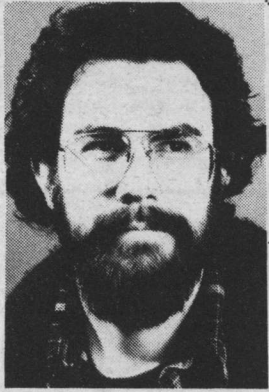


# Nuclear energy is unsafe at all



The following article continues our paper's look at the question of nuclear energy. Written by U of A student Jeff Moore, today's installment is the first of two parts. Moore is a fourth-year arts student, majoring in English. With the second part of his investigation, he will include a bibliography.

*The splitting of the atom has changed everything, save our mode of thinking, and thus we drift toward unparalleled catastrophe.*

Albert Einstein

*In spite of soothing reassurances that the AEC (Atomic Energy Commission) gives to an uninformed, misled public, unresolved questions about nuclear plant safety are so grave, that the U.S. should consider a complete halt in nuclear plant construction.*

Carl Hovecar  
Safety Specialist at  
the Idaho Falls National  
Safety Testing Station  
in his letter of resignation

Safeguards against the misuse of nuclear energy and the protection of human rights should both be waived if they are obstacles to the interests of the nuclear power industry. This is a perilous attitude and I believe that the reactions of the Atomic Energy Commission (AEC), the Canadian government and the press, to the loss of the 1-billion dollar CANDU reactor contract with Argentina reveal the roots of this view toward nuclear power and the people it is supposed to serve.

Implied in this view is the utilitarian argument that the greater good of a society dependent on energy will be served by making some sacrifices (even human ones) in the short term for abundant, clean, and safe energy in the long term. It is assumed that nuclear energy is, or soon will be, clean and safe. It is my opinion that nuclear energy is not only unsafe but is the most hazardous project humankind has undertaken to date. (I use the word opinion because nuclear safety is the subject of dispute and disputed matters are by definition, opinions — not facts; this is too often neglected by both sides of the nuclear debate, says physicist Amory Lovins). To support my view, this article will consider radiation hazards at several phases of the fission process. However, before I do this, let me return to my opening statement, which needs further explication.

I cited reaction to the loss of the CANDU reactor contract as indicative of a growing view that the nuclear power industry has primacy over human life and human rights. Here is an outline of the reaction I refer to. First, an embittered Ross Campbell, chief of the AEC, quickly laid the blame for the Argentinian rejection at the feet of the government. Campbell claimed that the government's foolish tightening up of nuclear safeguards to prevent non-peaceful use of fissionable material, and its expression of concern for human rights violations in Argentina, irritated the customer enough to cause rejection of the contract. The government failed to follow the fundamental business creed — "the customer is always right." Red-faced government officials were quick to deny the accusations but not a word of defence did they utter about the moral rightness of their stand. Nor did the press. Instead, the focus was on the juicier economic aspect: Who is responsible for this economic blunder? How much will it cost? Can the AEC survive? Fortunately, the government did not have to defend their line (which wasn't a very hard one) since they were absolved of guilt when Argentina announced it

was the poor construction record of the first reactor that solicited their rejection.

That Ross Campbell sees such a moral stand as dangerous to business, and the fact that the government is reluctant to defend itself for taking such a stand, indicates that very soon the public health and their rights may become subordinate to the interests of the AEC. I predict that the new customer for a CANDU will be handled with kid gloves, and that pecuniary concerns will take a front seat while the issues of safeguards and human rights will ride closer to the back of the bus. The latter may even be asked to leave enroute if they get too noisy.

I must now make a further preliminary observation which relates to a different political aspect of the nuclear debate. Many proponents of nuclear energy are quick to identify opponents with radicals and extremists. Opponents are dubbed "envirofreaks" or "coercive utopians" and are said to be using the nuclear issue as a springboard for the overthrow of corporations, capitalism, and democracy itself. In fact, opponents come from the full range of the political spectrum. Many are prominent scientists, and some are former employees of the nuclear industry. American physicist, Amory Lovins, one of the most articulate of the nuclear dissidents, offers alternatives to nuclear energy which he stresses "do not run against the political grain." I suggest that the *ad hominem* arguments of many proponents serve only to cloud an extremely complex issue.

## The nuclear fuel cycle

Let me address the issue of nuclear safety more directly by following the flow of radioactive material through the nuclear fuel cycle (Figure 1). It is an undisputed fact that some radiation escapes into the environment at every phase of the cycle. It is also a fact that

radiation is harmful to health. Depending on the level of exposure, the effects of radiation can be placed into time-related divisions:

### 1. Immediate Effects

High dosages of radiation can cause the following: burns which heal very slowly; radiation sickness (symptoms include nausea, hair loss, serious blood cell composition changes); and, if the dosage is high enough — death.

### 2. Delayed Effects

Several forms of cancer are induced by radiation, but this may not develop until years after the initial exposure.

### 3. Long-Term Effects

Radiation can alter genetic structure of exposed individuals and the result will be genetic deficiencies in his or her offspring (to use a harsher phrase, radiation victims may produce mutants). Even if the first generation is spared, subsequent ones may not be.

According to many experts, there is no such thing as a "safe" dose of radiation. The U.S. Federal Radiation Council states that "a threshold of radiation does not exist; every use of radiation involves the possibilities of some biological risk, either to the individual or his descendants." In addition, the effect of radiation is cumulative; that is, each dose increases the likelihood of adverse effects. Finally, radiation concentrates like D.D.T. or mercury, as it is transferred along the foodchain.

All this should be kept in mind, as I outline some rather disturbing suggestions made by Canada's Atomic Energy Control Board in a 1978 report. This report recommends that the exposure levels for the public in the event of a serious nuclear reactor accident be raised from 25 rems to 100 rems. The report adds that should this limit prove "uneconomic" or "impractical" for the licensee, it could increase to 1000 rems.

These figures may not mean much until one considers what experts say about such levels. In 1977, in his report on Nuclear Energy for the U.K. Royal Commission on Environmental Pollu-

tion, physicist Sir Brian Flowers concluded that 250 rems of radiation delivered over a short period of time will kill half the individuals exposed within 30 days.

Nevertheless, certain Canadians consider safeguards so costly, that it is necessary to raise exposure limits four times the level considered fatal to the British. If this seems disconcerting, remember that these figures are presupposed by the assumption that plant operators will be able to control the amount of radiation to be released after an accident. In the case of a "meltdown" (this will be described in detail later in this article) radioactive material escapes the containment, control is impossible.

I think it is safe to assume that significant amounts of radiation will escape as a result of the nuclear power industry the public will be harmed. It is now necessary to show that nuclear power is presently exposing us to radiation and it is possible that exposure will increase in the future.

## All phases are dangerous

It is best to begin at the first phase in the fission process — mining. The first phase is almost one of the most dangerous phases. Uranium ore contains 23 radioactive isotopes. As it is mined, it liberates the radioactive radon-222 which, in turn, produces its own radioactive daughters. These daughters attach themselves to dust particles which are inhaled by miners, and, as a result, there is an extremely high incidence of lung cancer among these workers. (The dust also contains silicosis which induces silicosis.)

The U.S. Public Health Service estimates 600-1100 out of 6000 miners will die of lung cancer as a result of radiation exposure on the job. Some measures have improved since this estimate was made but are considered inadequate. The cost of adequate safety equipment reaches a level which becomes "uneconomic" to continue operation, according to managers. This is why workers in the uranium mining industry (as well as many other dusty industries) continue to work in a hazardous environment.

Not only the miners are affected by the radiation emitted at this first phase. There is a by-product from the extraction of ore called "tailings." The sand-like piles produced as the ore is brought to the surface and pulverized. These piles emit radon gas into the atmosphere and pollute waterways with radium; the latter is considered to be one of the most toxic of radioactive substances. These piles will remain dangerous for 100,000 years, according to the Canadian Coalition for Nuclear Responsibility (CCNR). In the Lake area, tailings have already resulted in the contamination of the Serpent River system. According to a 1976 report by the Ontario Ministry of the Environment, no water in the area (which includes a dozen lakes) is safe for human use, and there are no fish in the river downstream from the mine.

Tailings are accumulating so fast and no adequate economic method of disposing of them has been discovered. The obvious solution seems to be to just return them to the mine. Unfortunately, the ore is

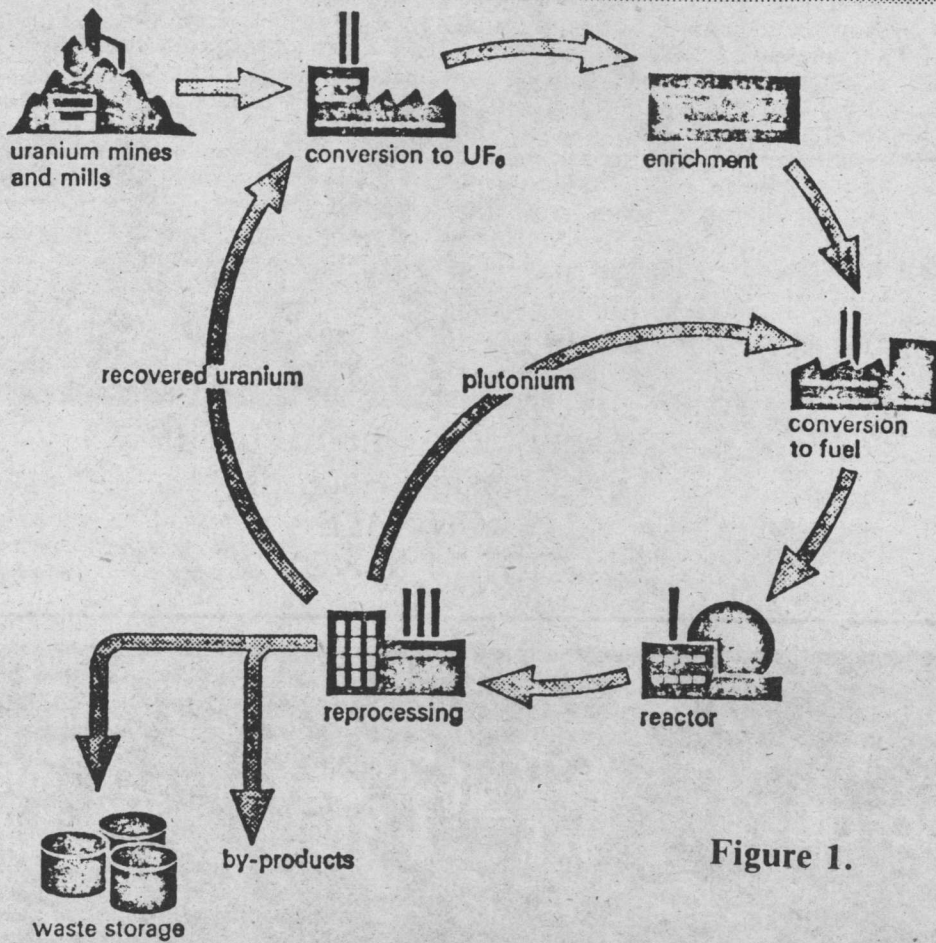


Figure 1.

From "Nuclear Power" by Walter Patterson.