

November 4, 2021

To:

Yvonne Hilton, City Solicitor
City of Pittsburgh
yvonne.hilton@pittsburghpa.gov

Re: Spatially Heterogeneous Radiation for Illumination

Dear City of Pittsburgh,

We wish to alert the City of Pittsburgh to liability issues related to unregulated, dangerous, and discriminatory, spatially heterogeneous Light Emitting Diodes.

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 streets and parking lots. Pittsburgh uses IES RP-8-18 as the basis for its own local lighting codes. 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.¹

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.

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

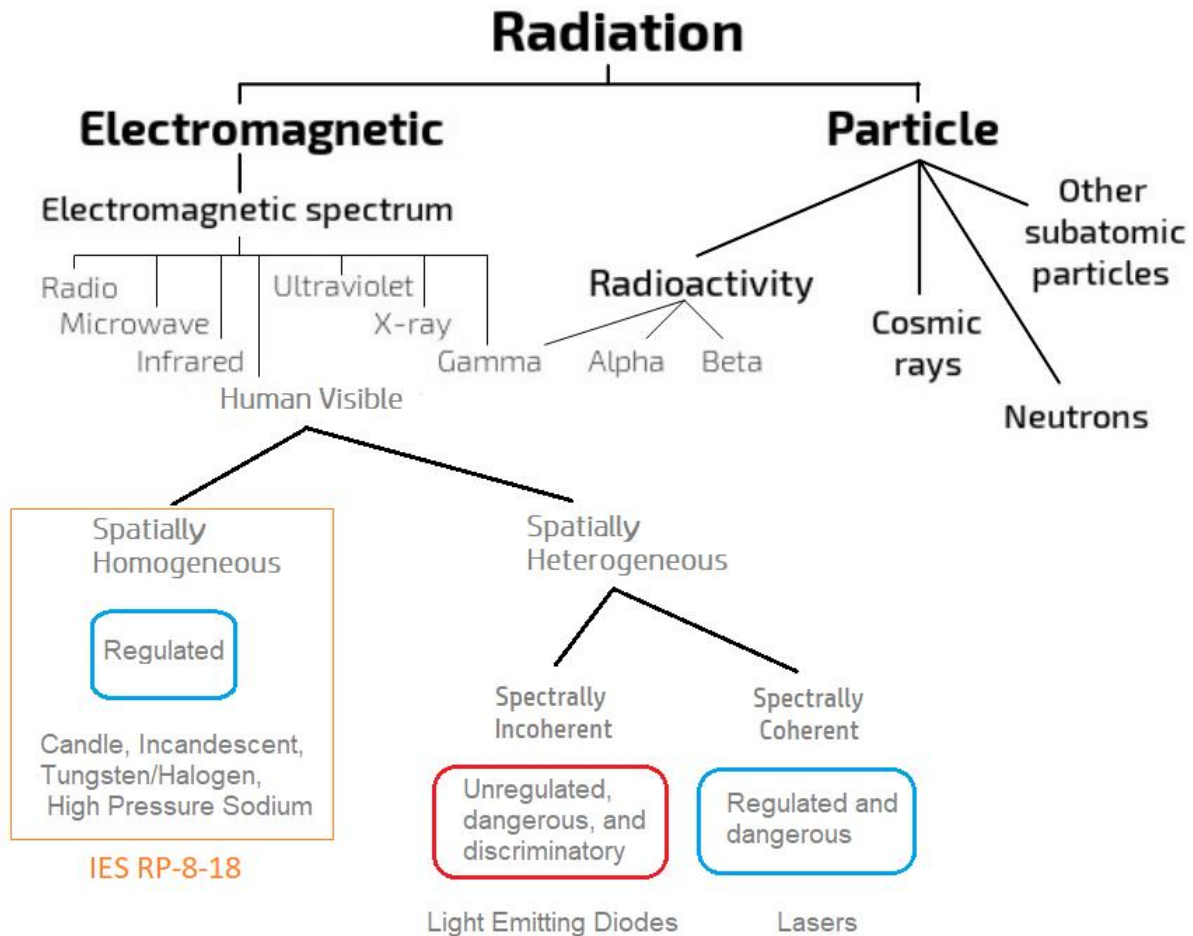


Figure 1 - Radiation Types

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. LED lights have been shown to cause pain, seizures, migraines, psychological trauma, eye damage, and thoughts of suicide.

The reason this is important for Pittsburgh is because Pittsburgh has installed LED streetlights that do not comply with existing standards, emit dangerous radiation, and discriminate against persons with light sensitivity disabilities because of the unregulated spatial, temporal, and spectral characteristics. Even more serious is the use of directed energy LED flashing lights on police and other emergency vehicles which place lives in immediate danger due to the radiance and flash rate.

In addition, the Illuminating Engineering Society does not guarantee their own standards and disclaims any liability for the use of their standards. Thus, if the City of Pittsburgh attempts claim that they followed standards for LED streetlighting and are therefore not liable for the harms caused by LED

lighting, Pittsburgh's claim will fail, both because IES RP-8-18 is not applicable to LED streetlights, and because IES has warned Pittsburgh 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."² To our knowledge, these ocular exposure standards for LEDs have never been written.

In this research article, titled Light Emitting Diode Induced Retinal Damage³ 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 psychological trauma and eye damage, and discriminate against people with light sensitivity disabilities makes Pittsburgh liable for the harm and discrimination they cause. Since Pittsburgh uses these LED lights in so many locations and vehicles, the liability exposure to Pittsburgh is significant.

To protect human health and reduce liability, Pittsburgh should replace spatially heterogeneous LED streetlights with fully shielded, spatially homogeneous light sources with a Correlated Color

² http://www.softlights.org/wp-content/uploads/2021/10/MichaelShulman_LEDFireElectricalSafety.pdf

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

Temperature of 2700 Kelvin or less, with 2000K preferred to protect the natural night resource. LED flashing lights must be eliminated completely due to the excessive danger they pose.

Sincerely,

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

Mark Baker
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