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LETTERS

Three Mile Island

Eliot Marshall (News and Comment, 20 Apr., p. 281) perpetuates misinformation about the health effects of the radiation released from the Three Mile Island nuclear plant when he states that "the radioactive isotopes of these gases [krypton and xenon] have brief half-lives, so that they decay within days." This is true for xenon, *but not* for krypton. One of the major products of nuclear fission is the radioactive isotope krypton-85, which has a half-life of 10.76 years. Thus, krypton-85 can affect not only the local and downwind population over a period of time depending on how fast it is dispersed in the atmosphere, but also, because the isotope can accumulate in the atmosphere, the general population is exposed to higher levels of radiation. The effects of krypton-85, which is essentially a pure β -emitter, are primarily limited to the skin and superficial tissues. However, when the isotope is inhaled, the lungs and blood-forming system become the critical organs.

The release of krypton-85 from the Three Mile Island plant can be added to the already significant quantities being released by nuclear fuel reprocessing plants. It has been postulated that the continued release of this isotope could lead to inadvertent weather modification as well as other environmental effects (*1*). Thus, the people of Harrisburg and the rest of us may be in for more than originally anticipated.

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References

1. W. L. Boeck, *Science* **193**, 195 (1976).

In the first News and Comment report (13 Apr., p. 152) on the Three Mile Island incident, misstatements regarding the foreseeability of the hydrogen bubble that appeared elsewhere are repeated. The problem of hydrogen accumulation inside the containment structure was foreseen and considered to be a potential problem by the Advisory Committee on Reactor Safeguards (ACRS) in 1969 (*1*):

The applicant has discussed . . . the question of post-accident production of hydrogen in the containment atmosphere due to radiolysis and metal-water reactions. The Committee believes that further consideration should be given to providing means for coping with additional hydrogen which might be generated

by Zircaloy-water reactions in a postulated loss-of-coolant accident. . . . This matter should be resolved between the applicant and the AEC Regulatory Staff.

In 1971, the ACRS said:

The Committee has commented in previous reports on the development of systems to control the build-up of hydrogen in the containment that might follow . . . a loss-of-coolant accident. . . . The Committee believes that purging capability should be retained, but that the primary protection in this regard should utilize a method of hydrogen control other than purging. The applicant should submit . . . a proposed design for hydrogen control, including provisions for inerting. . . . The Committee wishes to be kept informed of the resolution of this matter.

As the above demonstrates, the possibility of hydrogen accumulation inside the containment was anticipated. The moral is clear—the licensing process should be changed to give the ACRS some direct control over the outcome.

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References

1. Advisory Committee on Reactor Safeguards, "Report on Calvert Cliff nuclear power plant, units 1 and 2," in *Safety Evaluation by the Division of Reactor Licensing U.S. Atomic Energy Commission* (Docket Nos. 50-317/318, Atomic Energy Commission, Washington, D.C., 9 April 1969), appendix B.
2. —, "Report on Enrico Fermi atomic power plant, unit No. 2," in *Safety Evaluation By The Division of Reactor Licensing U.S. Atomic Energy Commission* (Docket No. 50-341, Atomic Energy Commission, Washington, D.C., 17 May 1971), appendix B.

Bronstein's point is that the officials—forewarned about the dangers of a hydrogen buildup in the containment—also should have been aware of the dangers of a hydrogen buildup in the reactor core. Alas, they were not, according to Harold Denton. When Denton arrived on the scene, he said the unexpected danger was not the risk of an explosion, but the possibility that the bubble might expand and incapacitate the coolant pumps. One hardly imagines he dissembled in this matter, for it is at least as damning to confess ignorance as negligence.—E.M.

Marshall's generally informative article on the Three Mile Island incident needs a correction. The rem is a unit of biological damage *per gram of exposed tissue*; thus the implication that a chest x-ray of 25 millirems is equivalent to the (presumably whole-body) exposure received in 25 hours by a person who, standing in a radiation field, receives 1 millirem per hour, is misleading. The discrepancy amounts to something like the factor by which the mass of a person's

body exceeds that of a person's chest. If one assumes that gonadal shielding is provided in the case of the chest x-ray, the comparison is perhaps even more inappropriate.

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I was very pleased with *Science's* coverage of the Three Mile Island reactor incident. I believe the real quality of any publication can be best judged by how well it covers a spot news item. *Science* responded quickly and effectively to Three Mile Island.

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"Strategy"

Gideon Louw (Letters, 9 Mar., p. 955) laments the widespread biological use of the word "strategy" because of the implication of rational choice where none exists. Perhaps the term is "semantically incorrect," but it is a necessary evil; there is no simpler way to label possible evolutionary designs. Unconventional uses of the language may be necessary to accommodate new or unwieldy ideas; consider the physicists' "flavor," the feeding "preference" of a predator (that may exert no active choice at all), and natural "selection" (what is doing the selecting?). It is easier to talk about selection than about differential perpetuation; as long as these minor bendings of conventional usage are introduced conservatively and explained to the uninitiated, they are acceptable and even desirable.

I suggest that we select a strategy to pass over these semantic dilemmas and concentrate instead on the many more insidious and easily corrected abuses of the language, including incorrect or hackneyed words and phrases like "pre-date," "utilize," "interface" (as a verb), "it is the case that," "due to the fact that," and so forth.

PAUL MURTAUGH

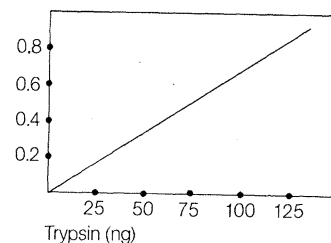
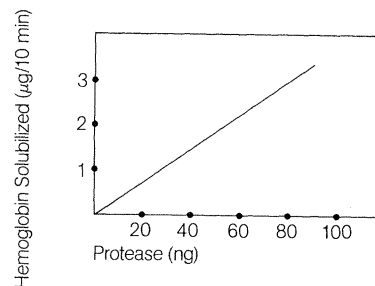
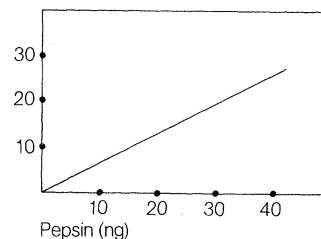
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Erratum: The second author of the report "Immunocompetence in the lowest Metazoan phylum: Transplantation immunity in sponges" (27 Apr., p. 420) was Ian S. Johnston, not Johnson.

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