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# You can safely operate a UVC device under appropriate circumstances.

“From Safety and Effectiveness of UVC Emitting Devices in Germicidal and Anti-Viral Applications: A White Paper” by James Wiebe, CEO, Thin Air Energy, August 17, 2020

There is little media coverage that has provided good answers on government standards for safe UVC dosing. This is surprising, given the benefits vs risks. As it turns out, there is a solid source of information for UVC dosing recommendations: ACGIH.org, which is the American Conference of Governmental Industrial Hygienists. Drilling into their published data, we find a table of safe UVC radiation levels.<sup>1</sup> The referenced table is published as part of a ACGIH® Threshold Limit Values (TLVs®) and Biological Exposure Indices (BEIs®), and I will dig into it later in this paper.

The document uses a strange word, “actinic,” which begs for a definition. Here are two definitions:

Actinic: Referring to the ultraviolet (UV) rays from sunlight and UV lamps. *Sunburn* is an actinic *burn*. An *actinic keratosis* is a skin lesion that is the consequence of chronic sun exposure.<sup>2</sup>

Relating to or denoting light able to cause photochemical reactions, as in photography, through having a significant short wavelength or ultraviolet component.<sup>3</sup>

<sup>1</sup> <https://www.nsc.org/Portals/0/Documents/facultyportal/Documents/fih-6e-appendix-b.pdf> (page 1042)

<sup>2</sup> <https://www.medicinenet.com/script/main/art.asp?articlekey=19890>

<sup>3</sup> <https://www.lexico.com/en/definition/actinic>

Actinic radiation causes photochemical reactions (in cells and viruses, for instance) and can cause burns, lesions, and cancer.

Actinic UVc radiation is radiation that occurs within the wavelength of 100 to 280 nanometers. As a comparison to visible light, this is a shorter wavelength and is not visible. It does not reach our retinas. It has the unique ability to cause a reaction in living things, causing cellular mutation and death.<sup>4</sup>

The European authority has substantially different research<sup>5</sup>, which contradicts the US information and suggests the detrimental effects for UVc radiation are not there.

Measuring the level of UVc radiation is important. It establishes both safety and effectiveness. Here is a snippet of the UV actinic dosing table which was referenced earlier<sup>6</sup>, showing published safety standards.

<b>Duration of Exposure</b>	<b>Irradiance Level, in milliWatts per <u>cm</u><sup>2</sup></b>
8 hours	0.0001
4 hours	0.0002
2 hours	0.0004
1 hour	0.0008
30 minutes	0.0017
15 minutes	0.0033
10 minutes	0.005
5 minutes	0.01
1 minute	0.05
30 seconds	0.1
10 seconds	0.3
1 second	3
0.5 second	6
0.1 second	30

After multiplying the duration of each line (in seconds) times the level (in milliWatts), the resulting result is milliJoules (mJ). And for each line, the calculation produces a value of 3 mJ. To emphasize, it is the same resulting dose value for every line. They are all the same dose.

*Per ACGIH, this is a daily limit exposure of UVc: 3 milliJoules.*

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<sup>4</sup> <https://www.insider.com/does-uv-light-kill-germs>

<sup>5</sup> [https://ec.europa.eu/health/ph\\_risk/committees/04\\_sccp/docs/sccp\\_o\\_031b.pdf](https://ec.europa.eu/health/ph_risk/committees/04_sccp/docs/sccp_o_031b.pdf)

<sup>6</sup> <https://www.nsc.org/Portals/0/Documents/facultyportal/Documents/fih-6e-appendix-b.pdf> (page 1042)