

The Impact of Exposure Standards on Directed Energy Non-Lethal Weapons (DENLW)

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Directed energy, both optical and radio frequency, is being developed for use in anti-materiel and counter-personnel non-lethal weapons. Such use not only raises issues concerning effectiveness and “non-lethality” for the target, but also of possible risk to non-combatants and to personnel involved in developing, testing, and using the systems.

Quantified limits have been established for occupational and environmental exposure to optical and radio frequency parts of the electromagnetic spectrum. These limits are specified in documents variously identified as recommendations, guidelines, standards, instructions, or regulations and may apply multinationally (e.g., NATO or the EU) or nationally, to certain licensees, to an occupational specialty, or to a specific governmental institution (e.g., national defense ministry).

Optimally, the limits for exposure to directed energy are based on the best science, uncertainty estimations, and the predictions of validated mathematical models. However, sometimes non-scientific factors enter into the mix, including precautionary approaches, unfounded assumptions/beliefs, industry pressure, and politics. In general, the limits are set very conservatively with safety margins of ten-times or more. The actual limits and the documents that embody them are not immutable, and can be changed for many reasons, the most appropriate of which is new or better scientific data.

In evaluating, demonstrating, or training operators for DENLW systems it may be useful to expose personnel to emissions that exceed the ordinary standards. While there are provisions for exceeding such limits during institutionally approved and medically monitored human use protocols, planned special exposures for effectiveness testing, demonstrations, and training pose challenging issues for counter-personnel DENLW.

Many disciplines facilitate the progress of DENLW; physics, engineering, and bioeffects, come easily to mind. Directed energy standard setting should be recognized as another valuable contributor in this important endeavor.

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