

## Lying with statistics

In an article entitled "Lies and Statistics" in the March 1969 issue of *Nuclear News* magazine, author Jon Payne presents the truth about how statistics about clusters of illness around nuclear power plants have been manipulated to fuel fears of radiation.

In the real world, he reports, studies exist that show a "moderate excess above the expected in the number of leukemia cases" near a particular nuclear plant. However, there are other geographical locations in the vicinity of other plants where there exists a "moderate deficiency" of such cases.

"The most reasonable conclusion should be that probably the nuclear facilities were not the cause of either the excess or the deficiency." If you conclude, he explains, that the findings of one are accurate, then you also have to explain the findings of the other case. "Unfortunately, reasonable conclusions are not always drawn in such situations," Payne observes. Most often, the clusters of disease are considered to be relevant, and the lack of clusters,

irrelevant. "Two forces are at work in these matters: emotionalism, and innumeracy," he explains. Clustering itself is not unusual, but should be expected. "Clusters of illness occur because of statistical variation, and in fact they occurred even before there was industrialized society," Payne states.

"Take the situation where two cases of leukemia are expected in a population in 10 years. If just one case occurs, the public yawns and turns its attention elsewhere; if there are three cases, the nearest industrial facility is blamed. In most instances, these are normal variations around the expected, but many people remain unaware of this. Consequently, this is fertile ground for planting claims that a nuclear plant is the source of the illness.

"In fact, you can guarantee variations from the expected by looking at smaller and smaller subsets of data," he points out. "In most of the instances we are talking about, the radiation releases are so small they are lost in the noise of variation in Mother Nature's background radiation."

Mr. Payne's article is clear proof that rigorous scientific study has clearly not been one of the methods used by those posing as the protectors of humanity who have a vested interest in stopping nuclear power, transmission line construction, or other industrial projects.

—*Marsha Freeman*

and animal—when subjected to electromagnetic fields of the sort produced by high-voltage transmission lines. Many experiments, however, have not been successfully repeated; even when effects are demonstrated—such as reduced honey production in apiaries—no one yet knows what health risks, if any, are posed to human beings. A study prepared for the Office of Technology Assessment<sup>3</sup> points out that electromagnetic field effects may exist in common home appliances: High-voltage transmission lines may be the least of your worries, and you may instead eye that toaster or electric blanket with a bit more caution. (See **Figures 1-3**.)

One of the first in-depth studies of the effects of extra-high voltage transmission lines was conducted under the New York State Power Lines Project in 1987. The study was undertaken to answer opposition to a line to facilitate importing cheap hydroelectric power from Canada. The line would have formed a ring tying all of the state's systems together, thereby allowing New York State to eliminate the use of oil for its power generation. (See **Figures 4-7**.) The New York State study was one of the first to specify whether they were measuring effects from electric or magnetic fields, and cautioned that

There are important general differences between the electric and magnetic fields produced by power

transmission lines which should be emphasized. The first of these differences concerns the sensitivity to the current flowing in the lines. Once a power transmission line is raised to its operating voltage, the amplitudes of the electric fields produced by the line are essentially independent of the currents flowing in the conductors comprising the line. On the other hand, the magnetic fields produced by the line depend primarily on the currents flowing in the conductors, and not on the line voltage.

Thus a specification of line voltage alone is inadequate to define the magnetic field levels that a particular line is likely to produce.

Another important difference concerns the directions of the fields. The electric fields on the ground beneath an overhead power transmission line are necessarily very nearly vertical at all times, whereas the magnetic fields on the ground are largely confined to planes perpendicular to the lines (although there can be a small component parallel to the lines), where, due to the phase differences of the currents flowing in the individual line conductors, the horizontal and vertical components combine to give a total magnetic field vector that rotates at the power line frequency. . . . in general the magnetic