

October 31, 2021

To:

Desiree Ralls-Morrison, General Counsel  
McDonald's Corporation  
110 N. Carpenter Street  
Chicago, IL 60607

Re: Spatially Heterogeneous Radiation for Illumination

Dear Desiree Ralls-Morrison,

The Illuminating Engineering Society Recommended Practice for Design and Maintenance for Roadway Parking Facility Lighting (IES RP-8-18) is the de-facto standard for outdoor lighting of parking lots. While we do not have specific information about the standards that McDonald's follows for parking lot lighting, it is likely that McDonald's follows IES RP-8-18 or a similar standard. While the definition of "light" is not included in the standard itself, there are constraints on what "light" means, two of which, Radiation Type and Spectral Range, are described on the IES website.<sup>1</sup>

**Radiation Type:** It is implied that IES RP-8-18 is applicable only to electromagnetic radiation sources emitting massless photons and is not applicable to particulate radiation emitting particles with mass.

**Spectral Range:** It is implied that IES RP-8-18 is applicable only to radiation within the human visible portion of the electromagnetic spectrum and is not applicable to radiation in the microwave, x-ray, radio, and other portions of the spectrum.

**Spatial Form:** It is implied that IES RP-8-18 is applicable only to human visible radiation that is emitted homogeneously such that any steradian will have uniform luminous intensity, and that IES RP-8-18 is not applicable to a spatially heterogeneous radiation source where the radiance can be exceedingly high at one angle, and exceedingly low at another angle.

These constraints on what the word "light" means in IES RP-8-18 are shown in Figure 1.

---

<sup>1</sup> <https://www.ies.org/definitions/light/>

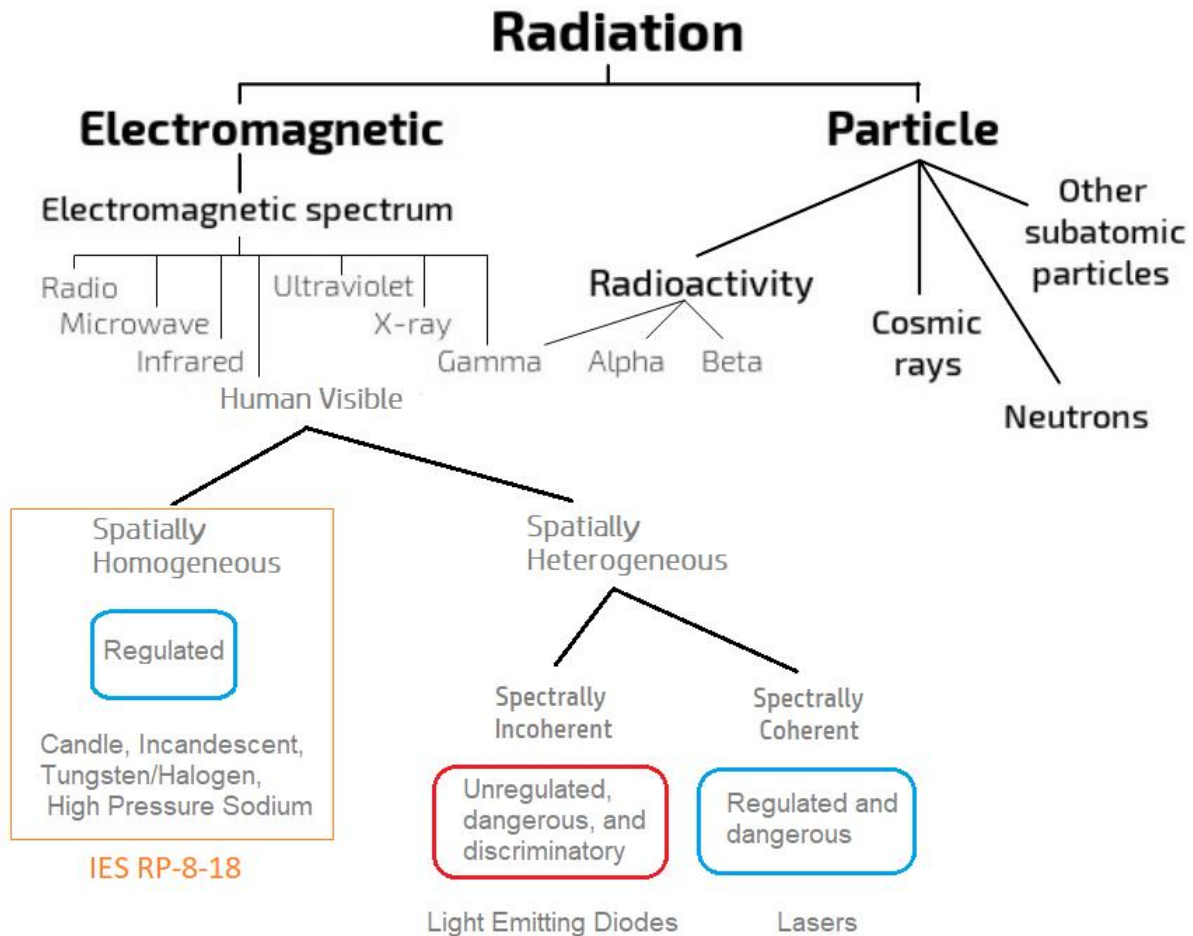


Figure 1 - Radiation Types

IES RP-8-18 applies only to the subset of radiation shown in the orange box in Figure 1. As you can see in the diagram, IES RP-8-18 applies to electromagnetic visible radiation that is spatially homogeneous. Radiation from Light Emitting Diodes is not included in the IES standard because LEDs emit spatially heterogeneous, spectrally incoherent radiation and IES has not written standards for this type of radiation.

The reason this is important for the McDonald's Corporation is because McDonald's has installed LED parking lot lights that do not comply with standards, emit dangerous radiation, and discriminate against persons with light sensitivity disabilities because of the unregulated spatial, temporal, and spectral characteristics.

Figure 2 is a photo from the McDonald's parking lot in Philomath, Oregon taken at approximately 4:00pm on Sunday, October 31, 2021.



Figure 2 - McDonald's - Philomath, Oregon

As you can see in the photo, it is daytime, so the lights are not serving a useful function and wasting energy. Worse, is that these LEDs are spatially heterogeneous, with a large spike of high energy blue wavelength light (approximately 450 nanometers) and have a very high luminous flux. These lights cause pain and possible seizures, migraines, psychological trauma, and eye damage.

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."<sup>2</sup> To our knowledge, these ocular exposure standards for LEDs have never been written.

In this research article, titled Light Emitting Diode Induced Retinal Damage<sup>3</sup> 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 show that LEDs are safe.

---

<sup>2</sup> [http://www.softlights.org/wp-content/uploads/2021/10/MichaelShulman\\_LEDFireElectricalSafety.pdf](http://www.softlights.org/wp-content/uploads/2021/10/MichaelShulman_LEDFireElectricalSafety.pdf)

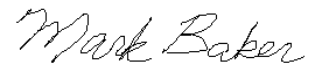
<sup>3</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5313540/>

The fact that LEDs are unregulated, can cause eye damage, and discriminate against people with light sensitivity disabilities makes McDonald's liable for the harm and discrimination they cause. Since McDonald's has installed these LED lights at so many locations, the liability exposure to McDonald's is significant.

To protect human health and reduce liability, McDonald's should replace spatially heterogeneous LED lights with fully shielded, spatially homogeneous light sources.

A copy of this letter has been posted on our website for public access.

Sincerely,

A handwritten signature in cursive script that reads "Mark Baker".

Mark Baker  
President

Soft Lights Foundation  
[mbaker@softlights.org](mailto:mbaker@softlights.org)  
9450 SW Gemini Drive PMB 44671  
Beaverton, OR 97008