

FACTS AND FALLACIES ABOUT RADIATION

Fallacy 1: All radiation is harmful, no matter how small the dose.

Fact: Low doses of radiation stimulate repair mechanisms inside and outside the cells and are actually protective against both high doses and against chemical carcinogenesis. There are at least four known mechanisms for protection against cancer: low dose radiation stimulates the production of enzymes within the cell nucleus that repair broken strands of DNA, which is the way that high dose radiation causes cancer; it stimulates the immune system to kill cells that have escaped the repair, much like a vaccine; it stimulates so-called apoptosis, which is the self destruction of cells with damage; finally, it slows cell division so that repair mechanisms have a chance to work before sick cells multiply. This feature of low dose radiation is known as the hormetic effect, or hormesis.

Fallacy 2: Coal power plants are safer than nuclear power plants.

Fact: Radiation from nuclear power plants has killed no one in the U.S. in more than 30 years of operation, but pollution from coal power plants and gasoline emissions kill about 50,000 people every year, and 2 million in the world, plus thousands of coal miners (6 per day in China alone). Furthermore radiation emitted by coal power plants exceeds that emitted from nuclear power plants by a factor of 100, but even that is not the main source of illness and death from coal plants. However, anyone who believes that radiation emissions from nuclear power plants render them too unsafe for construction, should oppose coal power plants at least 100 times more vigorously.

Fallacy 3: There is no safe way to deal with nuclear spent fuel.

Fact: Storage in salt mines or deep ocean, after turning spent fuel into glass, has been shown to keep it safe for millennia. Even better, Integral Fast Reactors (IFRs) can recycle all the long lived spent fuel, as well as nuclear warheads, into fresh fuel and use up over 99% of the available energy in the fuel, and the short lived fuel can be used for medical experimentation to find better treatments and cures. Current reactors consume less than 1% of the available energy in uranium and the rest of the fuel's energy currently goes to waste.

Fallacy 4: Nuclear power plants put us in danger of a nuclear explosion.

Fact: Nuclear explosions require enrichment of uranium so that Uranium-235 comprises 80-90% of the total, the rest being Uranium-238. On the other hand, nuclear power plant fuel is enriched only to the extent that Uranium-235

constitutes 3-5%. This is a tremendous difference, and no nuclear power plant has ever had a nuclear explosion. It always has been physically impossible.

Fallacy 5: Even if there is no nuclear explosion, a meltdown is always possible with release of radiation to the air.

Fact: The only two melt events have been in reactor 2 at Three Mile Island in 1979 and reactor 4 at Chernobyl in 1986, but as with all early advances in technology, much was learned and there have been no repeats in the last quarter century anywhere in the world. Besides, no one was hurt at Three Mile Island, mainly because there is a 5-foot thick concrete containment building reinforced with steel rods. Even at Chernobyl the only unpreventable deaths occurred among workers in the plant and firemen sent to put out the fire, and these numbered fewer than 50. Chernobyl had no containment building, the event occurred during an experiment on the cooling water when no nuclear engineer or physicist was present, and the experimenters violated many of the written rules. Both these events involved leakage of the cooling water, and not nuclear explosions. Anti-nuclear forces claim that Chernobyl caused thousands of deaths from radiation, but these are projected future deaths based on the demonstrably false assumption that all radiation is harmful no matter how small the dose (see Fallacy 1). Designs now have built-in fail -safe mechanisms that turn off the reactor in the event of early overheating.

Fallacy 6: Were it not for human activities, there would be no radiation in the environment.

Fact: Nuclear radiation is mainly natural rather than the result of human activity. These forms of radiation include sunlight, cosmic rays from stars, rocks containing radium, thorium, and uranium, as well as potassium and carbon in our food supply. You get more radiation from inside your own body than from living next to a nuclear power plant. Every year in the U.S. people receive on average about 240 units (called millirems) of radiation from natural sources, and less than 0.01 units from nuclear power plants. Even the Nuclear Regulatory Commission permits a radiation worker to receive 5,000 units per year, which is half a million times more radiation than anyone gets from a nuclear power plant.

Fallacy 7: Nuclear radiation is different from other kinds of radiation.

Fact: Radiation from all sources is qualitatively the same. The only thing that varies is the intensity and energy, and whether it's from particles of matter or from photons (light, radio, TV, microwaves, x-rays, and other portions of the

electromagnetic spectrum). There is a great range of energies and intensities in nuclear radiation just as with any other source of radiation.

Fallacy 8: There are no nuclear power plants in the U.S.

Fact: There are 104 nuclear reactors producing electricity in the U.S., gathered in 65 power plants, each with one, two, or three reactors. The largest power plant in the U.S. is the Palo Verde Plant, 25 miles west of Phoenix near Wintersburg, just off I-10. It has three reactors. 20% of U.S. electricity is from nuclear power plants, with some states getting the majority from nuclear. For the world as a whole, about 16% of electricity is supplied by nuclear energy, with 80% in France (the country with the highest percentage and the cleanest skies). In Kazakhstan a reactor desalinated their water from the Caspian Sea for many years at the same time as it produced electricity.

Fallacy 9: Radiation killed hundreds of thousands of people in Hiroshima and Nagasaki in 1945.

Fact: The vast majority of the 80,000 people killed in Hiroshima and 120,000 killed in Nagasaki were killed by the blast. Many fewer were killed by radiation, and beyond 2 miles from the center of the blast there have been no increases in cancers or birth defects ever since. In fact, a man who had the misfortune of being in each of the two cities when the bombs struck, three days apart, died a few weeks ago at the age of 93. To this day, the U.S. is the only country to use nuclear weapons in wartime. But as horrible as nuclear weapons may be, the fire bombing of 65 Japanese cities by the USAF killed millions of people, over 100,000 in one fire bombing raid in Tokyo alone; the bombing of Dresden by the RAF and USAF killed up to 40,000; and the Japanese Army murdered 250,000 Chinese men, women, and children in the Rape of Nanking in December 1937, using hand held weapons. Nuclear weapons are no worse than conventional weapons in the hands of warring nations.

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