

LETTERS TO THE EDITORS

Units Should Have Regular Plurals

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Dear Sirs:

WE WERE recently working on a project involving the use of the terms rad, rem and person-rem in their singular and plural forms. Some of us preferred to form the plurals of these by adding "s", while others preferred invariant plural forms (e.g. "a dose of several rem"). It became clear that we should settle on one method or the other for consistency's sake, and we turned to the history of the terms for guidance.

In English, the plurals of regular nouns, including most units of measurement, are formed by adding "s" to the noun. How did we come to have irregular (non-"s") plurals of the radiation terms? There are at least two contributing reasons:

(1) Originally (but not for over a decade) the words "rad" and "rem" were acronyms for "radiation absorbed dose" and "roentgen (or radiation) equivalent man," respectively. However, rad and rem are no longer acronyms (similar to "laser", "to lase", "lasing", etc.); both words are now defined without reference to their origins (e.g. ICRU71; ICRU73).

(2) Neither rad nor rem has an abbreviation, making them very unusual among units. Units which do have abbreviations are commonly used in singular or plural, as needed, when written out; but the abbreviations are invariant. For example:

1 watt 10 watts; but

1 W 10 W.

The term "10 W" is read "ten watts" with an "s". Perhaps the former acronyms rad and rem are treated by some as abbreviations, by others as complete words.

The abbreviation problem is further complicated by the fact that rad and rem are commonly used with the prefix "milli". Since milli is abbreviated "m", one encounters a non-abbreviated unit with an abbreviated prefix!

1 millirem → 1 mrem 1 millivolt → 1 mV

10 millirems → 10 mrems 10 millivolts → 10 mV.

We decided to standardize on regular plurals, as follows, by analogy with other units:

nouns: $\left\{ \begin{array}{llll} 1 \text{ rem} & 1 \text{ mrem} & 1 \text{ dollar} & 1 \text{ year} \\ 5 \text{ rems} & 5 \text{ mrems} & 5 \text{ dollars} & 5 \text{ years} \end{array} \right.$

adjectives: a 5-rem exposure, a 5-dollar bill, a 5-year loan

combined forms: $\left\{ \begin{array}{ll} 1 \text{ person-rem} & 1 \text{ person-year} \\ 5 \text{ person -rems} & 5 \text{ person-years.} \end{array} \right.$

The term rad is used in a similar fashion.

We based this on the following considerations:

(1) New words in a language should be regular, not irregular. This is especially important for communication with non-native speakers.

(2) The use of regular plurals reduces jargon. This reduction improves communication with non-technical press and public.

(3) By analogy with other units, including roentgen, curie, becquerel, gray, and sievert (ICRU80), the terms rad and rem should have regular plurals.

Little guidance can be found in the literature. The ICRU and the U.S. Nuclear Regulatory Commission are quite consistent in their use of regular plurals (ICRU71; ICRU73; ICRU80; NRC80). However, ICRP, NCRP and contributors to *Health Physics* are inconsistent; cases can be found where both regular and invariant plurals are used together within the same article or pamphlet!

For the reasons stated above, we recommend that the editors of *Health Physics* and others uniformly use the regular (s-type) plurals.

DANIEL J. STROM
PAUL S. STANSBURY
JAMES E. WATSON, JR.

*Department of Environmental Sciences
and Engineering
School of Public Health
University of North Carolina
Chapel Hill, NC 27514*

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