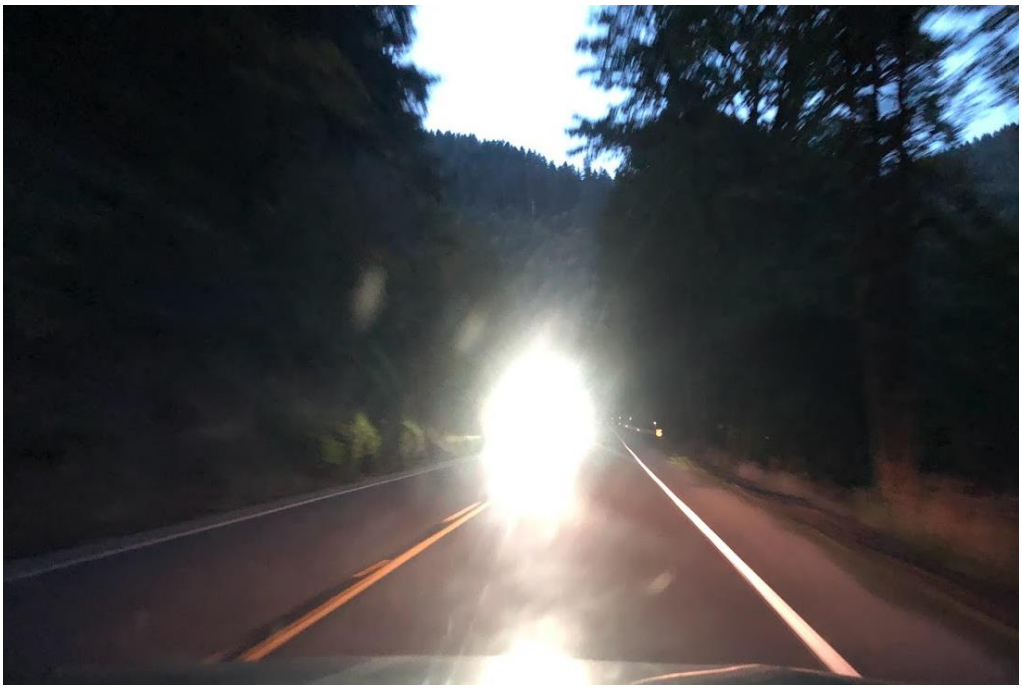

Figure 2 - LED Headlights

To our knowledge, there are no ocular exposure standards for LEDs. In his 2009 presentation, Senior Engineer Michael Shulman of Underwriters Laboratories wrote, "Currently, neither the U.S. nor Canada have mandatory standards or regulations for ocular exposure to LEDs emitting incoherent visible light."[3] In the research article, titled Light Emitting Diode Induced Retinal Damage[4] the authors state, "*Excessive LED light exposure presents a potential hazard to retinal function.*" In other research, those in Risk Group 3 (those with epilepsy, autism, migraines, photophobia, etc.) are often purposely ignored during the research, invalidating results that might have shown that LEDs are safe.

LEDs are not "energy efficient". To be energy efficient, a technology must provide the same quality of service and perform the same task as the previous technology[5]. The task in this situation is to provide *light* and uniform illumination while using less energy and not causing harm. Since LEDs do not emit spatially isotropic radiation, LEDs are not illumination devices. Instead, LEDs emit spatially anisotropic visible radiation from a flat surface that causes sickness and eye damage, endangers lives, and violates civil rights. The claim of "energy efficiency" by the LED lighting industry is fraudulent.

As an example of how dangerous LED radiation is, consider this warning shown in Figure 3 from the company Gear Light. LED chip makers exceeded 100,000,000 nits of peak luminance as of 2018.[6]

[3] http://www.softlights.org/wp-content/uploads/2021/10/MichaelShulman_LEDFireElectricalSafety.pdf
[4] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5313540/
[5] https://www.energystar.gov/about/about_energy_efficiency
[6] focusworld.com/test-measurement/research/article/16555223/nonlaser-light-sources-highluminance-leds-target-emerging-automotive-lighting-applications

Figure 3 - LED Flashlight

The fact that LEDs are unregulated and lack standards, cause sickness and eye damage, interfere with the human nervous system, discriminate against people with light sensitivity disabilities, endanger public safety, and are illegal, makes Honda liable for the harm and discrimination caused by their vehicles that emit LED radiation. LED radiation devices are toxic, hazardous, discriminatory, and illegal for use as vehicle headlights. To protect human health, comply with federal regulations, and reduce liability, Honda must recall all vehicles with LED headlights, and sell only vehicles with headlights, daytime running lights, taillights and brake lights that comply with federal regulation FMVSS-108, are not toxic, are not hazardous, and do not discriminate.

Sincerely,

Mark Baker

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