

November 3, 2021

To:

Carlos M. Brown, Chief Counsel  
Dominion Energy  
1 James Center  
Richmond, VA 23219  
Carlos.M.Brown@dominionenergy.com

Re: Spatially Heterogeneous Radiation for Illumination

Dear Carlos M. Brown, General Counsel, Dominion Energy,

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 streetlights and parking lots. While we do not have specific information about the standards that Dominion Energy follows for street lighting, it is likely that Dominion Energy 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.

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

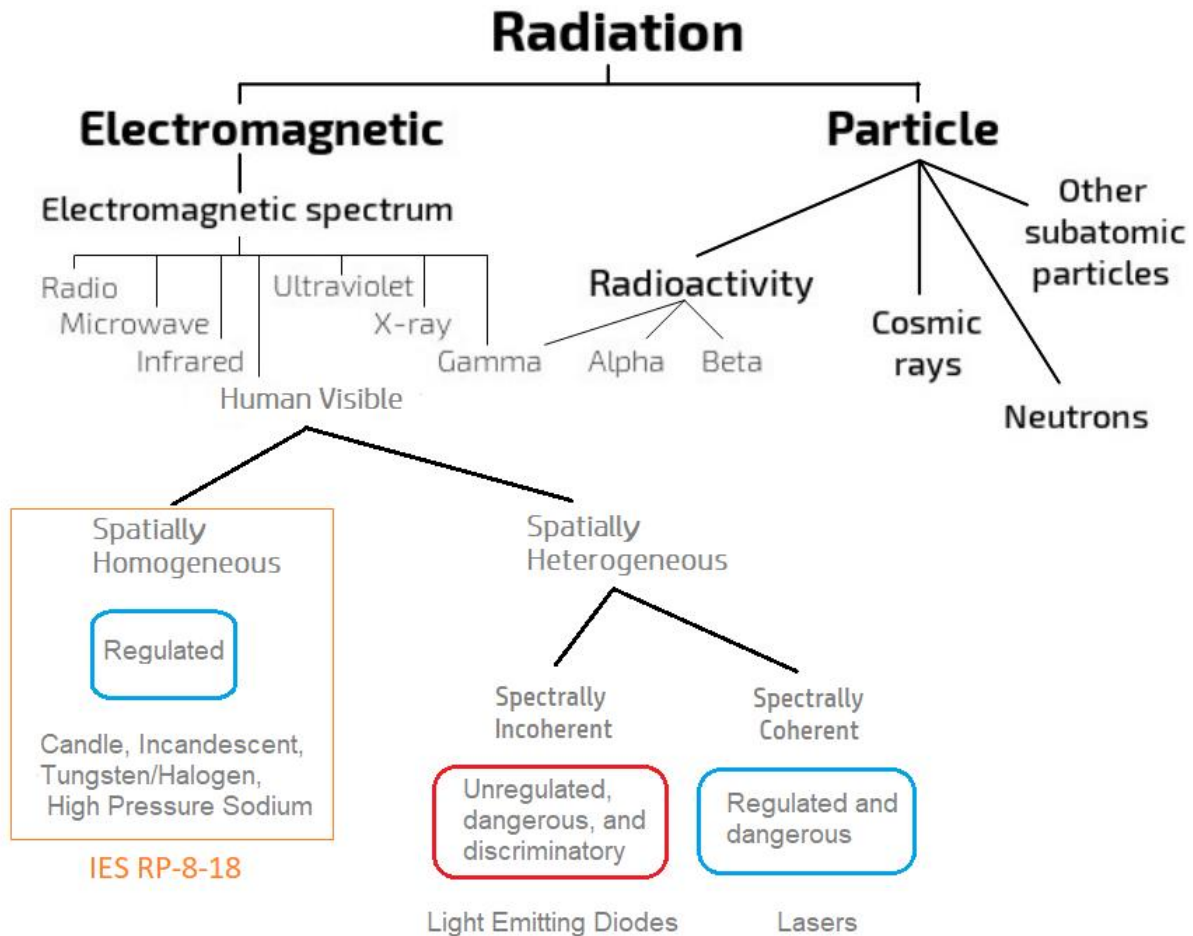


Figure 1 - Radiation Types

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 Dominion Energy is because Dominion Energy has installed LED streetlights 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.

In addition, the Illuminating Engineering Society does not guarantee their own standards and disclaims any liability for the use of their standards. Thus, if Dominion Energy attempts claim that they followed standards for LED streetlighting and are therefore not liable for the harms caused by LED lighting, Dominion Energy's claim will fail, both because IES RP-8-18 is not applicable to LED streetlights,

and because IES has warned the Dominion Energy that their standards are not trustworthy enough to be guaranteed or relied on.

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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.

The fact that LEDs are unregulated, can cause eye damage, and discriminate against people with light sensitivity disabilities makes Dominion Energy liable for the harm and discrimination they cause. Since Dominion Energy has installed these LED lights at so many locations, the liability exposure to Dominion Energy is significant. Liability includes claims of dangerous product, reckless endangerment, and violation of the ADA because there are numerous documented cases of epileptic seizures, migraines, psychological trauma, eye damage, vehicle crashes, loss of liberty, thoughts of suicide, and possibly loss of life from directed energy LED radiation.


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<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/>

To protect human health and reduce liability, Dominion Energy should replace spatially heterogeneous LED streetlights with fully shielded, spatially homogeneous light sources with a Correlated Color Temperature of 2700 Kelvin or less, with 2000K preferred to protect the natural night resource.

Sincerely,

A handwritten signature in black ink that reads "Mark Baker". The signature is written in a cursive style with a large, prominent initial "M".

Mark Baker  
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