exposure due to evacuation. When information is lacking, the natural tendency is to attempt to err on the side of safety. What is not generally appreciated is that an order to evacuate may be a major error. It may actually increase risk and, therefore, not be an "error on the safe side."

What then should be our strategy for action? During a reactor accident, decisions will have to be made in the face of considerable uncertainty. In this context, time is an asset: It allows decisions to be based on more information and less guesswork. The instinctive reaction—if an accident occurs, immediately run for the hills—is not the best course to follow. It deprives us of time and does not allow for the fact that even a quite serious accident is likely to result in only a small radioactive release. In most cases evacuation may in fact expose the public to greater danger than less drastic measures, such as just staying indoors. During an accident, the severity and status of the situation is difficult to determine, even if all lines of communication function perfectly. Decisions must nevertheless be made based on whatever information is available. Under such conditions, the principle of the "Decision of Minimum Regret" should be applied, whereby one assumes that the known information is incomplete and may be erroneous, so that the best course to pursue is the one that, if wrong, results in the least harm. Fortunately, the nature of reactor accidents helps out in the matter of time. Hazards to the public would evolve over a period of hours and days, not minutes.

A disturbing facet of our current national planning for emergency preparedness is the tendency to develop logically inconsistent scenarios of *hypothetical* accidents that are not necessarily based on reality or experience. The only accident that may give rise to a public risk is a core meltdown. But one of the surprising results of analyzing such accidents is that less than 2 percent of them would lead to significant offsite consequences. This does not take into account possible reactor operator actions or various circumstances in the plant that would further diminish any consequences. Experience has shown that, in the event of core meltdown accidents, 99 percent of the biologically hazardous fission products such as iodine never get out of the reactor building, even if that building is vented to the atmosphere. The incidents at the noncommercial Windscale and SL-1 reactors were two such accidents. The engineering of the containment building used for commercial reactors would further diminish the fraction of radioactive inventory that might escape (as it did at Three Mile Island).

But what if, despite all projections and precautions, a radioactive plume suddenly appeared over a stricken nuclear plant? We believe inadequate recognition is being given to the safety margin provided by the simple expedient of staying indoors. Closing the windows further reduces potential radioparticulate inhalation. The shielding ability of structures also offers substantial protection. Even a simple wood frame house reduces the dose rate from a passing cloud by a factor of 2. A masonry structure may give dose rate reductions of up to a factor of 10 on the first floor, and of 50 or more in the basement. These values are for isolated structures. A town where 35 percent of the area is covered with buildings may provide additional protection (up to a factor of 3). In fact, the greater the concentration of people the more protection is afforded by buildings, and the more difficult is evacuation. Evacuation, on the other hand, is likely to increase exposure due either to changes in meteorological conditions or to the fact that the movement of people may coincide with the direction of the radioactive cloud.

Currently the public official faced with an evacuation decision has no technical basis for making such a decision. Clearly, the question whether to evacuate or not is complex. There may be certain areas of low population within a mile or so of the plant where evacuation, even early evacuation, is the best course of action. But equally clearly, massive evacuations will only add to the public risk, with little probability of having tangible benefits.

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Scanner Development

In the article by Di Chiro and Brooks on the Nobel prize awarded to Allan Cormack and Godfrey Hounsfield for their separate contributions to computerized tomography (Research News, 30 Nov. 1979, p. 1060), the authors report, "It is a curious fact that the mathematical procedure used in present-day scanners . . . dates back to 1917." While no one in the field of tomography would dispute the great importance of Radon's 1917 paper, it is a curious fact that Di Chiro and Brooks overlook the substantial difficulties in applying Radon's theorem, and the person who introduced Radon's work into tomography. It is doubly curious because the contributions they overlook are mathematical, and the Nobel Assembly stated "that the problem was basically a mathematical one" (press release of 11 October 1979).

Numerical procedures based directly on Radon's formula are notably unsuccessful and have not been of practical value. The filtered back-projection procedures currently used in virtually all scanners required development of new reconstruction formulas, which were originally developed from Radon's formula, although they can also be developed directly from Fourier-transform theory (*1*). The chief figures in this development were undoubtedly A. V. Lakshminarayanan, B. F. Logan, and L. A. Shepp. Shepp played the central role, including introduction of Radon's work into the field, development of new formulas suitable for numerical use, and introduction of "mathematical phantoms," which provide a valuable way of experimenting with different numerical methods (*2*, *3*). Logan provided important mathematical assistance (*2*), and Lakshminarayanan (working separately) extended the formulas to the fan-beam geometry, in itself a difficult step (*4*).

The modern, filtered back-projection method provides two key advantages (both first demonstrated by Shepp): the picture quality is greatly improved, which has contributed greatly to the success of Hounsfield's technique; and the numerical procedures are greatly speeded up. In fact, most of the computational speedup emphasized by Di Chiro and Brooks may be attributed to the numerical procedures, with today's improved computers playing an important but secondary role.

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Erratum: In the report by Simpson *et al.*, "Saturnian trapped radiation and its absorption by satellites and rings: The first results from Pioneer 11" (25 Jan., p. 411), in Fig. 1B the right hand scale of flux (for the electrons with energies > 3.4 million electron volts) should be multiplied by a factor of 10 so that the maximum flux measured by the electron current detector is 3×10^6 cm^{-2} sec^{-1}. Furthermore, in reference 9, the following citation was inadvertently omitted: M. H. Acuña and N. F. Ness, *ibid.*, p. 444.