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# C.A.N.E. INAUGURAL GENERAL MEETING

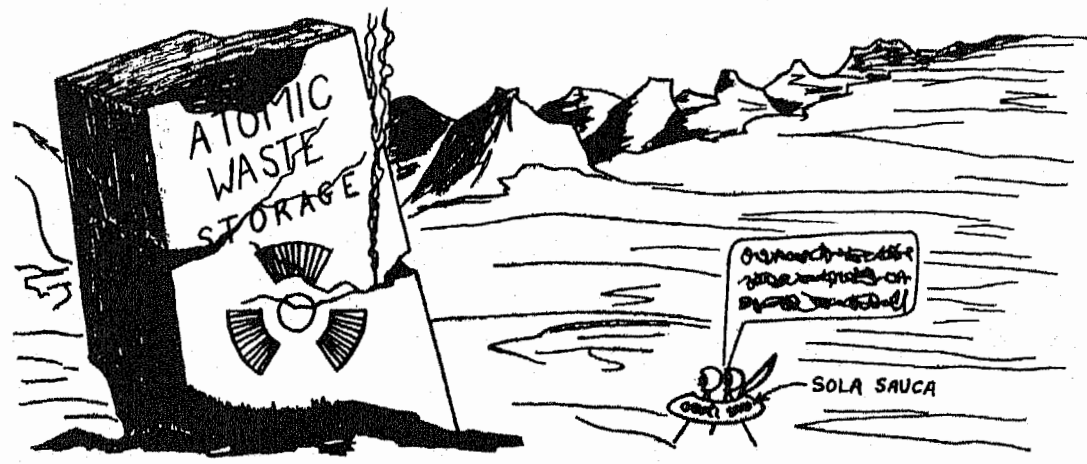
open to all interested in fighting  
THE FEDERAL GOVERNMENT'S

## URANIUM POLICIES



**Willard Hall  
8:00pm**

**Thurs 1st May**



TRANS:- "A PRIMITIVE MONUMENT TO SOMEONE CALLED ATOMIC WASTE!!"

Campaign Against Nuclear Energy, 1/187 Prospect Road, PROSPECT, 5082: 42 2870 51 8422, After hours 278 2411

## NUCLEAR POWER - BOON OR BANE

At present in the U.S., NPS Nuclear Power Stations supply about one per cent of the national energy requirements. Forty reactors are now operating, generating 24,000MW. An MW is one million watts, i.e. enough electrical power to run 1000 single bar radiators. The U.S. A.E.C. now predicts 2,600 breeder reactors in the U.S. by the year 2020. This would imply about 5000 NPS in the world. The fast breeder reactor to be built for the Tennessee Valley Authority is a 375 MW station. It has taken 1350 acres and \$700 M to construct.

What has caused this flurry of construction? It is the realisation that our fossil fuel reserves are finite. There will come a day when they are gone.... In Australia, the most optimistic estimates give us enough fossil fuels to take us about half way through the next century. The current energy crisis has many prominent people thinking that the end will be much closer. Just what is a nuclear power station? A "conventional" NPS is a place where U fuel containing very little fissionable material decays into a waste product which also contains little fissionable material. This process releases tremendous heat which is transformed to steam which in turn is used to generate electricity.

What of the breeder reactor? A device about which we are hearing more and more. The attraction of the breeder reactor is its ability to generate more fuel than it consumes. Compared with the conventional reactor, a breeder has two vital features. First, more Pu is formed from U than fission into lighter elements plus heat; Second, one can make an atomic weapon from Pu239 in much the same way as from U235 and to extract enough Pu239 for a bomb from a breeder's fuel is relatively simple and relatively cheap.

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With such a large commitment to maintaining a supply of power generation devices, one would expect to find a vast sum of money being poured into research and development on all types of power generation devices. Vast sums are indeed involved, but most of it is channelled towards atomic devices. The reason for this is that there is a strong lobby maintained in Washington by the nuclear power firms.

And what of Pu, the substance used in breeder reactors? Pu is arguably the most dangerous substance on earth. It is extremely toxic chemically as well as being highly radioactive. It is hard to think of any adequate reason for ever assembling a tonne of Pu in one place. Pu is the most carcinogenic substance on earth. One millionth of a gram injected intradermally in mice has caused local cancer. A breeder reactor uses around three tonnes of Pu.....

### PROBABILITY OF ACCIDENTAL RELEASE.

What is the probability of accidental release of radioactive material? Commenting on the release, in October 1973, of radioactive material from Britain's Windscale fuel production and processing establishment, Sir John Hill, Chairman of the U.K. Atomic Energy Authority suggested that society over-reacts to nuclear events. Had the Windscale radiation leak been just one more industrial accident, he believed there would have been little public interest. As he said "With more and more radioactive material being processed, such leaks become INEVITABLE." How often they should be tolerated is another question, related to the price we are willing to pay to eliminate such events. In operating NPS there is always the problem of heat disposal. One of the worst things that can happen to a reactor is for the heat removal system to break down... This is especially true for breeder reactors. The power density of a breeder is far higher

than that of an ordinary nuclear reactor; around 400 kilowatts of energy per litre is being generated in its heart. To remove this heat, molten sodium is pumped through the core, and this INTENSELY RADIOACTIVE coolant emerges at around 580 degrees Centigrade. The core is about two cubic metres in volume and the sodium flow rate is 5 cubic metres per second.

As most of the core volume is taken up by thousands of fuel and control rods, the sodium reaches high channel velocities and is subject to considerable turbulence. Should its flow be seriously impeded, 400 KW/L of energy would fail to be removed, a situation which (if uncorrected) would quickly lead to a melt down of the reactor core. A breeder is hotter and faster than an ordinary reactor. Controlling it offers much the same problems as developing from biplane to supersonic flight. You can't steer Concorde by looking out of the window. It is essential to be able to shut down the reactor in the event of an emergency. Throughout nuclear power design, independent back-up systems are used, to the point where a melt down is incredible.

If the incredible does happen then designers have even allowed for the molten radioactive core to be divided into separate pools, each with its own cooling system. People are at risk from a variety of causes, ranging from car accidents to being struck with lightning. Risk levels associated with such accidents lie between one in a thousand to one in a million per person per year, or higher.

These levels can help us fix limits of both frequency and size for small reactor accidents. Different considerations arise for large accidents where the total impact on society is important. By the year 2000 there could be 1000 reactors in operation.

It has been suggested that the odds against a large accidental release anywhere in the world should be at least 100 to 1 or even 1000 to 1.

For an absorber system this could lead to a criterion that it should be designed, built, tested, operated and maintained so that no fault leading to a major release occurs in a million reactor years. If the number of demands on the system is ten per year, then the criterion would become "not more than one failure in ten million demands".

#### AN UNACHIEVABLY HIGH RELIABILITY NEEDED.

Experience has shown that no single system can achieve such a high reliability, both because of common mode failures and the impossibly high requirements on component reliability. What all this means is that amongst 1000 reactors operating for a century, a failure rate of one in ten million would mean a 1 in 10 chance of a major accident. At this point I wish to quote Professor Hannes Alfvén, a 1970 Nobel Laureate for physics. "The reactor constructors claim that they have devoted more effort to safety than other technologists have. This is true. From the beginning they have paid much attention to safety and they have been remarkably clever in devising safety precautions. This is perhaps pathetic, but it is not relevant. If a problem is too difficult to solve, one cannot claim that it is solved by pointing to all of the efforts made to solve it."

A major breeder accident would involve tens, if not hundreds, of millions of casualties. Edward Teller once succinctly stated that no foolproof system can be proof against an excessively great fool. And fools do exist, even in the nuclear power industry. U.S. A.E.C. records show one plant where a radioactive effluent tank was accidentally piped up to an employee water drinking fountain.

Of course, as the nuclear power programme in the U.S. speeds up, standards are going to decline... An added danger is what conventional bombs could be made by hostile forces, in civil or international war, to destroy any NPS and thus cause the release of radiation.

#### DISPOSAL OF ATOMIC WASTES.

The disposal of atomic wastes is a very important subject. When considering radioactive waste, the half life of a substance is of prime importance. A half life is the time taken for the radioactivity of a substance to decay to half of its current level. As a result of the fission process, the fuel rods in any reactor become contaminated with a variety of radioactive elements. Every year or so, the rods must be removed and taken to a nuclear fuel processing plant, where the impurities are removed and the fuel rods re-assembled. The reprocessing plants therefore accumulate large quantities of radioactively hot wastes, which must be concentrated and stored until the natural processes of atomic decay have rendered them harmless.

How are we to guarantee that the unimaginable human civilisations of even the 22nd century, respect, or even remember, the exact locations of the nuclear graveyards which we are now bequeathing them? How can we create taboos, against digging in old salt mines, which will be powerful enough to last for 500 years?

Breeder wastes contain significant quantities of Pu239, whose half life is 24,400 years and which therefore needs to be contained for perhaps half a million years. The problem of storage is so great that it was even suggested that atomic waste could be rocketed into the sun. Apart from the problem of a faulty launch and subsequent disaster, it has been estimated that by

the year 2020 there would be so much waste being created that it would require a Saturn 5 launch every 6 hours.

Stored wastes still generate heat. The British store theirs in above ground stainless steel tanks. The Americans bury some of theirs underground, ostrich like, out of sight out of mind. One such storage place in the U.S.A. is at Hanford Reservation in the South East corner of Washington State.

The wastes at Hanford, in the form of liquids, are divided into three categories, those termed low level in terms of their radioactivity are piped directly into surface ponds on the site. Intermediate level wastes are treated more cautiously, being emptied into concrete covered trenches known as cribs. The cribs are open to the soil at the bottom and the water in the wastes gradually seeps downward taking the radioactive isotopes with it. The hottest wastes, known as high level, are buried in steel-lined concrete tanks in the ground. Because these wastes contain a significant proportion of short lived radionuclei, they tend to boil in the tanks for a matter of three to five years after they have settled down.

These liquids are separated from the most toxic isotopes, Sr90 and Cs137 by ion exchange processes and carefully evaporated. The effect of evaporation is to leave in the bottom of the tanks solid "cakes" of radioactive material. The Sr and Cs are stored separately above ground in stainless steel containers. The problem which brought atomic wastes to light once more a leak in one of the stainless steel tanks on about 20th April, 1973. At the time there was no way for technicians to know that there was a leak because they were in the process of pumping the liquid wastes into the 30 year old, 533,000

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gallon tank. Even after pumping stopped on 25th April, the leak remained undetected - although the level of liquid dropped by nearly three feet and monitors buried in the ground near the tank recorded extremely high levels of radiation. Not until the 8th June did officials of the site realise what was happening. By that time 115,000 gallons of the high level wastes had percolated into the ground.

#### WASTES COULD EXPLODE.

A succession of fires, explosions, reactor accidents and contamination incidents at Hanford have long drawn comment from members of the environmental protection agency and the national academy of sciences as well as the national press. The most important charges centre around the dumping of 300 kilograms (about

660 lbs.) of plutonium directly into 14 deep trenches. About 100 kilograms (enough to make 13 Nagasaki size bombs) have ended up in a trench numbered Z9.

A recent A.E.C. study concludes that "due to the quantity of plutonium contained in the soil of Z9, it is possible to conceive conditions which could result in a nuclear chain reaction". According to Environmental Protection Agency experts who have studied the data, such a chain could cause the trench to explode, venting lethal plutonium into the Hanford area.

If I may quote Sir McFarlane Burnet: "To a biologist, nuclear war is the final insanity of power seeking men. The fact that all nuclear fission reactors are potential sources of fuel for bombs is, in my view, reason

enough to oppose the whole concept of nuclear power. There are alternative sources of clean power that could be used to replace the fossil fuels - solar radiation, geothermal heat, and the tides".

So we have seen the problem involved in the design and operation of NPS. I have raised the question of a major accident or deliberate destruction of an NPS. You have heard of the massive problem of disposing of atomic wastes, and finally, the very likely possibility that small groups of terrorists could easily convert sufficient Pu to enable them to make an atomic bomb.

Up to this time, no NPS has been built in Australia. I hope that you will make sure it stays that way.....

This article was prepared by Bertrand Russel Peace Foundation.

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## **RIDE AGAINST URANIUM**

Uranium exports mean:

- \* destruction of aboriginal society for electricity and air-conditioning in New York and Tokyo;
- \* atomic bomb proliferation;
- \* increasing inequality in energy use;
- \* risking the ultimate pollution for all time from radio-active substances such as plutonium, which cause cancers and mutations;
- \* bureaucratic and centralised energy production controlled by a technocratic elite;
- \* maintenance of the autocidal society (uranium exports for the Shah of Iran's oil);
- \* Etc., all the way to oblivion.



In conjunction with Melbourne and Sydney, C.A.N.E. is cycling to Canberra to protest outside Parliament House, Canberra, against uranium mining. It is a mind boggling proposition, but for the purpose of bringing attention to the issue, it will be extremely effective. Hopefully the bike ride will also illustrate the effectiveness of the bicycle as a low energy means of transport.

To finance the expedition we hope to get bicycle manufacturers

interested and individuals who could sponsor riders for so many cents a mile. At this stage at least one or two support vehicles going, which will be able to carry camping gear. It will also be able to warn motorists of the cyclists ahead and assist tired riders.

Plans, at the moment, are to leave Adelaide on Thursday 8th May and reach Canberra on Tuesday 20th May at the same time as the contingents from Melbourne

and Sydney. In Canberra we will camp outside Parliament House and visit Conno and Whitlam

At the moment, while Melbourne is expecting 300 riders, we are hoping for modest 10 or 20 for the 730 mile trip. We already have 6 definites, and many others interested.

The distance is long but since we are following the bus route it will be possible for cyclists to join our bike ride on the way.

This way we can show to the Australian people that mining and export of uranium must stop, and that the workers must exercise their final right by banning the stuff.

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