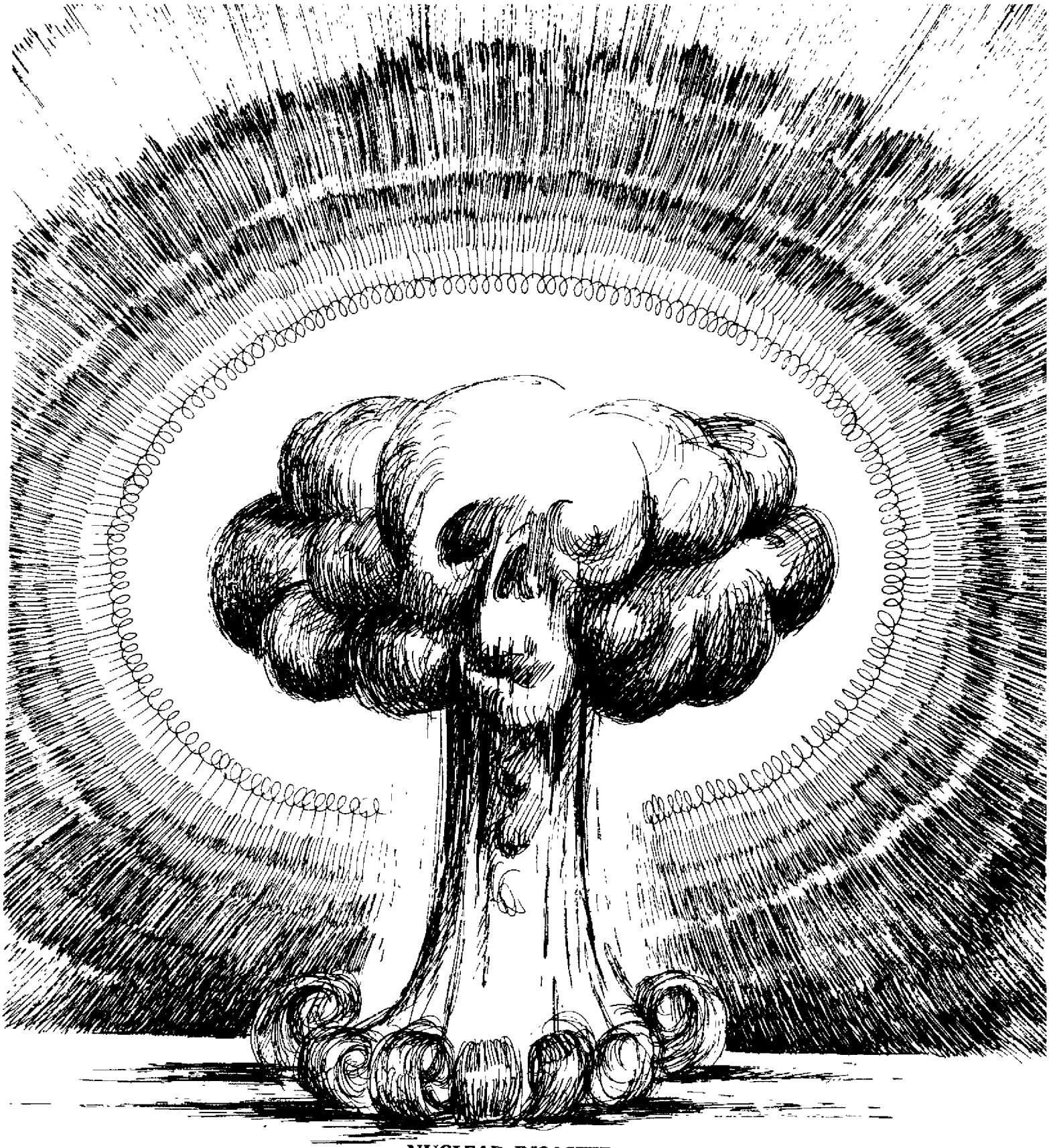


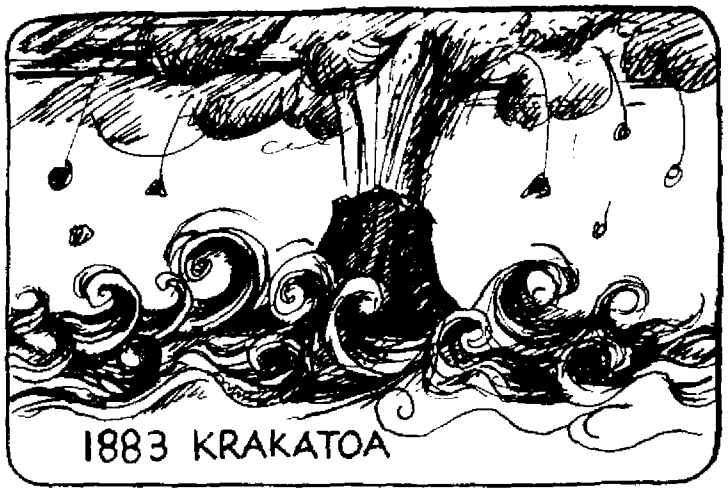
NUCLEAR DISASTER

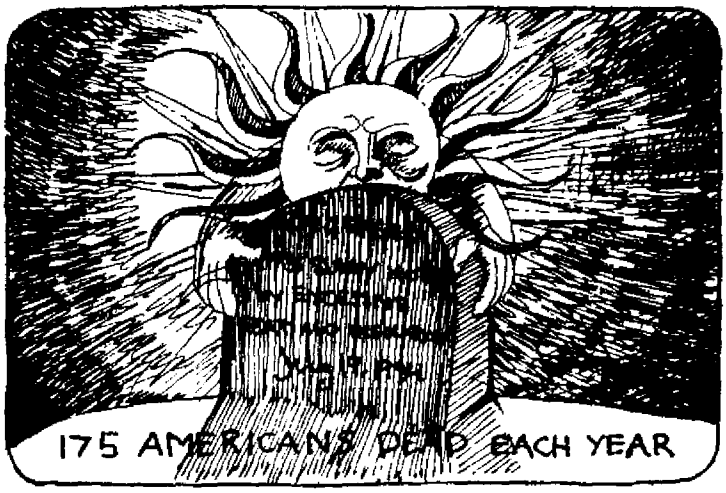
Fallout and radiation have been with us a lot longer than the radioactive fallout which rises in the mushroom cloud of nuclear explosions, and then "falls out." Any body of matter—say from a dust storm or oil fire—picked up into the air, and re-deposited somewhere else, is fallout.

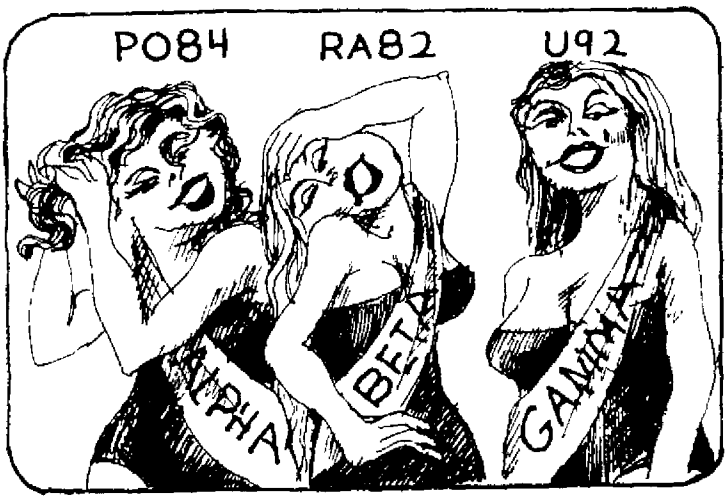
The dust, pumice, and debris that erupted from Mount Krakatoa in 1883, and traveled on winds around the world, was one form of fallout. Nuclear fallout, which is radioactive, is the latest man-made version.

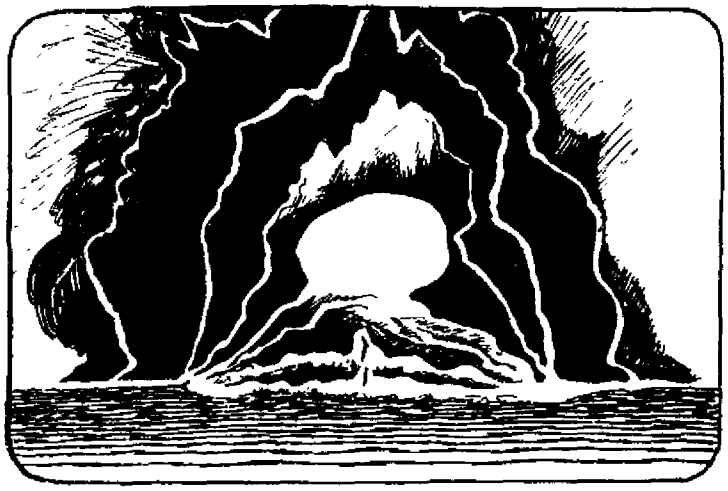
Radiation comes from many sources. One is the energy of our sun (and other suns beyond ours), given off in the form of heat and light rays. We enjoy and rely on them for fuel, suntans, ripening the orange crop, drying up a flood. But we also guard ourselves from the skin burns, drought, and death they cause.

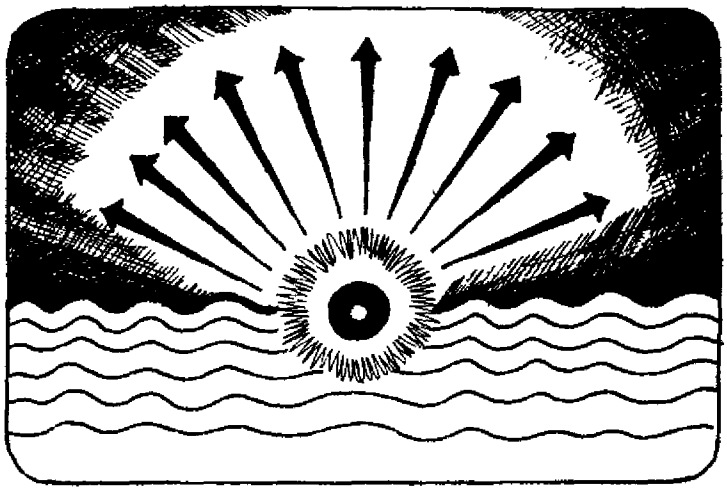
Radioactivity is also energy —but this time the rays come invisibly; alpha, beta, and gamma rays cause varying degrees of silent damage. Alphas cannot penetrate, but can irritate the skin; betas cause body burns; and gammas can go right through you—and thus damage cells, which can make you ill, or kill you. Like energy from the sun, these rays are potentially both harmful and helpful.

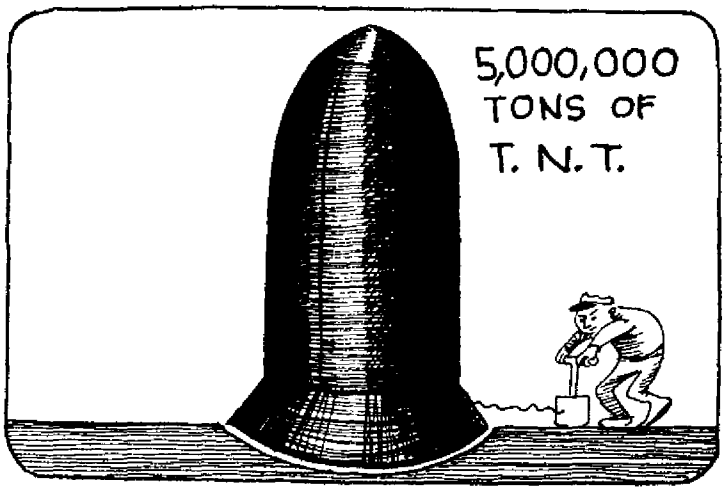




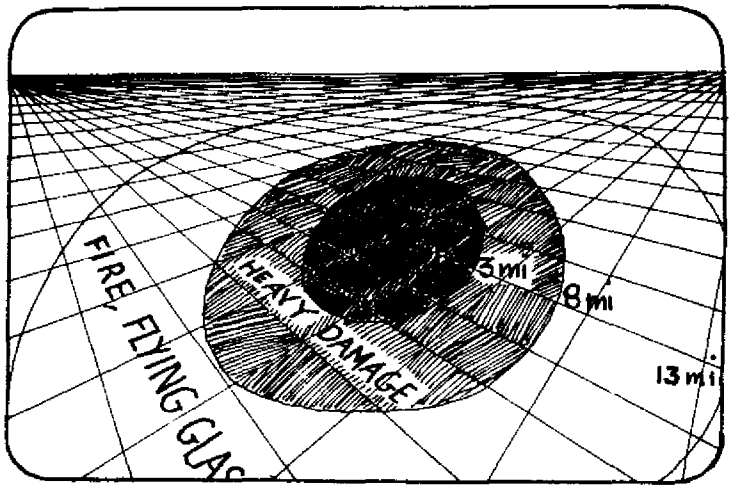


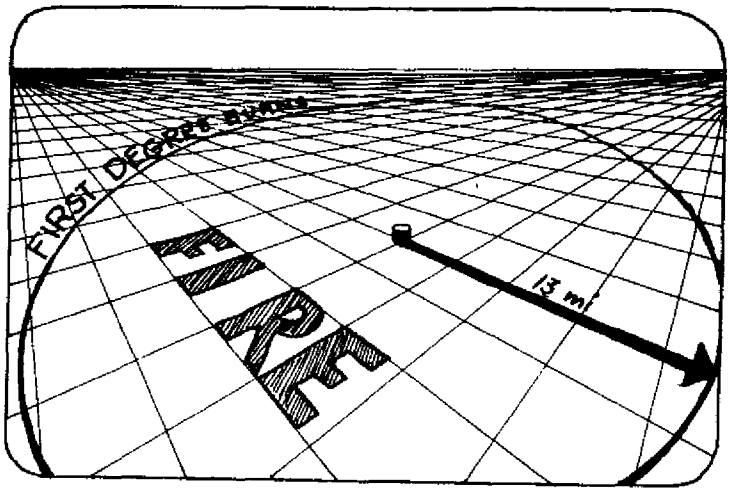


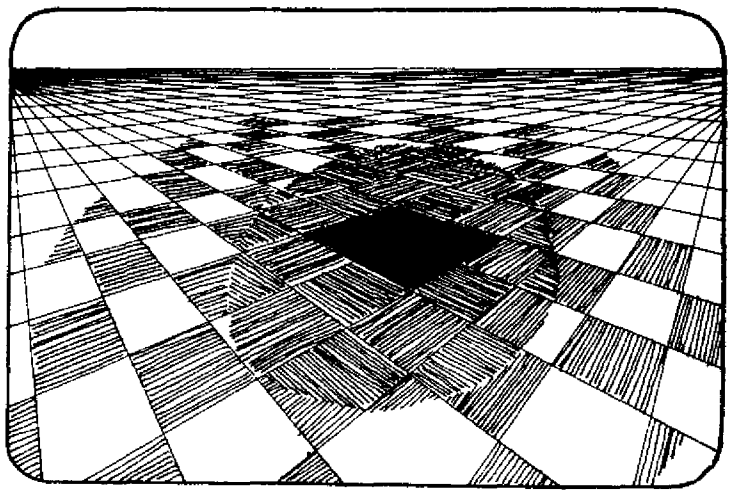




When a nuclear bomb bursts on or near the earth's surface, 50 percent of its total energy goes into blast waves and ground shock. Thermal radiation—heat and light—can cause instantaneous fires and severe skin burns (about 35% of the total energy). Initial nuclear radiation (5% of total energy) is released at the core of the explosion. The remaining energy release (10%) comes as the radiation of fallout.

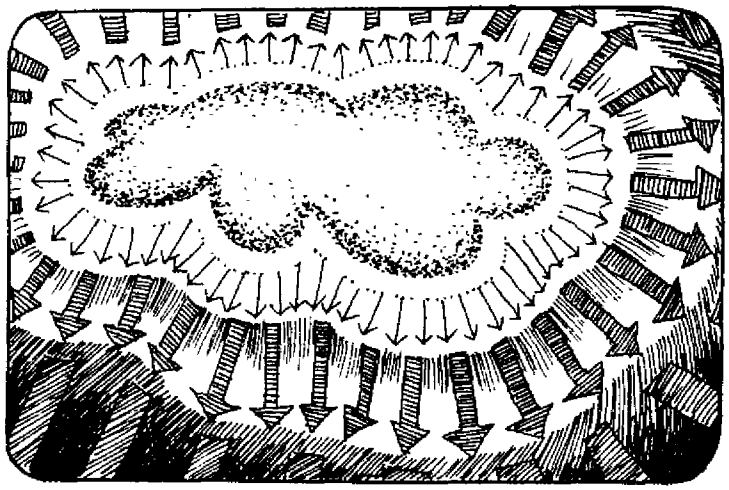


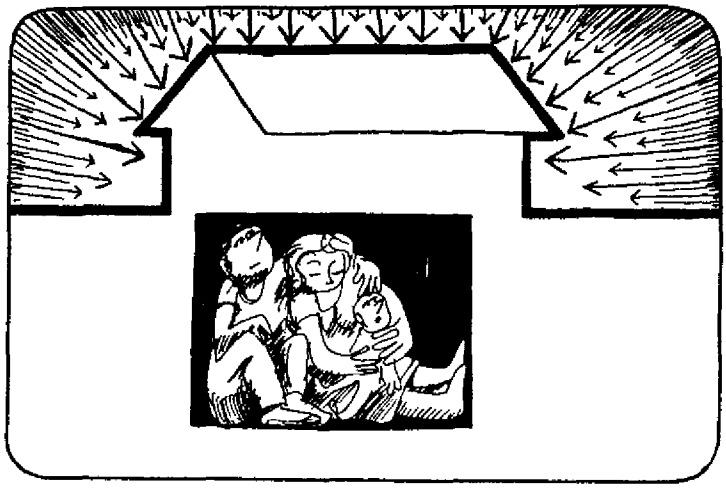


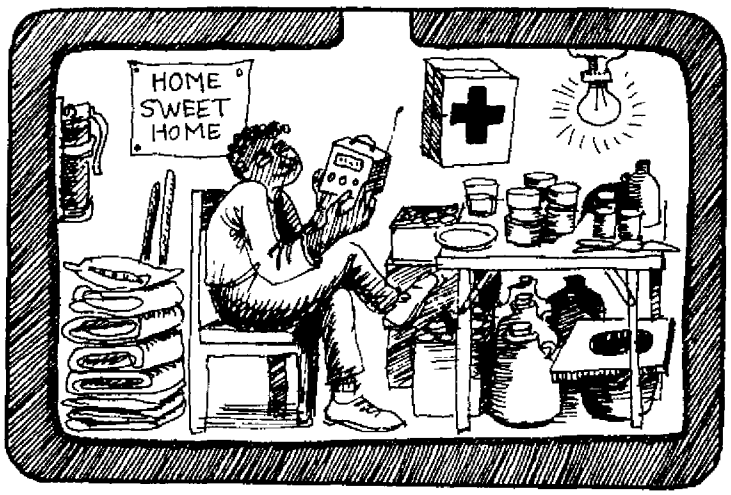


If a 5-megaton bomb (5 million tons of TNT equivalent) were exploded in your living room, everything except specially designed structures in an area extending outward for 3 miles would be totally devastated. Look out your window and think what that means.

If the 5-megaton bomb were detonated 13 miles away, you could still receive first-degree burns. Think of something 13 miles away. That's quite a distance for heat to travel and still give you first-degree flash burns. The most serious initial nuclear radiation occurs within the 3-mile radius of the severe destruction. Everything here is subject to the blast and heat, so initial nuclear radiation is a hazard only if one is protected from these effects.



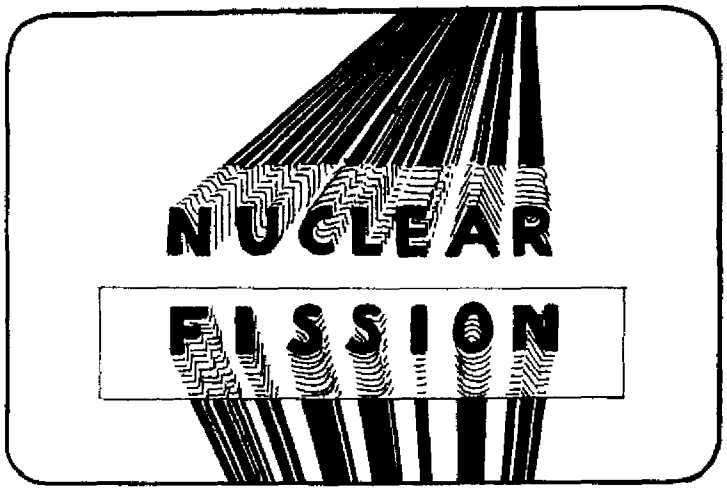


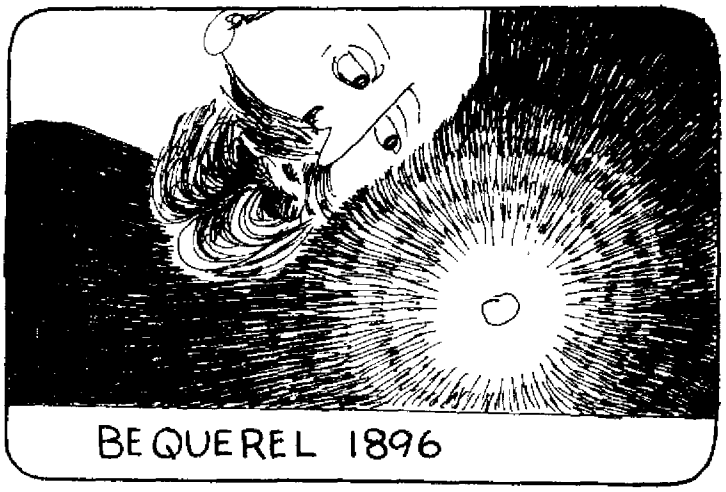


Radioactive fallout is the threat survivors of the initial effects of a nuclear explosion (blast and heat) would have to reckon with. Fallout from a single weapon burst could cover hundreds of square miles. The only virtues of fallout radioactivity are that it decays, or lessens, with time—and that we can shield ourselves from it. The rays of fallout radiation, like light rays, travel in straight lines; and like light rays, can be scattered around a corner. However, they can be absorbed effectively by common, heavy materials, such as earth, concrete, sand, and steel.

Protect Yourself

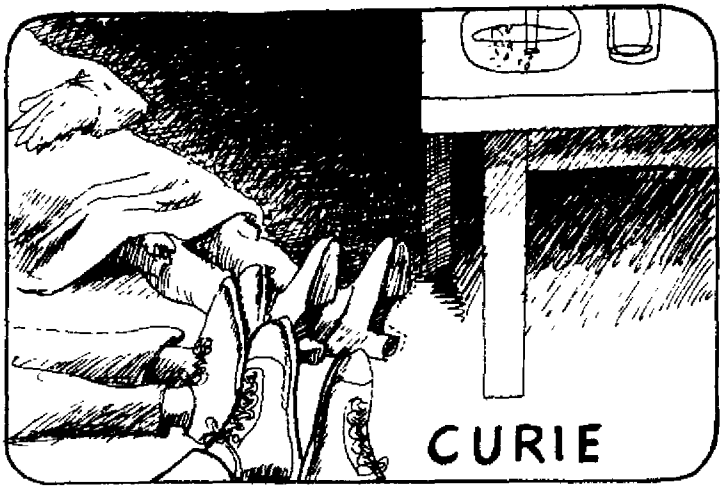
In an emergency, you may be directed to go to a community fallout shelter. Or, you could seek protection in your own home shelter. (For information on home shelters, see the chapter called Home Shelters.) If you are caught short, improvise. Pile protective materials around yourself: piles of newspapers, furniture, sacks of grain. Create your shelter area in an inner room or closet. You can also improvise protection by digging a trench in your yard, and covering it with lumber (or a door) and earth. Stock your home shelter with survival items (see p. 11).

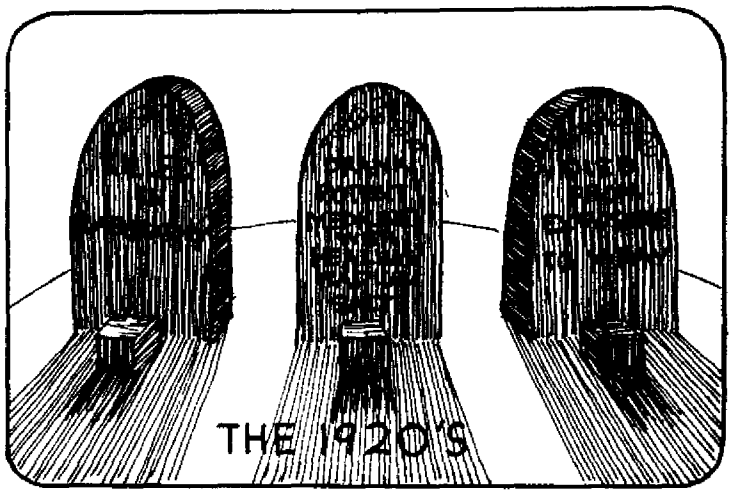


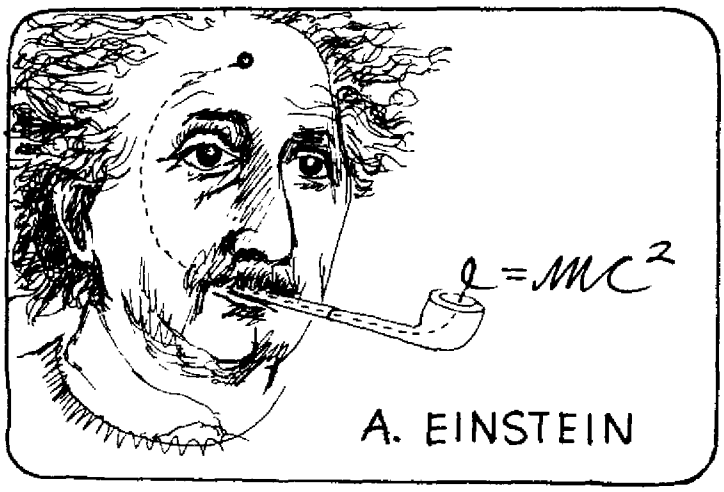


William Roentgen in 1895 discovered invisible, but immensely powerful, energy rays. He tracked them down during his studies of luminescence, when he noticed that the rays he was using caused photographic plates enclosed in a box to become fogged and darkened. At that time, the origin of the rays was unknown, so he christened them "X." We still call them X-rays, even though their source and behavior are now well understood.

Soon afterwards, Henri Bequerel discovered that certain kinds of matter throw off charges of energy; a little like discovering that your baseball sends out radio signals. His discovery meant that matter was not inert; motion was going on inside it.

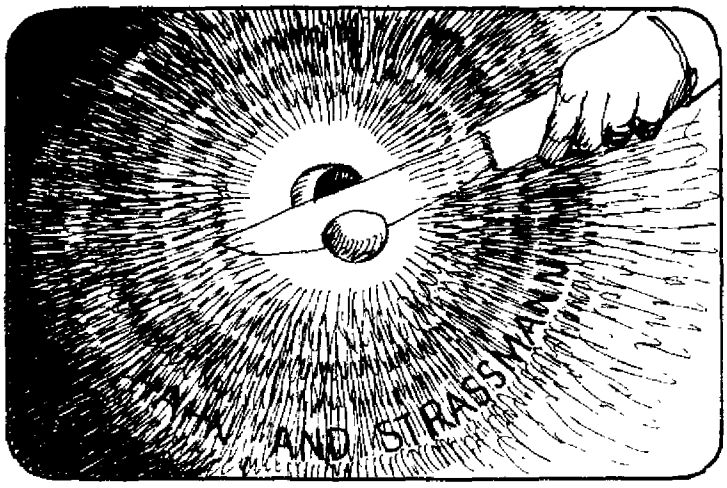


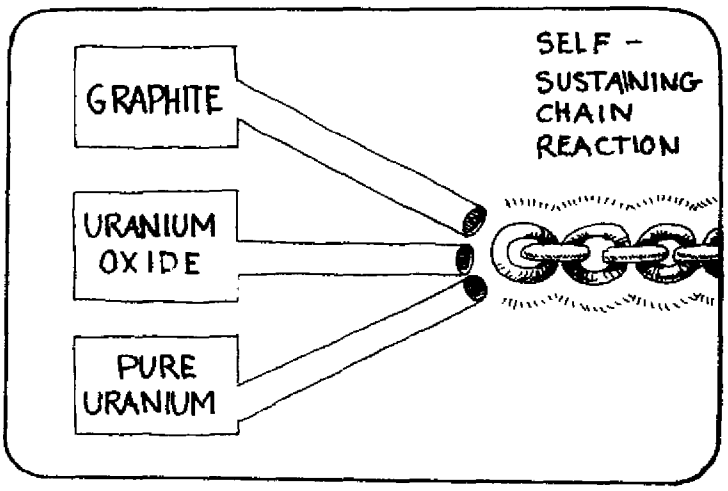


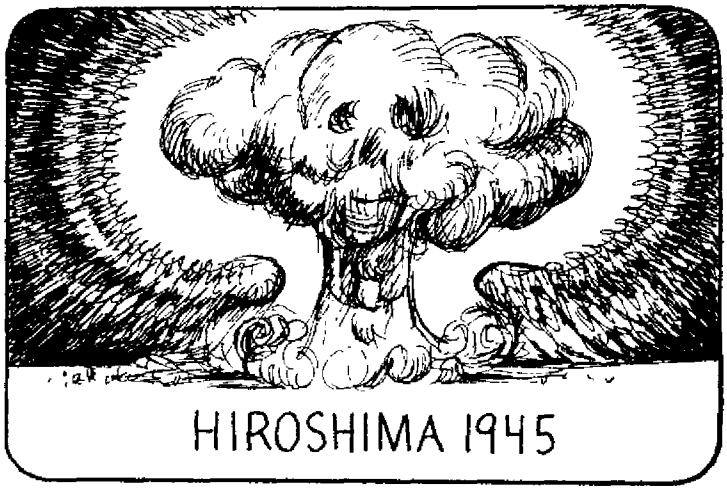


When radioactivity was discovered, scientists were generally unaware of its dangers; but they soon learned. Many experimenters received bad burns from overexposure; and Madame Curié, the French scientist who discovered radium, and two of her immediate family, died lingering deaths. Their knowledge of radioactivity's dangers came too late to save them. Radiation can cause cancer, destroy bones and vital organs, and damage genes.

Bequerel's discovery of radioactivity in 1896 led indirectly to work by the then obscure Albert Einstein. In 1905, Einstein said that matter could be converted into energy. This led to understanding and use of the atom's awesome power.



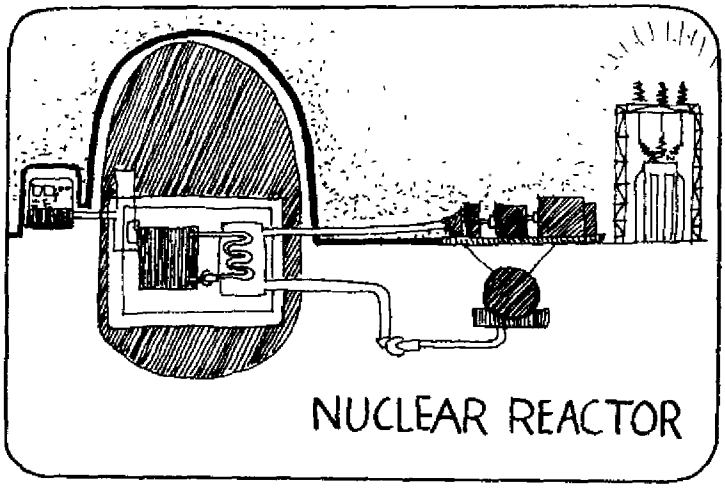


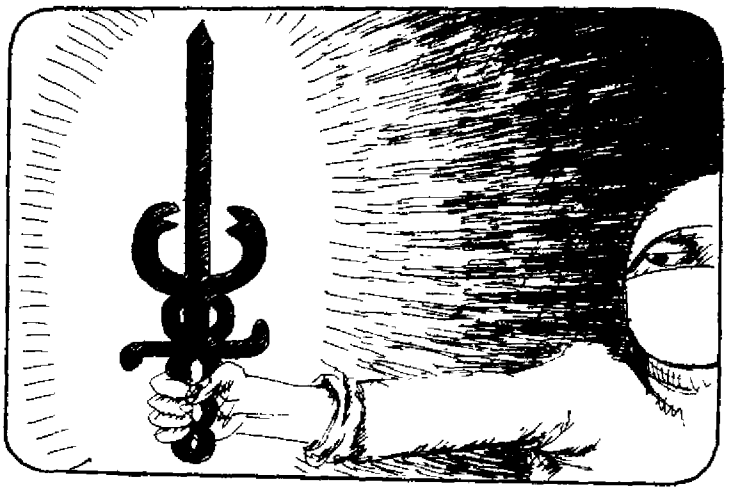


While the deadly nature of radioactive rays was well known in the years following 1900, no organized effort to establish rules to protect people existed until the early 1920's. In 1960, the Federal Radiation Council recommended stringent safety rules for nuclear industry workers, and protection guides for the general population.

In 1938, Otto Hahn and Fritz Strassman, in bombarding the element uranium with a neutron, split the uranium nucleus in two. However, they did not immediately recognize the potential of the results, and it remained for Lise Meitner and Otto Frisch in 1939 to explain properly the fission process and confirm their prediction of an enormous release of energy.

Enrico Fermi, an American-based Italian scientist, dreamed of a chain reaction. If a neutron could split a nucleus, why shouldn't that produce more neutrons, and an endless supply of splitting nuclei? He managed to do it on December 2, 1942, in Chicago, Illinois, in the first operation of a nuclear reactor. His dream had become reality. The military use of this new source of energy was demonstrated when the first atomic bomb was exploded successfully at Alamogordo, New Mexico, July 16, 1945. In the early days of August of the same year, atomic bombs were dropped on Hiroshima and Nagasaki. Their incredible destructive power led to the end of World War II.



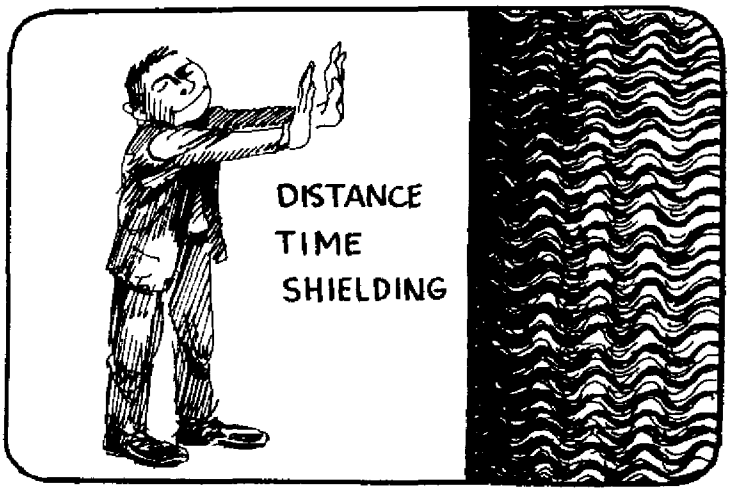


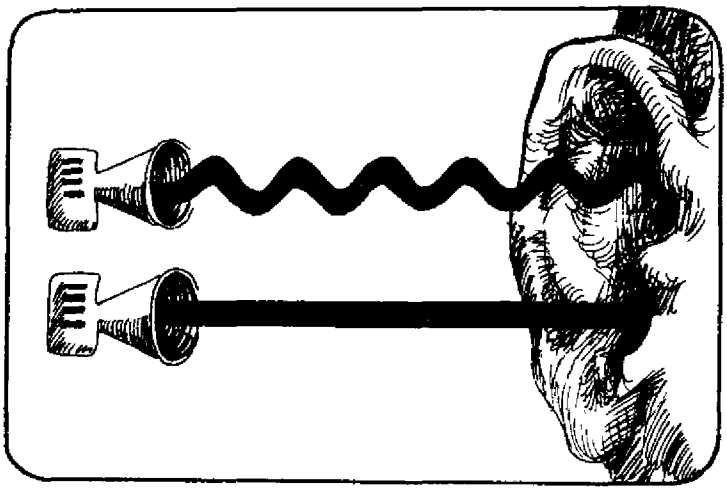
In 1952 and 1954, thermonuclear devices (hydrogen bombs, H-bombs) were detonated at the test site in the Pacific. Fallout from these explosions first made the world aware of the widespread threat radioactivity could pose for the survivors of the immediate effects of nuclear attack.

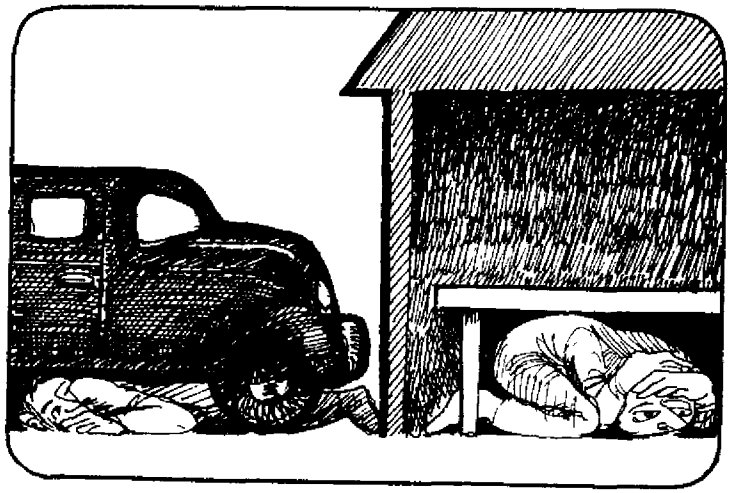
The enormous power of nuclear energy commands mankind's careful attention to the application of atomic energy. As used in the H-bomb, it can pose a terrible, destructive threat; but properly used, it can provide untold benefits for people everywhere.

Reactors in Great Britain and the United States generate electricity to warm and light homes, to make people's lives easier and more comfortable. Radioisotopes are used to diagnose and treat diseases; and in ongoing experiments to yield bigger, better, and more economical food supplies.

Radiotherapy cures certain kinds of cancer and blindness. X-rays are indispensible to modern medicine. Of course, they are used by experts in controlled situations, in carefully measured doses. But the power of radiation for good is considerable.





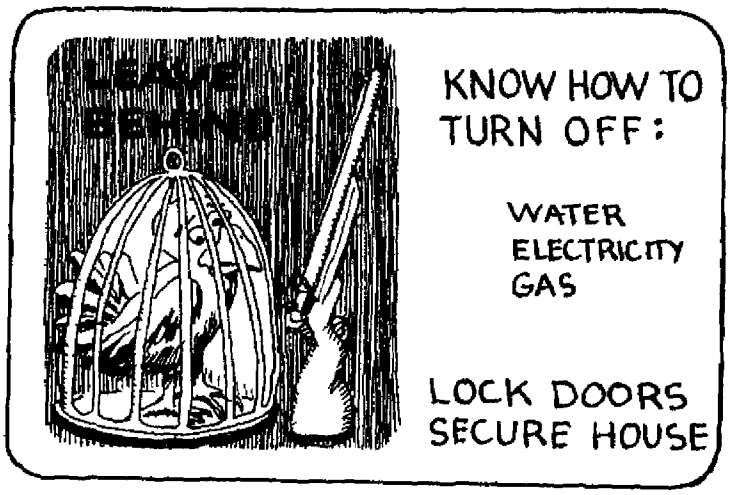


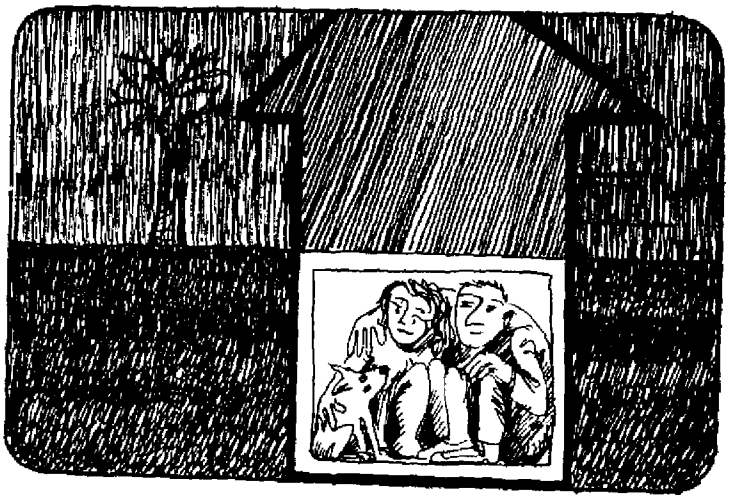
SUMMARY

Fallout radiation is the big danger. If you broil in the hot sun all day, you'll be sorry. If you let yourself be bombarded by gamma rays, you'll be sorrier still. Radioactivity decays. Get away from it, stay away from it, barricade yourself until it's faded.

You must have a plan; know what you're going to do when the warning signal sounds. Do you know those signals? What they mean? See the chapter called Warning Systems for details.

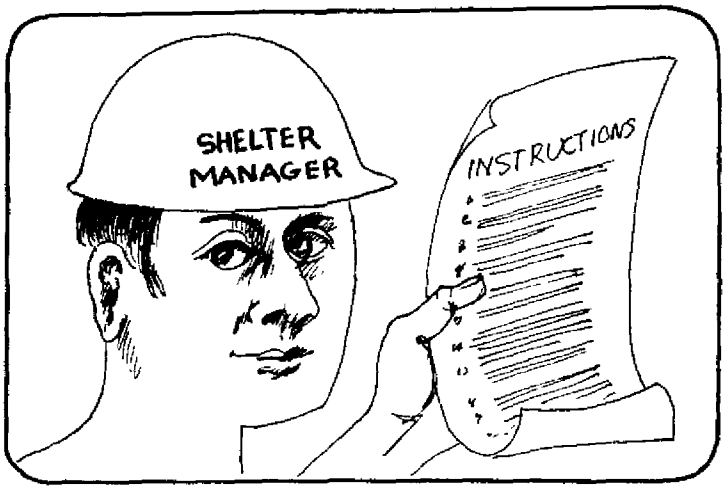
Encourage parents to keep sufficient gas in the tank to get to the community fallout shelter in an emergency. But consider that roads may be blocked, and be prepared to get there under your own steam. If you can't make it in time and you have no prepared home shelter, improvise as mentioned earlier.





Check out public fallout shelter location and supplies. Local civil defense officials may ask you to bring additional food, bedding, books, and games. In any case, bring any necessary medication and such things as special diet items for babies and old people. The things you plan in advance to bring, readied in a box or easily carried bag, can mean the difference between a difficult 2 to 14 days, and relative comfort. Take things to share. Think of others as well as yourself. Extra food and water, perhaps extra batteries, a small radio.

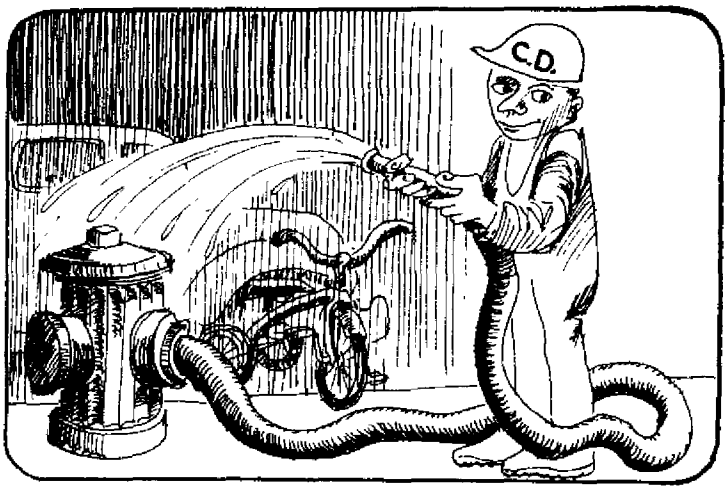
Know how to cut off gas, electricity, and water supplies. Check with your local utility company to find out what they want you to do in time of emergency. Don't bring narcotics, alcohol, or pets to the shelter. Don't bring your bongo drums, either. Use your head. Leave plenty of food and water at home for your pets.

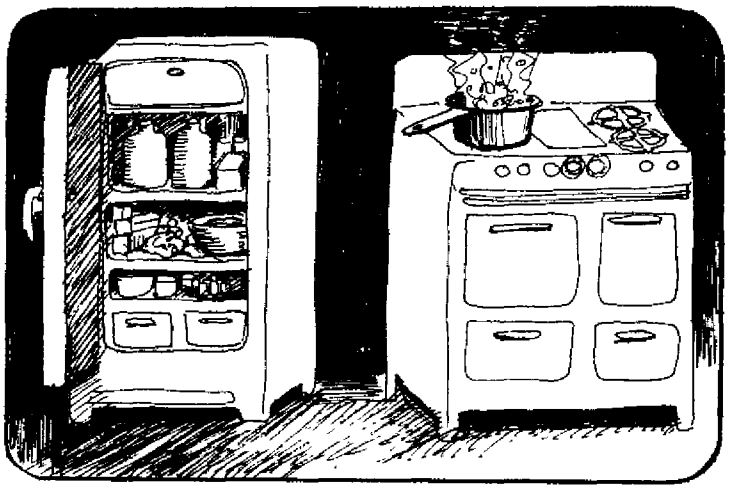


IN THE SHELTER

In the shelter, cooperation is the key word. The shelter manager is trained, and is in charge. Do as he says. Be patient. Be ready to help, and share, with others.

Continue to listen to the radio for the duration of the emergency. It will keep you informed of events, and let you know when the danger from radioactive fallout is over.





WHEN YOU EMERGE

Remember that there may be radiation sickness cases around you when you come out. IT IS NOT CONTAGIOUS. Also, inanimate objects will *not* be radioactive, but may need to have radioactive fallout particles washed or brushed off.

Food in refregirators, freezers, or other containers will not be contaminated. If food has fallout on it, it will still be safe if the fallout particles are removed. Radiation doesn't contaminate water; fallout particles will drop to the bottom. The radio will advise on available food and water.

Centers will help you find clothing, shelter, and medical care; trained teams will remove health hazards. Follow instructions so you can help everyone get back to normal.

Food, tools, medical supplies, and other materials are available all over the country. Everyone will work together to help the community get back to normal. Be prepared to help in that effort. You are not alone, but *you count*.

The South American Indian stalking his prey through the tall grasses knows that the curare on his arrowhead will instantly kill. The doctor who uses it to cure muscle spasms in tetanus and spastic paralysis has a different view of it. Hopefully, eventual worldwide use of nuclear energy will be only peaceful and constructive. Until that time arrives, we must be prepared to survive in nuclear disaster situations.