Continuing our review of MULTIPLE EXPOSURES BY CATHERINE CAUFIELD. Page numbers given in our text, below, refer to Ms. Caufield's book.

The NEW YORK TIMES recently called for greater U.S. reliance on nuclear power plants to generate electricity. The nuclear industry has seized upon Saddam Hussein as an excuse to peddle its wares more aggressively, and the TIMES is helping out. The TIMES says America should go nuclear in a big way because we need to get off the oil binge and because the problem of catastrophic nuclear accidents has been solved by new plant designs. In older nuclear power plants, catastrophic releases of radioactivity could occur when the nuclear fuel got too hot and melted, burning a hole in the outermost protective shell of the plant, or perhaps allowing an explosion to occur. Radiation releases at Three Mile Island and at Chernobyl both resulted from core meltdown (though at Three Mile Island the outermost protective shield remained intact).

The TIMES says the core melt problem has been solved in a new generation of nuclear plants—plants that the nuclear industry calls "inherently safe." The TIMES seems to like this phrase and repeats it often.

Even if this optimistic view of modern nuclear plants were correct, which is by no means assured (see RHWN #145), there would still be good reason to discourage the spread of nuclear power.

Catastrophic releases of radiation are not the only problems that make nuclear power plants dangerous; an even larger danger is the routine, small doses of radiation that occur to workers and to the public alike as a nuclear plant goes about its business of generating steam and electricity. Even if nuclear power plants never released large amounts of radioactivity at one time, the cumulative radiation exposures they entail would make them much more dangerous than the available alternatives (biomass, wind, and solar).

The nuclear "fuel cycle" begins when human beings mine uranium from a mile or so below the surface of the ground; the uranium is then crushed ("milled") into sand. The sand is chemically processed to extract uranium, which is then sent to a factory where it is turned into fuel pellets, which are then crushed into rods, which are bundled together and inserted into the core of a reactor. The rods are allowed to "go critical"—which is to say, they are encouraged to undergo the same reactions that occur inside an atomic bomb, though inside a power plant everything is closely controlled to avoid an explosion. The uranium fuel undergoes nuclear fission, heats up, boils water which makes steam, which turns a turbine to make electricity. Meanwhile, the fuel rods are "fissioning," and making not only heat but also many new radioactive elements that weren't there to begin with, like strontium-90 and cesium-137 and plutonium-239. These useless, highly dangerous, and unwanted byproducts are "radioactive waste" and they must be put somewhere for the duration of the hazard, which in some cases is several hundred thousand years.

Another kind of radioactive waste, which many people (including the editors of the TIMES) tend to forget is the uranium mine and tail wastes that remain heaped on the desert because there isn't anyplace else to put them. (They are mined as rock, then crushed into sand and after they are crushed their volume is so large that they don't fit back in the same hole they originally came out of, besides which putting them back into the ground would be expensive and would obstruct further underground digging, so there is no place to put them except in a big pile on the desert where they blow around with the wind, wash away with the rain, and exude radioactive radon gas for thousands of years into the future, causing deadly exposures all the while. There are already 191 million tons of radioactive uranium wastes heaped on the desert in the southwestern U.S., literally blowing on the wind; they contain little uranium but much radium (about 100 times the amount of radium found in average rock). U.S. Environmental Protection Agency (EPA) estimates that the people living near these piles have a one-in-a-thousand chance of fatal lung cancer—a risk 1000 times greater than the risks EPA usually calls "acceptable." (Pgs. 75-88, 202-207.)

The people who mine uranium have been treated as a disposable commodity. The U.S. Public Health Service says the death rate from lung cancer is five times greater among uranium miners than among the population as a whole. The average age of uranium miners who die of lung cancer is 46. (Pg. 78.)

A problem affecting even more people is the radiation exposure that accompanies the routine operations of a nuclear power plant and its associated "fuel cycle." The public is exposed somewhat; workers are exposed somewhat more. As radioactive fuel and wastes are created and handled and transported and stored, many people are exposed a little. Inside the plant itself, a broken pipe spills a puddle of radioactive water, which some one mops up. Then the pipe is fixed or replaced. Each operation exposes workers a little more and creates a little more radioactive waste, which must be packaged and shipped somewhere by someone. Exposures add up.

The unit of measurement for radioactivity is the rem. One person exposed to one rem of radiation creates an exposure of one person-rem. The size of a nuclear power plant is measured by the plant's capacity to produce electricity. A large plant is rated at 2 billion watts, or 2 gigawatts, meaning it could light 20 million 100-watt light bulbs continuously. Such a plant operating for one year will produce 2 gigawatt-years of electricity.

The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) estimates that one gigawatt-year of nuclear electricity produces 467,500 person-rem of dose-commitment; this means that running a 2-gigawatt nuclear plant creates conditions that will eventually lead to 467,500 person-rem of exposure each year it remains in operation (pgs. 163, 202). According to the International Commission on Radiation Protection (ICRP), which is the most prestigious standards-setting group for the nuclear industry—this will cause fatal cancers in 116 people per year and will cause 75 serious genetic defects per year (pgs. 163, 202). If this typical nuclear plant operated for 25 years, it would thus kill a total of 25 x 116 = 2900 people and would cause 25 x 75 = 1875 serious genetic defects. For every fatal cancer, there will also be 1.5 to 2 non-fatal cancers caused; so, conservatively, we can estimate that 25 years of operation of a 2-gigawatt nuclear power plant will cause 1.5 x 2900 = 4350 non-fatal cancers (skin cancers and thyroid cancers, for example); these costs of operating a nuclear power plant will accrue far into the future (pgs. 163, 183).

These are rock-bottom estimates, straight from the heart of a standards-setting agency of the nuclear industry, the ICRP. Another international organization, established to track the health of humans who survived the bombings of Hiroshima and Nagasaki (called the Radiation Effects Research Foundation), during the 1980s published a series of reports indicating that the survivors of Hiroshima and Nagasaki had been exposed to about 10 times less radiation than was previously thought; since current estimates about radiation danger to humans are largely based on the experiences of these Japanese people, this means that current estimates of the hazards of radiation are roughly 10 times too low (pg. 164). If this is the case (and there is now a great deal of evidence that it is), this means that operating a 2-gigawatt nuclear power plant for 25 years will kill 29,000 people, not 2,900 people, and will cause an additional 43,500 non-fatal cancers, not 4,350 non-fatal cancers. If the genetic damage increases proportionately with the cancer risk (very likely a good assumption), 18,750 serious genetic defects will be caused by operating a nuclear power plant for 25 years, not merely 1,875 serious genetic defects.

We must not let Saddam Hussein stampede us, or the TIMES lead us down this dark, dangerous path.

Get: Catherine Caufield, MULTIPLE EXPOSURES,

--Peter Montague

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