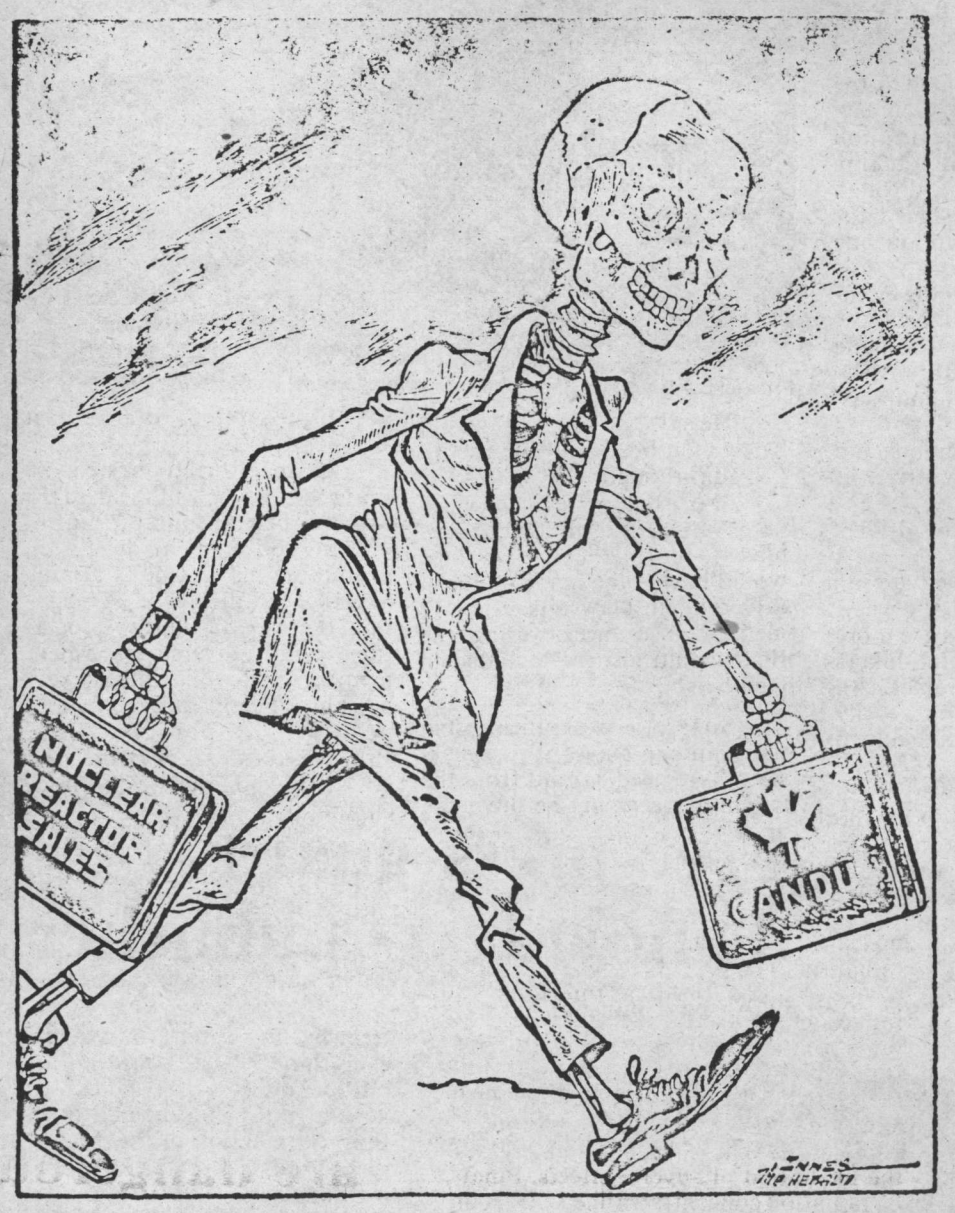
y speed (Part One)

by Jeff Moore



in volume when pulverized, so not all of it can be returned. Returning it to the mine would also be more costly than dumping it into ponds or concrete containers or just leaving it in piles.

The ore remains radioactive as it moves through the milling, enrichment, and fuel fabrication phases, but when reaching the reactor phase the radiation becomes intense and the dangers begin to multiply. The reactor is well-shielded, but some radiation inevitably escapes the containment.

There are routine releases of radioactive wastes from all nuclear reactors. These include the air which is used in the reactor ventilating system, radioactive gases like Krypton-85, which has a short half-life of 4.5 hours, and the mildly radioactive cooling water which is discharged offshore. All these are dubbed "low-level" waste, but this may prove to be somewhat of a misnomer since these wastes are capable of concentrating in the food chain. Their effects may be far greater than is now assumed.

Inside the reactor the fuel is sheathed in metal "cladding" (in the CANDU reactor the cladding is zircaloy). This sheath corrodes and, therefore, must be replaced regularly. There is a chance that it can leak radioactive gas, but this would probably not escape the containment.

The meltdown

The accident which is of primary concern to the public is the "meltdown." The nuclear industry has created its own euphemistic language for such an accident. They call it an "abnormal event" or a "significant event."

A meltdown occurs when the reactor core overheats and the fuel melts through the pressure vessel and the containment. It begins with the failure of the coolant supply which surrounds the core. This can be caused by such things as a malfunctioning valve, as was the case at the Three Mile Island plant in Harrisburg, or a break in the pipes which carry the coolant to and from the core.

When there is a loss of coolant, the core begins to heat up and an emergency cooling system should kick in. If it fails to do so, the reactor will shut itself down, but the residual heat will still cause the core to increase in temperature. If it is not cooled at 2000 degrees F. the fuel cladding will rupture and the radioactive gases will be released.

Then, at 5000 degrees F., the fuel itself will melt, and at this point huge amounts of radioactive gas will be liberated. If they escape the containment they will contaminate a large area. Now the molten fuel will melt through the pressure vessel, then through the concrete floor and into the ground. American nuclear engineers have christened this accident the "China Syndrome" since the molten mass will melt toward Asia. Just how far the fuel will travel is not known but estimates range from a few feet to thirty feet and beyond.

The probability of such an accident is the subject of much debate. Probability formulas are applied and estimates are made. The one most cited was determined by the American Rasmusen Report on Reactor Safety. It concluded that the probability of a meltdown in a single reactor is about one chance in 20,000 years. This may sound reassuring, but if there are 1,000 reactors in operation by the year 2000 (presently there are 523 commercial reactors operating, under construction, or ordered, and 138 more are planned), a meltdown would be expected to occur about every 20 years. In Canada the CCNR states that, if there are 100 reactors operating, we could expect a meltdown every 40 years. The nuclear industry touts figures up to 100 times higher (i.e. less probable) but the Porter Commission has accepted the figures cited by the CCNR as the most realistic.

In 1965, the U.S. Atomic Energy Control Board wrote a report on the consequences of a "serious" core meltdown. This report was suppressed until 1973 when its release was forced by the threat of a lawsuit under the U.S. Freedom of Information Act. The report concluded that the worst possible reactor accident could result in 45,000 deaths, 100,000 injuries, and 17 billion of 1965 dollars of damage. Note: Canadian reactors are insured under the Canadian Nuclear Liability Act; this provides only 75 million dollars worth of insurance coverage per station. Who will pay for the damage caused by a serious nuclear accident? Can there ever be retribution for the death and injury of so many thousands?

The shut-down mechanisms and emergency cooling systems of reactors can only be tested by computer simulations and these cannot predict all the possibilities that can occur. Proof of this fact is an accident at the Brown's Ferry, Tennessee, nuclear plant. Here an electrical cable fire was accidentally started by the candle of an electrician checking for leaks. The fire travelled along hundreds of cables and disabled what were formerly considered *redundant* safety systems. This is what Gregory Minor, the man responsible for the design of the safety systems said after the fire:

I had responsibility for the people who designed the redundancy of those safety systems. We knew we were building the thing well. We even thought it was overkill. But when the fire precluded the operating of those safety systems ... it was a very big shock.

There are other ways the radioactivity could be released from nuclear reactors and these have been termed "external events." These can be affected by humans or by nature. The natural disasters include floods, earthquakes, fires, and the collapse of the surface of the site. The man-made events are bombings and other means of sabotage like aircraft crashes into the nuclear plant.

We still have the storage and transportation of nuclear waste and the use of reactor grade plutonium for non-peaceful means to consider, but already it should be clear that there is not enough evidence to justify the confidence of nuclear proponents and more than enough evidence to justify the immediate imposition of a moratorium on the construction of nuclear power plants. The case for a moratorium is gaining supporters daily in North America, Europe and Japan. Only a few days ago, six of the twelve members of the presidential commission investigating the Three Mile Island accident called for a moratorium on the construction of nuclear plants.

Where do you stand?

Are we hooked on nukes?

The following short essay is reprinted from an April 1979 pamphlet entitled "The 3 Mile Island Nuclear Disaster." The term 3MI refers to Three Mile Island. The pamphlet was produced by an organization called Science for the People.

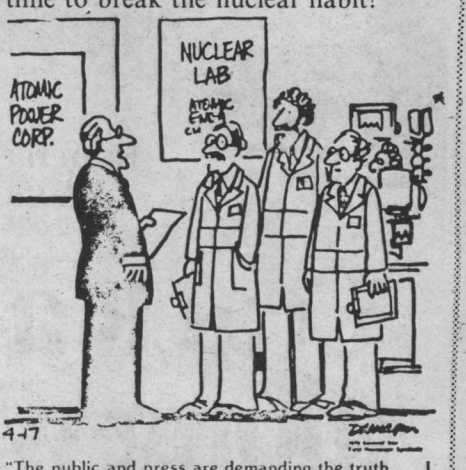
The nuclear energy pushers would like to convince us that we are already hopelessly addicted to nukes. Since 3MI the energy industry, the utilities, and their friends in government right on up to President Carter have been telling us that all sorts of dire consequences will result if we fail to build any more nuclear power plants and shut down the ones that are now operating. They talk about electrical shortages and dimouts, about the effect of oil supplies or fuel prices, and about potential loss of jobs. All three of these scare tactics are unjustified.

Nuclear power presently supplies about 12% of our electricity and about 4% of our total energy. Nationwide there is about a 30% overcapacity of electrical power. Since nuclear power plants are shut down an average of 40% of the time, all utilities operating these plants must have alternate means of producing power. These alternate means could immediately take up a great deal of the slack if all nukes were immediately shut down. Transmission networks allow utilities to buy power from one another, providing a second means by which nuclear-generated electricity could be immediately substituted-for. In a very few areas of the country an immediate shutdown of all operating nuclear facilities may not be possible without creating some unacceptable hardships. Even in these cases a phase-out of nuclear power over a period of a few years is certainly possible. In view of the fact that new nukes produce more expensive electricity than other types of power plants, there is clearly no justification for their future role in U.S. electrical power production.

Since only about 10% of our oil is used to produce electricity, shutting down nukes can not have an overwhelming effect on the supply or price of petroleum products. Improvements in automobile gas mileage and home insulation could more than make up for the oil required by utilities to replace nuclear power. *Business Week* reported in April 1979 that our supposed oil shortfall is "proving to be something of a mirage. Stocks of gasoline, heating oil, and crude are not seriously low by any measure." The possibility of future shortages, according to this article, depends more on policies of the Department of Energy with regard to regulating the oil industry than on any intrinsic petroleum supply problems involving either imported or domestically produced oil.

As far as jobs are concerned, capital-intensive facilities like nuclear power plants have a negative long-term effect. During the building phase many jobs are created, mostly of a highly skilled nature. A large percentage of these jobs is taken by workers who move into the area rather than local laborers. There is little if any effect on the unemployment situation until after the plant is finished, when the temporary economic boom turns to bust. By contrast, decentralized power-producing facilities using renewable energy sources and conservation measures produce many more permanent jobs.

We aren't hooked yet. There is still time to break the nuclear habit!



"The public and press are demanding the truth . . . I want you to come up with three versions of it."