



*Joshua Lederberg*

## Atomic Risk Hard to Rate In Terms of Electrocution

THE MOST important biological discovery of the 1960s was the awakening of everyman to the vulnerability of the environment, and therefore of human health and survival, to the appetites of technology. The most urgent business of the '70s must remain the building of orderly communities among and within the nations; and then we must learn how not to poison ourselves as a side-effect of economic arrogance and scientific ignorance.

Until now, the environment has been exploited as if it were a free good; in fact, it is everybody else's property. The reassertion of the community's right is an ineluctable test of the integrity of free enterprise economics and democratic government.

Wise policies for managing the environment depend on much more than good intentions and the ultimate dedication of civic power to the common welfare. They also require factual information on hazards and benefits for an efficient and just allocation of costs and profits.

ONLY RARELY do we know the right questions to ask; one could justify our entire investment in basic research as the only reliable way to override our rigidified preconceptions. And when we have identified major problems—for example, the health hazard of environmental radiation, or residual pesticides—we have rarely done the applied research needed for reliable answers. It is, of course, infinitely easier to design, build and test a machine or a food additive for its primary function than it is to forecast how its proliferation might affect the human habitat.

The first article of an environmental bill of rights

must be to shift the burden of risk for untried technologies away from a helpless consumer public to their sponsors and profitters. This is not a vindictive or confiscatory proposal but a necessary ingredient of a fair market where the cost of information about a product is high compared to its unit price.

This principle has been established in law for food additives, but for few other markets. Besides direct regulatory law, however, we also have possible recourse to liability for damages, compulsory insurance, tax incentives and sometimes simple civic conscience.

In a recent article in *Science* magazine, Chauncey Starr, dean of the UCLA School of Engineering, attempted to develop a calculus of technological risks as an extension of conventional economic analysis. Such studies are plagued by the "only poker game in town" syndrome: shaky data and contrived models may be pursued for lack of any better. This has its place, but we had better not expect to win.

FOR EXAMPLE, Dr. Starr counts the fatalities that are associated in any way with conventional electric power to be four deaths per year per million-kilowatt power station. On the assumption that this death index represents a pragmatic, social balancing of the costs and benefits of electric power, it is used as a criterion for the risk analysis of nuclear power plant operation.

Power plant catastrophes which might disperse radiation are postulated to cause human damage counted as 10 lethal cancers per million. A plant need then run

for only 2½ years to satisfy the death index, and the limiting factor would therefore be the risk to the capital invested in the plant. (This would have to reach a calculated useful life of at least 30 years.)

It would, I hope, be unfair to take this hypothetical argument as the reasoned posture of nuclear safety analysis, and I will respond only in equally hypothetical terms. Above all, these are the wrong questions for risk analysis. If capital investment would tolerate a catastrophe every 30 years, my own anxieties must revert to the effects of population exposure to radiation.

It costs us dearly to be as unsure as we are whether the fallout could cause five or 500 cancers. Furthermore, the analysis totally ignores other health effects, including fetal injury and gene mutation. Risk analysis should be looking for possible trouble; we dare not confide our futures to irrepressible or even tempered optimists.

THE MARKET where risks are balanced is also very different for the two cases. In my use of conventional electric power, I happily pay an extra premium for safe wiring, care of appliances, educating myself and my family and other ways of reducing the personal risk of fire or electrocution below the average.

The marginal costs of that safety effort are the measure of the risk market, which is relatively open and fair for conventional electricity. The comparable costs are perhaps not quite infinite for my personal quest for nuclear safety, but I am not sure where I could emigrate.

Is there a fair chess game in town?

© 1970, The Washington Post Co.