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URANIUM:PLAY IT SAFE

By Mike Rann
for the ALP (SA) Nuclear Hazard Committee

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INTRODUCTION

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Australia's involvement in the nuclear industry has become in recent years a major issue for the community at large and the ALP in particular. Faced with strong reservations about the adequacy of existing international safeguards and waste disposal techniques, the ALP adopted at its national conference in Perth in 1977, a "Play It Safe" policy.

SA Premier, Don Dunstan, was the principal mover in gaining support in Perth for the new policy, and in the December 1977 Federal elections Dunstan appeared in television advertisements explaining the party's uranium stance

Dunstan told viewers that he had once been keen for South Australia to reap the economic rewards of uranium development. He had asked his public service experts to study the matter and their report on safeguards and waste disposal problems had been "absolutely chilling". No procedures existed for the final and safe disposal of nuclear wastes which remained radioactive for a quarter of a million years. Safeguards were also inadequate, and the Indian Bomb exploded in 1974 demonstrated how nuclear fuel intended for peaceful purposes could be directed for weapons production.

Neither Dunstan nor the ALP platform espoused absolute opposition to uranium. The policy was simply that uranium should not be mined, developed or exported unless and until the hazards and flaws could be remedied, Hence, "Play It Safe".

The Dunstan and Corcoran Labor Governments in SA did allow exploration to continue. They believed that it was important to have fuller knowledge of the nature and extent of the Roxby ore body, as well as not allowing the uranium ban to prevent the exploitation of other minerals.

It was also important however, to keep up with developments overseas. In January 1979, a month before Dunstan was forced to retire from politics because of ill-health, he and four advisers, including the writer, went overseas to examine what progress had been made.

That mission found there had been improvements in the technology in several countries for the disposal of high level wastes, but that these weren't yet "on the shelf". International safeguards were found to be still seriously flawed. So the South Australian Government reaffirmed its commitment to the "Play It Safe" policy. South Australian Opposition Leader, John Bannon, has since spoken repeatedly about the hazards of the nuclear fuel cycle. His comments have been in the context of SA Liberal Government attempts to facilitate the mining of uranium at Roxby Downs in SA. This has focused the debate once more on SA. In 1981, in a follow-up visit to Europe and the United States, the writer found that no serious attempt had been made to rectify flaws in the international safeguards regime, but that there was now widespread criticism by experts of the vitrification method of waste disposal that had impressed the Dunstan team in 1979. It was also found that the ALP's policy on uranium was known and respected as sensible and pragmatic in Europe and the United States.

Last year, in recognition of the division of opinion about uranium mining, the SA Branch of the ALP established the Nuclear Hazards Committee, to publicise the reasons for the policy.

This feature has been prepared for use by that Committee in presenting the main arguments supporting the ALP's present policy to both. ALP members and the general public.

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ALP URANIUM POLICY

The ALP's Uranium Policy

(as approved at the 33rd National ALP Conference, Adelaide, 1979)

Uranium

Recognising - That the provision of Australian uranium to the world nuclear fuel cycle creates problems relevant to Australian sovereignty, the environment, the economic welfare of our people, and the rights and well-being of the Aboriginal people. Believing that, having regard to the present unresolved economic, social, biological, genetic, environmental and technical problems associated with the mining of uranium and the development of nuclear power, and in particular -

a. to the proven contribution of the nuclear power industry to the proliferation of nuclear weapons and the increased risk of nuclear war; and

b. the absence of procedures for the storage and disposal of radioactive wastes to ensure that any danger posed by such wastes to human life and the environment is eliminated.

It is imperative that no commitment of Australia's uranium deposits to the world's nuclear fuel cycle should be made until -

a. a reasonable time has elapsed for full public debate on, and consideration of, the issues;

b. the ALP is satisfied that the above-mentioned problems have been solved; and
c. the Australian Government endorses Recommendation 6 of the First Fox Report, which states:

"a decision to mine and sell uranium should not be made unless the Commonwealth Government ensures that the Commonwealth can at any time... immediately terminate those activities, permanently, indefinitely or for a specific period."

Accordingly, a Labor Government will -

a. declare a moratorium on uranium mining and treatment in Australia;

b. repudiate any commitment of a non-Labor Government to the mining, processing or export of Australia's uranium; and

c. not permit the mining, processing or export of uranium pursuant to agreements entered into contrary to ALP policy.

NUCLEAR POWER

Prohibits the establishment in Australia of nuclear power plants and all other stages of the nuclear fuel cycle.

WORLD SCENE

WORLD SCENE

URANIUM INDUSTRY BOOM GOES BUST

The nuclear industry is in the doldrums worldwide.

In 1975 the Australian Atomic Energy Commission forecast that 107,500 tonnes of uranium would be required each year to supply the anticipated growth of nuclear reactors in the West by 1985.
Three years later the Commission halved its estimate, and by 1980 it dropped it again to 39,000 tonnes.

Except for France and Japan, no new orders for nuclear power stations were made in 1979 or 1980. In West Germany, no reactors have been ordered since 1975.

In the United States exploration activity for uranium has sunk to a ten year low and some major uranium mining companies are reported to be considering getting out of the industry. Dozens of smaller mining companies have already shut down because of depressed sales.

Since early 1980, uranium production in the United States has been cut back by about a third, and the industry's workforce has been reduced from 22,000 to fewer than 14,000. In one State, Wyoming, there's been a 54% reduction in jobs.

The industry's deep and continuing recession has been publicised not only by the anti~ nuclear groups but by North Americas conservative, financial press.

On November 3, 1981, the "Wall Street Journal" published a major article entitled "Uranium Industry Boom Goes Bust As Growth of Nuclear Power Falters".

Abandoning its usually staid language, the "Journal" commented: "But as fast as the fortunes of nuclear energy have fallen, the US uranium mining and milling industry have crumbled, Thousands of people and scores of companies are trying to extract themselves from the rubble. The uranium industry itself faces the even grimmer prospect of being unable to recover, even if nuclear power in this country does come back. The condition of the domestic I uranium business already reads like an obituary: a glut of milled ore, called "yellowcake", used to fuel nuclear reactors; spot market prices of about $23.50 a pound, a six year low; production costs rising at more than double the inflation rate; only waffling support by the Federal Government, and the prospect of more imports of high grade, cheap ore from abroad."

CONTRACTS CANCELLED

In late January, 1981, ABC Television News in Australia presented a US report on the decline of the nuclear industry. That report said more than 80 contracts for new nuclear power plants have been cancelled and no contracts have been signed for plants to be built beyond 1990.

The stalling of the US industry came as no surprise. Since the Three Mile Island accident in 1979, the industry has been plagued by a succession of "mishaps", growing community opposition to new and existing plants, and deteriorating economic competitiveness with other power sources.

But it's not just the US industry that is experiencing difficulties. On January 26, Australia's "Financial Review" reported that Mary Kathleen Uranium Limited had recorded a major slump in profits for the year ended December 31, 1981.

Mary Kathleen's net profit dropped from $11,164,000 to $1.74 million. The "Review" said this downturn was due to a $13 million fall in sales revenue and reduced shipments of uranium oxide.

On February 7, the "National Times" reported: "... almost no new uranium contracts are being written around the world. More significantly, Australian companies concede privately that current spot prices do not cover costs of production".

SOUTH AUSTRALIA'S NON-BOOM

In South Australia, the Liberal Government has got itself into a tangle over the proposed Roxby Downs copper and uranium mine.

Since the September 1979 election, Premier Tonkin has pinned his Government's political hopes on a development he has described as eventually being as big as Mt. Isa.

Faced with record unemployment, the South Australian Liberal Government has painted itself into a corner over Roxby Downs. No serious commentators are now likely to join the Premier in trumpeting the economic impact of Roxby. Even Western Mining, a partner with BP in Roxby exploration, will not publicly commit itself to actually mining the ore body despite its insistence that the Government pass an Indenture Bill for the project.

Negotiations over the Indenture have not gone well for the South Australian Government. The Indenture Bill was supposed to be presented in November 1981. It didn't appear. Then it was due to be presented to Parliament in December of that year. But negotiators failed to agree over electricity prices and royalties.

The Bill was finally introduced in March 1982. It was a disappoint even to the strongest supporters of Roxby. Instead of the 10% royalties predicted by the Advertiser, the real figure was 2.5%, eventually rising to 3.5%. And there was no guarantee in the indenture that mining would proceed beyond the feasibility stage. The companies knew that the Government's political strategy hinges on a Roxby go-ahead.

With depressed uranium sales likely to continue throughout the 1980's (and probably beyond) the Government was in a weakened bargaining position. To put it crudely, the Roxby partners had Premier Tonkin over a barrel and the indenture publicity hype - full of "ifs" rather than "whens" - smacked of a political stunt.

Drilling Rig at Roxby Downs, S.A.

WORKER SAFETY

WORKER SAFETY

In Australia, unlike the United States and Europe, the opposition to nuclear development focuses, to use the industry's own jargon, on the "front end" rather than the "back end" of the nuclear fuel cycle.

There are no commercial nuclear plants in Australia, only a research reactor. But Australia does have enormous quantities of uranium, the nuclear engine's equivalent of oil. The principal concern is whether the health of Australian miners working in uranium mines will suffer as a result of the special nature of the material they have been working with.

RADON: "CANCER RlSK"

The danger to uranium miners results from the inhalation of radon gas which is released when the ore is mined and milled. When inhaled the gas and its own "decay products" can inflict radiation doses to the lungs, which can result in cancer developing years later.

In fact, it is the decay products of radon, rather than the radon itself that pose the greatest problems, Radon 222 has a relatively long half-life (3.8 days). Therefore, it tends to be exhaled before it decays radioactively. However, the decay products of radon, described by scientists in somewhat sexist terms as "radon daughters", pose a greater hazard because they have much shorter half lives and can decay whilst actively being inhaled into the lungs.

The decay products, which commonly attach themselves to less easily exhaled dust and water droplets in the air, emit high energy alpha particles that can damage cells in the lungs and bronchi.

Underground uranium mines have proven the worse source of this kind of radiation contamination for miners. As a result trade unions in countries where uranium is mined insist on the most stringent precautions in order to minimise contamination. A uranium mine must therefore be very well ventilated with dust controlled by using water sprays, There must also be the strictest monitoring of alpha radiation levels.

RADIUM HILL LEGACY

Unfortunately, when it comes to worker safety, the track record of the worldwide uranium industry is appalling.

Before it was defeated at the polls in September 1979, the SA Labor Government ordered its Health Commission to investigate claims that workers at the Radium Hill uranium mine, operating in the 1950's, had suffered a greater incidence of cancer than other members of the community. Certainly, a preliminary survey appeared to substantiate these claims, showing eight lung cancer deaths when 3.4 would have been expected statistically, Unfortunately, the Health Commission study team could not locate a large number of the former miners and records were inadequate. However, the SA produced film "Backs to the Blast" released in 1981 chronicles the personal tragedies of some of these miners, as well as Maralinga N-Test workers.

Information from the United States on the dangers of uranium mining is more readily available and is quite frightening.

During the period 1946 to 1968, about 6,000 underground uranium miners were needlessly and significantly exposed to radioactive gases, according to nuclear critics Ralph Nader and John Abbotts.

In their book, "The Menace of Atomic Energy" they cite C.C. Johnson, an official of the United States Public Health Services who estimated, in 1969, that "600 to 1100 lung cancer deaths, in excess of what would statistically occur among a similar sample of the general public, could occur in this group of miners".

Occupational exposure standards for uranium miners have improved markedly. But it is most worrying that a report in "The National Times" in late 1979 said that uranium miners in the Northern Territory are complacent and lax in observing safety requirements. It has also been reported that some miners are deliberately playing "chicken" with safety measures, regarding it as "macho" to break the rules.
There is now considerable debate in the United States as to whether even the new, improved standards for mining are adequate.

A few years ago, Dr. Victor Archer, again of the US Public Health Services, updated a study on a group of 3366 uranium miners of whom 745 have died. Lung cancer caused 144 of these deaths, which represents an excess of nearly 400 per cent over lung cancers which statistically would be expected to occur.

Dr. Archer further indicated that 30 years of allowed exposure under present safety standards would increase by 45% the chances that a person would contract cancer. "The epidemic of respiratory cancers among United States uranium miners is continuing, even though radiation levels have been lowered in recent years. A new epidemic of death from respiratory insufficiency has begun among them", warned Archer.

ARIZONA - THE NAVAHO TRAGEDY

Statistics tell only part of the story. Much of the uranium mining in the United States has been undertaken on Indian lands in Arizona and New Mexico.

Betty Tazzie, a 50 year old Navaho Indian, living at Red Rock in Arizona has been widowed twice. Both husbands worked at the local uranium mine. Both died of lung cancer.

For 6 years, Betty Tazzie has been battling in the courts and through appeals to congressmen to get workers compensation for her husbands' deaths. She, and 25 other lung cancer widows at Red Rock have no doubt that their husbands' deaths were caused by working down the mines, but their pleas for assistance, along with the plight of the many retired miners , now dying of cancer at Red Rock have been largely ignored by the uranium companies and by I State and Federal Governments.

The effects of contamination on future generations of Navaho living at places like Red Rock must also be feared. Huge piles of uranium tailings - a total of 10 million tonnes - have been heaped not far from where the Navaho live. Never warned of the dangers from the dusty waste, some communities actually constructed their homes from the gray cement-like radioactive material.

Yet despite the evidence it is difficult to convince people of the dangers of radiation exposure. Small amounts of radiation cannot be felt, heard, smelt or tasted. Human senses offer no warning of radiation dangers. As with other cancer causing pollutants, radiation- induced cancer may not develop until many years after contact. If cancer does develop, the tumour offers no indication of which cancer causing agent might have been responsible. This places the burden of proof on the worker and unless death was caused by a dramatic and immediate incident A like a major spillage - it is easy for the atomic industry to argue that death was due to natural causes. Once exposed, the victim must prove that the resulting cancer was work-related if any compensation is to be paid.

Indeed, British Nuclear Fuels Limited, the British partner in URENCO-CENTEC the consortium interested in establishing a uranium plant in Australia - has now belatedly paid out considerable sums of compensation to the widows of dead Windscale workers, even though it still claims that exposure at work was not the cause.

US URANIUM STRIKE

Fortunately, uranium workers in the US are now becoming more militant about on the job safety.

In June, 1981, workers at a plant handling uranium near Jonesboro in Tennessee, went on strike because they believed they were not adequately protected from uranium contamination.

The plant makes armour piercing artillery shells out of depleted uranium. The plant's 100 workers, members of the Atomic Workers International Union, turned down a 25% pay increase and refused to return to work until the company took steps to improve worker safety.

"I don't care if they offer us $20 an hour," said John Bettis, a maintenance man at the plant and president of the local union branch; "We're not going back until they clean that place up."

Analysis of workers' urine found relatively high levels of uranium, according to union officials. The officials said that union doctors told them that the uranium was collecting in the workers' kidneys, causing deterioration.

The workers also said that, although the uranium tailings they worked with were at relatively low levels of radio-activity, there were many "hot spots" in the plant. They claimed that radioactive material collected in their clothing and was taken home with them.

In addition the workers contended that radioactive uranium oxide was allowed to pollute the air around the plant and that contaminated water was probably seeping into the ground water.

In 1980 the company ordered the workers to use respirators to filter the uranium dust. The company said it was also installing engineering controls to remove the uranium-laden dust from the air. But a spokesman for the company told the New York Times that he could not say when the controls would be fully installed. The "Times" reporter, Philip Shabecoff, interviewed a number of workers who complained that the respirators were very uncomfortable to wear for eight or more hours a day. In any case, they claimed that the respirators usually did not work.

These concerns mirror the problems experienced in South Australia, where uranium tailings were mixed into the concrete floor of the BHAS plant at Port Pirie, and where tailings were dumped at the Australian Mineral Development Laboratories' ageing plant in Thebarton, an inner Adelaide suburb. Only a public outcry caused AMDEL to shift the major part of these tailings, but work on uranium still continues at the Thebarton site, despite an official report detailing lax handling procedures and a series of charges by Federal MHR John Scott about safety problems at AMDEL.

South Australian companies handling uranium ore have been accused of paying little regard to worker safety. Until recently the SA Health Commission did not have the equipment to measure radon levels, even though the Government had previously made bold statements about "safe radiation levels" at premises that were causing public concern. This duplicity has not assisted a rational debate over uranium.

In their excellent dissenting report, Labor MLC's Dr. John Cornwall and Norm Foster, Members of the South Australian Legislative Council's Select Committee on uranium resources, recommended that uranium mining should not proceed in South Australia at this time because of the absence of adequate waste disposal techniques for high level waste and because of the inadequacy of international safeguards.

But their 45 page report, despite its central conclusion, was by no means entirely negative. They reached additional conclusions about worker safety at uranium mines and made a number of positive recommendations about how procedures could be improved.

These included:

"Alpha particles in the radon and radon daughters constitute a major hazard to the lungs of uranium miners. The current levels of exposure accepted in the Australian Code of Practice for

the Mining and Milling of Ores may be up to four times too high. They should be urgently revised, based on the 1980 NIOSH study."

* "For both epidemiological studies and long term workers' compensation claims, a National Registry of those currently involved in the uranium industry in Australia should be established as a matter of urgency."

* "Radon and its decay products should be continuously monitored by an independent authority during uranium mining and milling operations. If uranium mining were ever to proceed in South Australia it would be imperative that special legislation for this purpose be enacted and committed to the South Australian Health Commission.

* "Because of the extremely long half life of the important decay products, the radioactivity in `" uranium mine tailings will remain indefinitely on any human time scale In view of the very large scale of the Roxby Downs ore body, it is essential that if it is ever mined the technology should be available or developed to return tailings to the mine or to bury them in reasonably deep repositories, e.g. quarries used in the production of mine fill.

* "Arriving at a level of worker hazard or safety based on a criteria which uses a "socially l acceptable risk" is morally questionable."

* "If uranium mining were ever to proceed in South Australia it would be essential that concurrent legislation be introduced for long term workers' compensation claims relating to genetic damage and long term cancer risks. A long term indemnity fund should be established through the State Government Insurance Commission."

* "Smoking on its own accounts for only a small fraction of the total number of lung cancers in miners. However, it does seem to act as a promoter, reducing the average latent period for the manifestation of cancer by an estimated five years."

* "Even with the best possible ventilation and safety features it will be a hazardous occupation for miners."

Incinerator for alpha-emitter waste containing plutonium at Marcoule, in France.

PUBLIC SAFETY

Public Safety. The Waste Dilemma

Concern over the disposal of nuclear wastes was central in convincing the ALP, in 1977, to adopt its "play it safe" policy on uranium,

In this the ALP was undoubtedly influenced by the findings of Britain`s Flowers Commission and Australia's Fox Enquiry into the nuclear industry. Both Commissions pointed to the unsatisfactory nature of the technology for the final and safe disposal of highly active wastes which if leaked to the environment now or in the future, would have disastrous consequences.

The highly active waste which arises from nuclear fuel reprocessing is so dangerous that it must be isolated until the various radio-isotopes have decayed to insignificant levels. Unfortunately, these wastes remain dangerous for hundreds of thousands of years. So when Governments consider how to handle this problem they are faced with time horizons that transcend human experience.

Apart from the technical problems, of course, is the issue of whether we can rely on the stability of governments, who will be responsible for safe radioactive waste management for thousands of years. Our track record isn't good, yet we are talking about periods of time greater than the 80,000 years that separate us from Neanderthal Man. A lot has happened in between.

However, it would be wrong to ignore the substantial progress that has been made in the field of radio-active waste management during the past three or four years.

The Dunstan overseas fact finding mission on uranium in early 1979 found that progress was most promising in Sweden. The problem is, however, that the Swedish proposals (which include the reprocessing and solidification of spent fuel in glass, long term storage to allow cooling, and ultimate disposal in deep rock) can apply only in limited areas.

Many countries do not have the conditions, such as geologically stable granite rock formations, which occur in Sweden, Nor has any other country come anywhere near Sweden in developing a safe means of disposal even though it is quite clear from international contracts covering reprocessing that each country will be required to dispose of its own waste,

VITRIFICATION

There is now widespread scientific criticism of the glassification or "vitrification" process This method was pioneered at Marcoule in the South of France, which was visited by the South Australian team in early February, 1979.

Essentially the vitrification process involves storing high level waste in tanks for up to ten years to allow a reduction in radioactivity and temperature. The liquid waste is then evaporated and the remaining solids are incorporated into borosilicate glass. The molten mix is then poured into stainless steel canisters, sealed and stored for four years in shallow. especially cooled concrete bunkers. After a further twenty years of cooling by natural air convection, the canisters will be encapsulated in lead and titanium before being buried in deep, stable, dry rock.

Critics of vitrification argue that it has been extremely difficult to obtain any detailed information about the performance of the Marcoule plant. It has also been claimed that the plant can only vitrify satisfactorily the waste from the old gas cooled reactors (now being phased out) and not the higher level wastes produced by oxide fuel used in modern water cooled reactors.

Some recent studies have also suggested that "devitrification" (a process by which the glass recrystallises and crumbles) can occur under quite plausible geological circumstances. If this were to happen, critics claim, highly radioactive materials could filter into ground water faster than anticipated by nuclear authorities.

Significantly, the UK Atomic Energy Authority has now abandoned its much touted "Harvest" vitrification method, being developed at Harwell, near London.

Another proposal, being developed at the Australian National University by a team headed by Professor A.E. Ringwood, is for radioactive waste to be incorporated in synthetic rock rather than glass. The "Synroc" process is still being evaluated, but its proponents claim that synthetic rock will be more stable and more resistant to leaching and high temperatures than boro-silicate glass, and can be buried more safely.

DANGEROUS WASTE "LEAKING"

A number of countries, including, the US, the UK, Holland and France, already have extensive stockpiles of temporarily stored highly-active waste. These countries have yet to decide, let alone solve, the problems of what to do with this waste permanently. The waste, dangerous for thousands of years, is stored in steel tanks with "lives" of only 50-80 years, and already there have been enormous difficulties with corrosion and leakages, some of them serious.

More than ten per cent of the US Nuclear Regulatory Commission"s 200 storage tanks have been troubled by "mishaps". The most spectacular occurred at the Hanford storage facility or "tank farm" in Washington State in 1973, when nearly half a million litres of high level waste leaked into the soil (near the Colombia River). Over a Six Week period before the leak was discovered.

Glass pour during tests at the pilot vitrification plant at Marcoule in France.

Adelaide's Helen Caldicott, now a leading nuclear critic in the U.S., reports that of the 149 old tanks storing military waste at Hanford, 24 have been confirmed by the Department of Energy as leaking and another 34 were labelled "of questionable integrity". These numbers are expected to grow.

Ironically, a major radiation leak from a storage tank at Britain's Windscale nuclear complex in Cumberland occurred in early 1979, at about the same time as the Dunstan investigating team visiting the plant was being assured of the safety of the nuclear fuel cycle. Between 10,000 and 100,000 curies of radioactivity leaked to ground from a Windscale tank and travelled about a hundred yards.

Much of the waste material leaked at Windscale had short half lives (the time taken for a radioactive isotope to decline to half its initial strength). But one third had half lives of about 30 years and there were also traces of materials such as plutonium and americium with very long half lives.

British Nuclear Fuels Limited, the firm which wants to be involved in South Australia's uranium processing, failed to notify the UK Government or the public until months after the leak was discovered. Since then there have been allegations of a "cover up" by nuclear authorities at Windscale, and an official inquiry castigated BNFL for its incompetence. Significantly, another leak at Windscale discovered in 1976 is still unrectified because of "technical problems.".

One suggestion to solve the long term waste disposal problem is to dump it in remote parts of the seabed. Both the UK and Japan have been considering this option. Other countries are also faced with a dilemma. The Netherlands, for instance, does not have the geological formations that occur in Sweden. Instead it was proposed to put Holland's highly active waste into deep underground salt domes which the Dutch Government believes would be geologically stable. But Holland's planning laws and strong local resistance haven't even allowed the Dutch Government to sink drill holes to establish whether they've got consistent salt in those domes to store nuclear waste safely.

Japan, on the other hand, hasn't yet got any place to put its highly active waste. It certainly hasn't established that it has granite rock which is stable for millions of years. The geological formations of earthquake-prone Japan are such that you cannot have that confidence. However, one "solution" proposed in the Japanese Senate was for Japanese waste to be sent to Australia for dumping if they use our uranium to power their nuclear reactors.
It is doubtful whether the people of Australia will allow this country to become the dustbin for the world's atomic waste.

The position of the Federal Government on waste disposal is really one of telling the people: "Don't worry, we know how to dispose of waste in theory and the practicalities will be worked out in the future." This is about as convincing as telling people to have themselves snap frozen in the hope that someone will perfect the details of everlasting life before the next power failure.

We should welcome advances in waste disposal techniques. However, that technology should not only be worked out on paper but must be conclusively demonstrated in practice. It should be guaranteed now - not promised hopefully in the future.

The Flowers Report said in 1976 "There should be no commitment to a large program of nuclear fission power until it has been demonstrated beyond reasonable doubt that a method exists to ensure the safe containment of long lived, highly radio-active waste for the indefinite future."

That has not yet happened.

At the moment, in the words of Mr. Justice Fox to the SA Select Committee on uranium resources: "As far as I am aware no-one has yet tried to dispose permanently of one milligram of high level waste."

REACTOR SAFETY

Reactor Safety

Supporters of the nuclear industry will tell you that nuclear power plants are the quietest and cleanest form of electricity generation. They will tell you that the film "China Syndrome" is a fantasy and that the nuclear industry has a safety record second to none. They will tell you that those activists who organise demonstrations against the construction of reactors are alarmist and irresponsible.

But are they? In the United States during 1980 there were 3,804 "mishaps" at nuclear power plants, according to the "Critical Mass Energy Project", the Ralph Nader citizen action group, using Nuclear Regulatory Commission information. In more than a dozen nuclear plants across the United States, the steel shield that encases the reactor's core is being made so brittle by exposure to radiation that officials have admitted that some may have to shut down for repairs. Federal officials have also admitted that rusting in 17 other plants may also force plant closures.

In 1980 the NRC audit of reactors found that 15 out of 50 plants were rated "below average" in areas such as management control, maintenance, radiation and fire protection. Admittedly, none of these incidents caused - as far as this writer is aware - any loss of life. But there have been accidents that have brought nuclear reactors perilously close to the situation the "alarmists" fear.

THE BROWN'S FERRY INCIDENT

In March 1975, the flame of a household candle caused two sophisticated nuclear reactors to be "scrammed" and nearly resulted in an accident that could have endangered the lives of tens of thousands of people. Four years before the much publicised accident at Three Mile Island, one of the world's largest nuclear plants - at Browns Ferry in Alabama - came close to the "China Syndrome", one of the nuclear industry's greatest fears.

At 12.30 p.m. on March 22, an electrician was using a lighted candle to check air leaks through cable openings in the cable room beneath the reactor control room. Supposedly fire proof packaging around the cables ignited and a fire - burning for seven hours - wiped out all five emergency core cooling systems that are called upon in an emergency to save a reactor from meltdown.

Greg Minor, a senior nuclear engineer and safety systems designer involved in the Brown's Ferry project, joined two other senior colleagues in resigning from General Electric, the company concerned, following the incident. Together, the three experts had 54 years experience in the nuclear industry. Minor, now a leading anti-nuclear activist in the United States, told the writer of the potential disaster that could have resulted at Brown's Ferry.

"The danger was that during the process of fighting to get this reactor under control during the fire, the operators had to relieve the pressure inside the reactor. In doing so, they had to manually open some valves which normally they would not open. But in manually opening those valves they lost a large part of the cooling water that normally covers the reactor core. That's the concern. If you lose the cooling water and it gets below the surface of the core, then the core begins to melt. The danger is that this core melting would release the radioactive material contained there. If the core went on further to melt out of the pressure vessel protecting it, and then out of the containment building, highly dangerous radioactivity would be released to the public and to the environment. And that would be a very, very serious accident".

It would indeed. During nuclear fission, the centres of the uranium pellets fueling a reactor heat up to around 4000 degrees F. Cooling water is essential to keep the surface of the pellets at the manageable level of 550 degrees. If the main cooling pipe cracked water could blow out of the reactor.

Unless that water is immediately replaced - by the emergency core cooling system designed to flood the reactor - the pellets would heat up dangerously within 30 seconds. Within a minute the reactor core would begin to melt. Within quarter of an hour the core would become a molten mass weighing several hundred thousand pounds. A huge, hot, radioactive glob would gnaw its way out of its steel and concrete container until it reached earth.

This is called the "China Syndrome" because scientists do not know how far down into the earth the molten core would tunnel. What they do know, however, is that once the radio-active mass reached the water basin under the earth it would react violently and shoot out clouds of deadly radio-active steam behind it or through fissures in the ground.

In the early hours of March, 28, 1979 - just three months after the Three Mile Island nuclear plant in Pennsylvania came on line - a maintenance crew working on a water pipe accidently cut off the flow in the main feedwater This automatically triggered a shutdown of the plant's reactor and turbine. These events would not normally have caused any problems. The plant had a series of supposedly Fail safe back-up procedures designed to immediately deal with any abnormality or malfunction. Within seconds the plant's emergency feedwater pumps went into operation. Again, this should have been routine. But it was at this stage that the "fail safe" systems began to fail.

The reactor had been jolted by the sudden shutdown of its main feedwater system. Inside the reactor the pressure of the cooling water had increased rapidly, because it was still being heated by the hot uranium fuel. This heightened pressure caused a relief valve to open, as it was designed to do. But instead of the valve opening to relieve the pressure and then closing within seconds it jammed open. This allowed the cooling water to flood out of the reactor rapidly - at a rate of 220 gallons a minute.

This behemoth, bearing a resemblance to a battleship, is under construction in Illinois, in the U.S. is a housing for a nuclear reactor.

This would have been a serious accident in its own right. But during routine tests only two days before, a maintenance worker had inadvertently shut off two valves in the pipes coming from the plant's three emergency feedwater pumps. This prevented the emergency back-up system from pumping in water to replace the cooling water which was cascading out of the reactor's jammed valve. By this stage plant personnel faced a serious safety crisis. But there was a second set of emergency pumps connected to a special reservoir of cooling water.

Two minutes after the emergency began, two of these reserve pumps automatically switched on. But operators in the control room misread their dials and incorrectly turned them off, manually overriding the computerised procedures. Human error again played its part when operators inadvertently opened another valve, releasing even more cooling water from the reactor. They did so because instrument readings had convinced them that the reactor was being supplied with too much cooling water rather than too little. They were to remain ignorant of the water flooding out of the jammed pressure valve for another two hours and 20 minutes,

In a recent major article in the "New Yorker", Daniel Ford, summed up the situation to this point.

"Within five minutes after Unit 2's main feedwater system failed, the reactor, deprived of both normal and emergency sources of cooling water, and no longer able to use its enormous energy to generate electricity, gradually began to tear itself apart. The pressure of the water inside, which had increased suddenly in the few seconds after the accident began, now kept decreasing, uncontrollably and at times precipitately. The water remaining inside the reactor began to flash into steam, which in the next few hours expanded and blanketed much of the reactor's uranium fuel, preventing effective cooling,

. . ."The net result of a long chain of human and mechanical failures was that for some sixteen hours the hot uranium-fuelled core in the Unit 2 reactor was not adequately cooled. All the uranium fuel rods overheated, swelled, and ruptured, according to post-accident NRC estimates, with about a third of the core reduced to rubble. The severely damaged fuel rods released large amounts of radioactive material into the rest of the reactor, and, because of the open relief valve, much of this escaped into the containment building housing the reactor. The atmosphere there became "murderously radio-active", as one NRC official later described it, and thousands of gallons of radio-active water from the reactor were accidently pumped from the containment building into a less secure auxiliary building".

GAS RELEASED

Later, radio-active gases were released from the plant and carried by the wind towards neighbouring towns. There were also fears, later proved unfounded, that a hydrogen bubble was growing inside the reactor. It was believed this bubble might explode, releasing much greater amounts of radio-activity to the environment. It took a month before the situation at the plant was finally stabilised.

The nuclear company operating the plant, Metropolitan Edison, is currently spending about a billion dollars on repair work and the decontamination of the reactor's containment building, where some 600,000 gallons of radio-active water covered the floor to a depth of seven feet. Immediately after the accident, the radiation level in this area was a staggering 30,000 rems (or units of radiation) per hour, A year later levels had dropped to a still dangerous 200 rems per hour, allowing engineers in special, protective clothing to make brief inspections and begin preliminary work.

At the time of writing the plant was still shut down, The reactor's uranium fuel has cooled off considerably and a large body of radio-active water remains on the basements of the containment building and auxiliary tanks. The potential enormity of the Harrisburg incident was brought home to disbelievers when it was revealed that plans to evacuate one million people living in surrounding areas, were almost swung into operation. Indeed, a report ordered by the Nuclear Regulatory Commission has suggested that the reactor came closer to melting down than anyone realised at the time.

The worst did not happen but there has been a bitter reaction from locals over releases of . radioactive gas from Three Mile Island both during and in the year following the incident. But, at least on the surface, the Brown's Ferry and The Three Mile Island accidents - like so many other "events" that have plagued the nuclear industry - appear to stem from very silly, very human mistakes.

But Greg Minor and other critics don't believe that safety systems can be made substantially more foolproof to account for human error, "I think the thing we learnt from the Brown's Ferry plant was that you cannot make them more foolproof. The problem is the human element, There can be human error in the form of design oversight, the problems we didn't foresee in designing a plant. There can be human error at the manufacturing stage, where a manufacturer doesn't follow the quality or the installation procedures. There can also be maintenance problems.

"It was a maintenance problem that happened to catch Brown's Ferry. But it could be any of these that could produce an accident in some other plant - regardless of how carefully you think you have designed it."

Greg Minor believes the benefits to society from nuclear power generation do not compensate for the risks. "The risks are so large that it is hard to put it on a scale that we normally think of in any other mechanical or technical disaster. The risks of a nuclear accident can be so devastating and so widespread and last such enormously long periods of time. We are talking about thousands of years of contamination of an area which may make it uninhabitable forever. These are dangers on a scale we do not normally think of."

Phoenix Feet Breeder Reactor at Marcoule, France

BOMB CONNECTION

The Bomb Connection

Much of the debate over whether or not Australia should mine and sell its uranium has centred on health hazards to miners, environmental effects, waste disposal and the safety of nuclear power stations. Yet the ALP's "Play it Safe" policy on uranium owes a great deal to questions about the adequacy of international nuclear safeguards. The complex issue of safeguards has caused a great deal of public confusion and there has been no real attempt by the national press, who are largely committed to uranium development, to explain the problems,

Safeguards are the procedures agreed to internationally to try to ensure that nuclear fuels and materials designed for peaceful use are not misused, deliberately diverted for military purposes or allowed to simply go astray.

PROLIFERATION RISK

The risk of further nuclear weapons proliferation arising from a growth in the civilian use of nuclear power has long been recognised,

In 1957 the International Atomic Energy Agency was created with the twin functions of promoting nuclear power and establishing safeguards against the conversion of nuclear technology to military uses. In 1970 the Non Proliferation Treaty came into effect. Under its provisions, the signatory nations without nuclear weapons are promised help and materials for peaceful nuclear developments if they place existing facilities under international safeguards. Today, 115 nations have signed the treaty. 46 countries including Israel, India, Pakistan and South Africa have not.

Australia's First Ranger Report, issued on 28th October, 1976 said:

The nuclear power industry is unintentionally contributing to an increased risk of nuclear war. This is the most serious hazard associated with the industry. Complete evaluation of the extent of the risk and assessment of what course should be followed to reduce it involves matters of national security and international relations which are beyond the ambit of the Inquiry.

Four years later, in December 1980, Mr. Justice R.W. Fox, who was Chairman of the Ranger Inquiry, went further when he appeared before South Australia's Select Committee of the Legislative Council on Uranium Resources.

It has been said (and it was said at the Ranger Inquiry) that civil nuclear energy was never used for the production of nuclear weapons and never has been. I do not think that was accurate at the time it was said, for reasons I have indicated. I think there is an increasing likelihood that civil industry will at least to some extent contribute. One reason for that is that most countries that develop nuclear weapons will want to do so in a clandestine way.

Obviously, if an immensely dangerous substance like plutonium - an essential ingredient in the manufacture of nuclear weapons - got into the "wrong" hands, world peace could be threatened, The thought of terrorists or a madcap dictator obtaining enough plutonium to make a relatively easily constructed nuclear bomb is terrifying, but by no means improbable,

Because of these fears, agreements are entered into between countries buying and selling nuclear fuels and technology and these are supposed to stipulate how these materials can be used. In addition, inspectors from the International Atomic Energy Agency - the Vienna-based authority set up to police nuclear development - periodically visit nuclear plants around the world. These inspectors are supposed to measure the actual amount of nuclear materials going through the fuel cycle at the plant against the official records to make sure none is missing.

Unfortunately, there is ample evidence to show that existing safeguards - both bilateral and multi-national - are seriously flawed.

Former SA Premier, Dan Dunstan, and advisers in Stockholm, January 1979, for talks with Swedish Government on international safeguards and waste disposal.

At the crux of the problem, of course, is the issue of national sovereignty. National considerations severely limit the effectiveness of the Nuclear Non Proliferation Treaty and the operation of the International Atomic Energy Agency inspectors. There is no international accountability of uranium stocks or international control of plutonium, to guard against the proliferation of nuclear weapons to smaller countries and to better prevent the diversion of nuclear materials for nonpeaceful purposes,

Instead the whole safeguards system relies on the good faith of countries that may have strong incentives not to honour their obligations. Safeguards agreements can be abrogated at short notice and sanctions, political and economic, have in the past proven difficult to enforce with any effectiveness, as the Rhodesian trade "embargo" proved.

The International Atomic Energy Agency is understaffed and under-financed. There are no permanent "on the spot" inspectors and many nuclear facilities are covered by no safeguards at all. Indeed, in some facilities that are covered - including Urenco Centec's enrichment plants - inspectors are not allowed to visit certain areas for "commercial intelligence reasons". Another problem is that the role of the inspector is to detect any transgressions after the fact, not to prevent them or to pursue and recover diverted or stolen materials.

SAFEGUARDS "GROSSLY DEFICIENT"

In November 1981, a report to the US Nuclear Regulatory Commission (NRC) concluded that the international safeguards system had gross deficiencies.

The report, prepared by a former Commission staff member and international inspector, argued that the International Atomic Energy Agency is "incapable of detecting the diversion of a significant quantity" of nuclear fuel "in any state with a moderate to large nuclear energy establishment."

The author of the 21 page report, Emanual R. Morgan, was a domestic safeguards inspector with the US Atomic Energy Commission and the NRC from May 1968, until May 1977. From then until September 1980, when he rejoined the NRC, he was an international inspector with the International Atomic Energy Agency.

Whilst at the international agency, Morgan inspected reprocessing plants, conversion and fuel fabrication operations, laboratories and reactors, primarily in Europe and Japan.

His report cites numerous deficiencies in the inspection systems.

It says international inspectors often "cannot communicate with the party being inspected" because the agency does not teach languages or help inspectors learn them.

Member nations provide inadequate information about the design of their nuclear plants and inspectors are frequently prevented from making sure that there are no hidden "diversion routes" where uranium can secretly be processed or stored. Moreover, some nuclear operations, such as reprocessing plants, are often not open to inspection, according to the report.

"The inspector is often doomed from the start by an inadequately negotiated" inspection agreement approved by the agency. In addition, nuclear waste, which contains plutonium potentially usable in weapons, is frequently transferred to central waste-handling plants that are not subject to inspection. Records also vary tremendously among plants. In one, the report noted, "There was no record kept of the final disposition of plutonium samples."

The report points out that the international agency does not regularly and promptly compare shipments of nuclear fuel on departure and arrival. Moreover, seals placed on nuclear material, which are sometimes made of paper, are easily counterfeited or duplicated.

DANGERS NOT HYPOTHETICAL

This concern over safeguards is by no means academic or hypothetical. There are many serious examples, particularly in the United States, where considerable quantities of dangerous fuels have gone missing and at least one recorded case where records for highly enriched uranium were fraudulently concocted to enable a power company to accumulate a surplus with which to cover future losses.

In 1980, the Comptroller General of the US General Accounting Office, slammed the adequacy of existing safeguards covering reprocessed nuclear fuels.

This report, presented to Congress in March, begins with the bald statement: "Adequate safeguards to prevent the theft or diversion of weapon usable material from commercial nuclear fuel reprocessing plants have not been developed."

The report continues:

Safeguards systems used at Federal reprocessing plants cannot ensure that diversions of weapons usable material for non-authorised purposes can be detected in a timely manner. Diversion or theft of material sufficient to construct a nuclear weapon is possible and could go undetected.

Material control and accountability systems cannot accurately measure and account for weapons usable material in spent fuel rods and in the process and waste streams. Since fiscal year 1955, a net shortage of 145.5 kilograms of plutonium occurred at the Savannah River, South Carolina, reprocessing plant. The Department of Energy assumes that none of this was diverted. It attributes the shortage to inaccurate production estimates, process measurements, and accounting and normal operating losses. GAO believes that with existing material control and accountability technology, the Department has no valid basis for this assumption and is thus unable to provide definitive assurance that no plutonium has been diverted

There is no way to measure the precise quantity of weapons usable material in spent nuclear reactor fuel because measuring instruments needed have not been developed.

...Uncertainties resulting from these measurements are so large that diversions of significant quantities of plutonium might not be detectable in large operating plants.
and
if material were diverted it is doubtful that the diversion could be discovered in time to recover the material before it could be converted into a form suitable for weapons.

The Computroller General, like Mr. Morgan, was equally scathing about the limitations of the International Atomic Energy Agency.

INDIAN BOMB SHOWS RISKS

Much has been written about the dangers of terrorists acquiring a nuclear capacity. But this writer believes that the danger of plutonium diversion or theft for weapons production is probably greater from nations than from terrorists.

The Indian bomb controversy demonstrates the dangers inherent in the export of nuclear materials for peaceful purposes.

On May 18th 1974, the Indian Government exploded a Hiroshima size bomb 300 feet below ground, in the Rajasthan desert, close to the Pakistan border. Plutonium used to make that bomb was produced in an Indian research reactor built by Canada and subject to "safeguards". It seems that small amounts of plutonium were gradually extracted from the reactor over a number of years until enough was available to make a bomb.

Recently, there have been persistent reports that volatile Pakistan is itself achieving a nuclear weapons capability - the so called "Islamic Bomb". As long ago as July 1979, Time magazine reported that Pakistan was building a uranium enrichment plant for its nuclear weapons program using blueprints stolen in 1974 by a Pakistani agent who had infiltrated Urenco-Centec`s enrichment plant at Almelo in Holland. With characteristic frankness the nuclear industry denied knowledge of the incident. In December 1979, SA Opposition Leader,

John Bannon, asked senior Urenco executives visiting Australia for a report on these allegations. He is still waiting for a reply, even though Urenco has had talks about establishing a plant in SA.

South Africa, Brazil, Israel and Egypt are also believed to have achieved or be close to achieving a nuclear weapons capability. Colonel Gadaffi's oil rich Libya is still "shopping around" for the technology.

IMPROVEMENTS NEEDED

Those that argue that only world government can satisfy demands for better safeguards are wrong. There are many areas where existing safeguards could be improved and many loopholes in safeguards agreements can and should be closed.

Further and urgent attention needs to be given to the security and safeguarding of uranium yellowcake, which does not happen at present. There also needs to be a total separation of military and civilian uses of nuclear fuel and processes.

Proposals for the multi-national operation and control of sensitive facilities should be explored, and Australia should support former President Carter's call for strict international control of plutonium.

If we are sincere about achieving real safeguards, then it is quite clear that Australia's safeguards agreements with Finland, the Philippines, South Korea, the United States and Britain, are quite inadequate.

Fortunately, our negotiations with Iran, a country considered by the Fraser Government to be stable enough to join with in entering safeguards agreements, broke down before the Ayatollah's revolution. Moving to get the Ranger proposal into operation the Federal Government's zeal for economic reward resulted in a safeguards policy that can at best be described as shallow.

Just before the 1977 Federal election, the Fraser Government told the public that commercial considerations would not override the necessity of getting safeguards. But now the Federal Governments position appears to have changed to one of telling companies to "make up your contracts to sell uranium now and we will fix up the safeguards later."

Nuclear Bomb test, Mururoa Atoll, French Polynesia

At the time of writing, in January 1982, the Federal Government had just initialled a nuclear safeguards agreement with Japan, following three years of discussions.

That agreement, negotiated in a climate of a badly depressed world uranium market, amounts to a significant watering down of Australia's so-called commitment to a realistic safeguards policy.

Leaked details of that agreement indicate that Japan will not be required to obtain approval from Australia before it can transfer Australian sourced nuclear materials to any other country.

That concession amounted to a collapse of Australia's bargaining stance.

But the Fraser Government is also believed to have dropped its requirement that Japan obtain approval from Australia before it be allowed to reprocess our uranium.

It would also appear that Australia has caved in on the conditions required before uranium ore can be enriched beyond 20 percent. This is the safeguard applied to prevent a customer country from misusing nuclear fuel for weaponry rather than for civilian nuclear power purposes.

Japan is reported to have told Australian negotiators that our safeguards were too strict and violated Japanese sovereignty, even though sixteen other countries have apparently accepted such conditions.

But the Australian safeguards position has been watered down over a number of years. Our contracts to supply uranium to Finland, West Germany, Sweden and France involve the fuel being enriched in the Soviet Union, even though that country's nuclear industry is not subject to inspection by the International Atomic Energy Agency.

When Prime Minister Fraser announced the Government decision to export uranium in 1977, IAEA safeguards coverage was said to be an essential precondition of sale.

This provision has been dropped, as has the insistence that our uranium remain under Australian ownership until it is upgraded from raw yellowcake to uranium hexaflouride. "Hex", the stage before enrichment, is covered by IAEA inspection, but yellowcake is not.

Again and again, it has been demonstrated here and overseas that when problems over safeguards prove difficult, commercial considerations will come first. After all, it was only in 1978 that European nations, claiming to champion caution and strict safeguards, bid heavily to sell a complete nuclear package to Brazil, a military dictatorship that has refused to sign the Non-Proliferation Treaty and which is widely believed to have aspirations, if not the capability, to produce its own nuclear bombs.

Tonkin Government Ignores Concern

Still bullish about the commercial gain from mining and selling uranium, the Tonkin Government in South Australia has chosen to ignore genuine concerns about safeguards.

Still, Premier Tonkin might do well to heed the words of Ben Dickinson, the man he asked the Queen to knight for services to the mining industry in a confidential report to former

Premier Des Corcoran, in June 1979, Dickinson said that,

"present indications point to the Australian Government tending to rush headlong into the marketing of yellowcake without the full implications of the world concern for uranium use being fully appreciated...

"Many loopholes and limitations, the report continued, have resulted in the policy which appears to be clearly aimed to put the Ranger proposal into operation."

But worst of all for the Tonkin Government was Dickinson's comment that in the 12 months following South Australia's ban on uranium mining there had been "good reason to question the adequacy of the Commonwealths policy."

The last words on safeguards should go to Justice Fox, who was until recently Australia's Ambassador at Large for non-proliferation.

I have done what I could to ensure that safeguards agreements were as adequate as we could make them, with a consciousness that there is not a great deal that one country can achieve when relying on international safeguards. At the same time I have recognised {as I think most people have) that a safeguards regime is by no means a complete and satisfactory non-proliferation regime,

I think that notwithstanding the control measures that I think have been developing, the risk of a nuclear war occurring over the next IO to 20 years has, if anything, slightly increased, particularly a nuclear war in one or more of the more sensitive areas.

So I come to try to answer the question: yes, there is a risk that plutonium produced from uranium supplied by Australia may be diverted for military purposes. I do not think anyone would agree to the contrary.

EXPERT OPINION

An Expert Opinion

Walter Patterson is an American nuclear physicist now based in Britain. He is international Editor of the Bulletin of the Atomic Scientists and is author of several books on the nuclear industry including the best-selling "Nuclear Power".

He was interviewed by Mike Rann at his home in Amersham, near London, April, I98I.

RANN: The supporters of uranium development in South Australia argue that a uranium enrichment plant will bring massive benefits in terms of money and employment.

PATTERSON: I don't think the track record supports any such assessment. I think the likelihood is that in the first place the enrichment plant will for a very long time to come be surplus to world requirements. There is already a large excess of uranium capacity available in the world - in the US, France and the Soviet Union - all of whom are offering these services on the open market because their own domestic market has fallen far below expectations.

The enrichment plant itself is not likely to represent any more serious environmental hazard than any other large industrial installation. In fact other types of industrial installation in operation would probably represent a more serious hazard.

But, of course, it will be physically a very large installation indeed and during the construction phase you will have the usual type of local disruption associated with that - both physical and social disruption. The impact on small local economies of this type of short term, large construction project has long since been demonstrated to be detrimental in the long term. There may be a brief boom period for some parts of the local economy but that boom will be followed by a very rapid collapse as the construction phase ends. An enrichment plant is a plant that requires very, very few people to run, and mostly highly skilled people who will have to be brought in from elsewhere. Indeed, much of the hardware will have to be brought in from elsewhere.

The effect on local employment will be to provide semi-skilled jobs in pouring concrete and that sort of work. There will also be the need to import a lot of welders for 3 or il years and thereafter a small handful of specialised local jobs which are not likely to be of much benefit to the local community. At the same time the local community will undoubtedly suffer severe dislocation. During the boom phase of the construction project the local services and other facilities will suffer because people will move from employment in local community work to employment on the site.

You will find that basic important jobs like road maintenance and sewers etc. suddenly don't get taken care of. A lot of local businesses will find they cannot pay the same sort of wages as will be paid on the site. They'll lose staff. The staff cannot be blamed for going to the higher paid jobs on site. But these highly paid jobs will only last at most five years, after which the community will be left to pick up the remains of the shambles.

RANN: The planned South Australian enrichment plant - a joint venture involving the Government and Urenco-Centec - wouldn't be built until the late 1980s. There's a long lead time. Will there be a market for South Australian enriched uranium then?

PATTERSON: Personally I very much doubt it. The industry's record of forecasting future demand is abysmal and this is, of course. one reason why private industry and private finance world wide won`t touch enrichment with a bargepole unless it is given iron clad guarantees by the taxpayer via the Government.

The only enrichment facilities that are operating anywhere in the world are enrichment facilities which are given 100 percent government backing for their investments. They get very generous support which, of course, ultimately comes out of the pockets of taxpayers.

The very few efforts that have been made to set up private enrichment facilities, particularly in the United States, foundered at the first fence because private financial institutions would not play.

RANN: Do you think that South Australia could be landed with a white elephant, or is that going too far?

PATTERSON: Not at all. I think it is likely to be a very large white elephant which, once in place, will be a white elephant that will be very difficult to get rid of. Once you have that kind of financial commitment, in terms of hundreds of millions of dollars, you will find that the Government will not know how to stop.

That is the position that has arisen in the US and in the UK. They have now got very large bureaucratic organisations which are, in essence, arms of government. And they are unable to market their services at any sort of profitable basis but they do not know how to stop.

RANN: Some critics of nuclear power in Australia are now arguing that whilst there are still problems with international safeguards and with the ultimate disposal of nuclear waste, the actual uranium mining process doesn't pose any hazards. Would you go along with this view?

PATTERSON: No I would not. Any large mining operation poses immediate occupational hazards and environmental hazards and the record of the uranium mining industry world wide is nothing to be proud of.

The problem which is the most serious, and which was so recognised in the Royal Commission report in Canada, is the problem of the eventual disposal of the uranium mine tailings. I'm referring to the fine sand that is left over when the uranium is dissolved out of the ground up rock. This fine sand which remains contains radium and a number of other very poisonous radiotoxic elements. And they are now in a finely divided state above the surface of the ground in very, very large volumes - literally millions of tonnes.

Uranium mine tailings which now have accumulated in places like the South-western United States and in Ontario have proved to be very difficult indeed to stabilise and manage in such a way as to prevent the eventual departure of these radioactive materials into local waterways and into the air.

RANN: What sort of problems would this pose?

PATTERSON: Well, the materials in question, like radium, are radio-toxic. They will tend to accumulate in living organisms and they are known to be in some cases very powerful carcinogens or cancer producing materials. It is always difficult to identify the long term effects of a build up of these materials in a local environment. We have very little convincing medical evidence, but it is generally accepted that even small amounts of these materials in human bodies can increase significantly the likelihood of cancers and other tumours as well as producing general detrimental effects in the body.

I think it is important to stress that the hazard from these materials is not necessarily more serious than the hazards from some non-radioactive materials like persistent chemicals and heavy metals. But the fact that the hazard is no worse doesn't mean that it is any better, and you are accumulating a toxic cocktail from different environmental assaults to which this would be a serious additional increment.

RANN: What about the milling phase of uranium mining. Are there any particular hazards there?

PATTERSON: The milling is the process which produces this fine sand and also produces very noxious effluents from the dissolving out of the uranium. The result is that you will find in most uranium production methods that you have to set aside large areas of land for, effectively, lakes of pernicious sludge which then "sterilise" that land area into the indefinite future. There's no way to reclaim land once it's been covered with tailings sludge and the areas involved are likely to be quite substantial. The result means that you have considerable difficulty in guaranteeing the isolation of these noxious materials from the surrounding environment.

RANN: One of the concerns of anti-nuclear people in Australia has been waste disposal problems, not just with uranium but at the back end of the system - the highly toxic waste from nuclear power stations and reprocessing plants. We understand that the vitrification process - the solidification of waste material in glass - has been held up as the solution to waste disposal problems. What do you think?

PATTERSON: Well, there`s clearly some high level expert disagreement about that in Europe, and within the past two years British Nuclear Fuels have effectively abandoned the UK Atomic Energy Authority's "Harvest" process which was being previously touted as perfectly satisfactory. They have adopted instead the French AVM process developed at Marcoule.

This AVM process is one which the French authorities have pronounced to be totally satisfactory. But it is extremely difficult to get any detailed information about the performance of the AVM plant at Marcoule and in particular it is very difficult to find out whether the process has in fact proved capable of vitrifying satisfactorily the waste which is produced from the oxide fuel which is now being used in most reactors worldwide. It appears to be satisfactory, at least in the short term, for the comparatively less highly active waste from gas cooled reactors. But whether it will work for the waste from water cooled reactors is, l believe, still uncertain. In any case the ultimate stability of the glass which is produced can only be demonstrated on a very long time scale. The extrapolations we have been presented with in this area previously have frequently proved to be too optimistic. We don`t know, for instance, about de-vitrification, which is the process by which the glass recrystallises and crumbles. There is evidence to suggest that under some quite plausible geological circumstances devitrification would happen quite quickly and make the highly radioactive materials available to ground water much faster than the nuclear authorities would like to have it happen.

I think any suggestion that we have solved the problem is simply not borne out by the facts. All you need to do is look at the high level expert disagreement between different countries about how to approach this problem and you will realise that nobody has been able to convince everybody else that a single solution is satisfactory. V

RANN: ln Australia we are also concerned about the international safeguards covering the sale and export of our uranium. The INFCE (International Nuclear Fuel Cycle Evaluation) Talks have been going on for sometime. Have they in any way advanced the international safeguards argument?

PATTERSON: No, l think they have been effectively a side show. INFCE was billed as the _ most extensive and detailed technical analysis of nuclear fuel cycles that had ever been undertaken. It certainly was a very large scale exercise. But it was carried out by the nuclear community; by the nuclear faithful so to speak.

It was essentially a confrontation between the US and the rest, about the validity or otherwise of the commercial use of plutonium. It eventually amounted to a standoff. Everybody agreed that nobody would say anything nasty about anybody else and they would all go ahead and do what they first thought of.

They came to the conclusion that there was no fuel cycle which was free of the proliferation hazard and they interpreted this conclusion to mean that they could therefore go ahead and do everything they originally intended to do. There is, of course, another interpretation which some people would put on it which is that if there is no proliferation free nuclear fuel cycle we should rapidly begin phasing out the nuclear technology right across the board.

RANN: There are some people that suggest that the attitude of "playing it safe" with uranium is in fact an albatross approach. How effective would a uranium ban by Australia be in terms of the world nuclear industry? Would it have any effect at all?

PATTERSON: It would probably save the Australian taxpayers a great deal of money and it would certainly keep Australia from getting into an industry which is showing every sign of being the biggest white elephant industrially the world has ever seen.

As far as the rest of the world is concerned I think it would demonstrate that there is still a glimmer of rationality available on the nuclear scene and that a dispassionate reading of the balance sheets suggests that this is not an exercise that Australia wants to get involved in.

It may also help begin a trend of this kind in other countries. We've seen some evidence of this in Scandinavia and in countries which have decided that they would rather not get involved in this morass.

It may also give a little bit of encouragement to those countries like the UK where the nuclear industry is riding on the backs of the taxpayers, and suggest to the UK and other Governments in the northern hemisphere that it may now be time for them to look again and see if they shouldn't also be getting out of the nuclear business.

RANN: Well, some of the supporters of nuclear power also argue that by withholding our uranium Australia is in fact denying the rest of the world a valuable energy resource during an energy crisis

PATTERSON: If the altruistic uranium supporters in Australia were prepared to hand over their uranium free to these poor deprived countries they are so concerned about I would be more impressed by that argument. As it turns out they may well have to hand over their uranium free, because I don't think anybody will buy it.

IMPLICATIONS FOR ACTION

Implications for Further Action

1. ALP POLICY

The continuing threats to human health and safety posed by the nuclear industry have been documented in the preceding chapters as a basis for assessing the appropriateness of the ALP's policy on this issue. It is clear from the evidence presented that the "economic, social, biological, genetic, environmental and technical problems associated with the mining of uranium and the development of nuclear power" (National ALP policy on uranium) continue to be unresolved. Only the naive could be satisfied that the above mentioned problems have been solved.

Some members of the Party have even suggested that the policy needs to be tightened. They suggest that the problems will never be finally and totally solvable, for example, that we will never be able to bind other sovereign nations sufficiently to ensure that their uranium does not end up in bombs. They would like, therefore, to see the ALP committed to never allowing uranium mining and development in Australia.

This writer regards such a change as unwarranted. We cannot be certain of the future of world events, and to tie ourselves to a policy which completely denies the possibility of a change in the political, social and economic framework of the world's nations smacks of rigidity and religious fervour rather than a practical appreciation of the facts and the issues.

We as ALP members must ensure, however, that we analyse exhaustively any arguments that the problems have been solved, and therefore that uranium developing should be allowed to proceed in Australia under a Labor Government. At present the case against uranium is convincing; to opt in favour of its development should be subject to equally thorough scrutiny.

2. LOCAL GOVERNMENT ACTION

Many Australians are convinced that the case against uranium is sufficiently strong to warrant action at a local and personal level to promote a "play it safe" attitude on uranium. A prime responsibility of these people is to let their elected representatives know their views. Federal MHR's and Senators, State MP's and Legislative Councillors, Mayors and local council members should not only be told where their electors stand on the issue, but should be asked to spell out their own positions. Their job is, after all, to represent the electors, and if they are responsible and competent officeholders they will listen to the concerns of the community.

Concerned citizens should also press their local Councillors to attempt to have their local area declared a nuclear free zone.

In Victoria at least fourteen councils have voted to declare their areas Nuclear Free Zones. These include Port Melbourne, Collingwood, Fitzroy and Footscray. In New South Wales nine councils have made this move, including the Sydney City Council, Broken Hill and Wollongong. Councils in Western Australia and Queensland have also set up local nuclear free zones.

In South Australia, proposals for nuclear free zones have been narrowly defeated, with Councils split down the middle on the issue. Others have yet to be decided, following strong community support.

Often nuclear free zones are the direct result of individuals getting signatures for a petition to present to the local council. One problem is that many Councillors do not know what a nuclear free zone actually entails. Printed below are the Nuclear Free Zone declarations of two Australian Councils. These may assist lobbying of other Councils.

STATEMENT ON THE DECLARATION OF A NUCLEAR FREE ZONE, FREMANTLE, WESTERN AUSTRALIA

"10, MOTIONS OF WHICH PREVIOUS NOTICE HAS BEEN GIVEN

In accordance with the provisions of the Standing Orders of the City of Fremantle, Cr, DJ Whittington gave notice of his intention to move the following motion at the Council Meeting A

"Fremantle City Council hereby declares that -

1. The whole of the Municipality of Fremantle is a nuclear free zone,

2. No nuclear power stations may be built within the Municipality.

3. No uranium, nuclear waste nor other material connected with the nuclear power industry may be stored or transported in or through the Municipality; and

4. It is not opposed to the responsible use of radioisotopes in hospitals within the Municipality, as it believes the benefits to the users outweigh the risks to the community at large,"

Cr. DJ Whittington moved the foregoing motion. Seconded by Cr. MacGill. Carried."

STATEMENT ON THE DECLARATION OF A NUCLEAR FREE ZONE, NORTHCOTE, VICTORIA

As a nuclear free zone Northcote will

- Oppose the siting of any facilities used in the nuclear fuel cycle in the City, i.e. uranium mining and milling, enrichment plants, nuclear reactors, nuclear weapons and nuclear waste storage dumps.

- Oppose the transport of nuclear materials (except those used for medical purposes) through our streets.

- The opposition would take the form of a publicity campaign and other actions within the limits of our power and the laws of the land.
Northcote City Council will enforce all legislative powers at its disposal to A

- Refuse planning permits for any proposed nuclear facility within its boundaries.

- Prohibit vehicles carrying radioactive materials (except those used for medical purposes) from using streets under the jurisdiction of Council.
The Council has taken this position because A

- Opinion polls show that the majority of the population of Melbourne oppose uranium mining and nuclear power anywhere in the world.

- Overseas experience shows that opposition increases when any facet of the nuclear fuel cycle is situated locally.

- It is meant to increase people's awareness of the issue.

- It will act as a deterrent to any organisation considering using Northcote for nuclear purposes.

- It will assist the Governments stated energy conservation programme.

- It will provide some level of protection to the residents from the health and genetic dangers implicit in the nuclear fuel cycle.

THE MAYOR AND COUNCILLORS, CITY OF NORTHCOTE
26th November 1979."

Launching of BP boycott, Adelaide, SA, 4 October, 1981.

Following the declaration of a nuclear fire zone there are a number of things a council can do to publicise their position.

Signs can be erected at municipal boundaries stating "this is a nuclear free zone" and stickers can be affixed to council vehicles. Coburg council in Victoria has done this. Their stickers say "Coburg: this is a nuclear free zone".

Councils who do declare their council areas nuclear free zones should also work through their local government associations to educate other councils about their decisions. lndividuals and local groups should pressure council candidates before each election to publicly declare their position on nuclear free zones. Local groups can then publish a leaflet or newsletter telling residents which candidates have declared their support.

3. PERSONAL ACTION

Individuals who are keen to promote a "play it safe" policy can also work though unions, clubs and community organisations of which they are members. Resolutions from such organisations which advocate a "play it safe" attitude to uranium can be particularly effective in generating publicity and pressuring elected representatives to take up the issue.
There are also a number of environmental groups which espouse anti-uranium views and which concerned people can join. They include CANE (Campaign Against Nuclear Energy), MAUM (Movement Against Uranium Mining), FOE (Friends of the Earth), Greenpeace and WANE (Women Against Nuclear Energy).

When the South Australian Government was considering possible sites for its proposal uranium enrichment plant, local citizens (many of whom who had never been involved in any protest or political activity) banded together to form action groups. They lobbied MPs, organised a large petition, arranged public meetings and put out press statements.

Because one site being examined was in a marginal seat, the government became very nervous and backed down. MP's and candidates in the area concerned were put under considerable pressure to take up the concerns of the people.

Another focus for the attention of concerned citizens should be the activities of those companies who are expressing interest in the uranium industry in Australia. While it is difficult for individuals to effectively challenge the activities of multinational corporations in this country, there are things that we can do as consumers to make the point. A good example of this type of activity is the "Boycott BP" campaign being run by a number of anti-nuclear groups in SA. BP is a joint partner with Western Mining in the Roxby Downs development in SA. The company has played down its role in the venture; indeed, has been mounting an extensive advertising campaign to portray itself as a responsible and caring corporation ("the quiet achiever") doing its best for Australia. Organisers of the campaign believe a consumer boycott of BP's products is a good way of letting the company know of people's disapproval of BP's uranium involvement.

Mastering the media is a key requirement if people are to communicate their concerns effectively and counter the type of advertising by, and coverage of, companies such as BP.

Press releases must be brief and specific; long and laborious ones will head straight for the journalists rubbish bin. The release should begin with the key point being made. Most newspapers in Australia are editorially committed to uranium development and this commitment often spills over into their news coverage. At least one newspaper has a policy of not covering local anti uranium stories, no matter how newsworthy. Local anti-nuclear groups must therefore develop skills to deal with the electronic media if they are to get the message across.

The use of television can be extremely effective. It is a visual medium and this should be borne in mind in planning press conferences. They should be held at a location that fits the story, rather than in a home or office.

The first step, however, for anyone who supports the ALP's "play it safe" policy must be to join the Party and lend their support to Labor's Campaign to win election. The policy cannot be successfully implemented if Labor is not in power.

Community Action, Elizabeth, SA.