Dollars for Death

Say No to Uranium Mining & Nuclear Power

Jim Green & Others

Contents

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Preface

By Jim Green

Dollars for Death addresses many of the problems associated with uranium mining and nuclear power: the adverse environmental impacts; the limitations of "safeguards" which purport to preclude the use of Australian uranium in nuclear weapons; the sale of uranium to nuclear weapons states, dictatorships, etc.; the huge water consumption of nuclear power plants; the after-effects of the Fukushima disaster; the many and varied interconnections between "peaceful" and military nuclear facilities and programs; the nuclear waste legacy; and last but not least, the crude racism which is so often a feature of nuclear politics.

Australia's experience with the nuclear industry has been a very unhappy one. The British nuclear bomb tests had a devastating effects on Aboriginal people and military personnel while leaving a long-term legacy of radioactive contamination. Then came the uranium mining industry, whose environmental performance at many mines — Rum Jungle, Radium Hill, Mark Kathleen, etc. — was nothing short of disgraceful. Likewise the uranium industry's treatment of Aboriginal people has been consistently appalling. Despite the rhetoric surrounding the industry, uranium is a negligible contributor to the Australian economy, contributing just 0.2% of national export revenue and less than 0.02% of jobs in Australia.

The link between "peaceful" and military nuclear programs and facilities is the most profound global problem with the nuclear industry. Australia actively contributes to the proliferation of nuclear weapons via the nuclear alliance with the United States, uranium exports, and the promotion of "peaceful" nuclear facilities that can easily be put to use for weapons production (see Uranium & Nuclear Weapons Proliferation, and James Lovelock & the Big Bang).

Australia's one and only serious push towards nuclear power came in the late 1960s and was driven by then Prime Minister John Gorton and the Australian Atomic

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Energy Commission — in particular the Chair of the Commission, the notorious racist and imperialist war-monger Philip Baxter. Gorton later acknowledged that the plan for a nuclear power plant was driven by a hidden agenda to provide Australia with the capacity to produce nuclear weapons.

Nuclear power is often pushed by pro-nuclear advocates as a "solution" to climate change. But as the articles collected here show, nuclear power comes with so many intractable problems that we would be mad to choose this technology over the many renewable sources of power available.■

URANIUM MINING

Uranium Mining in Australia

By Friends of the Earth, Australia.

Environmental impacts

At the Beverley mine in SA, an *in situ* leaching process is used which involves dumping radioactive and acidic waste water directly into the underlying aquifer.

The Olympic Dam (Roxby Downs) mine in SA has produced a radioactive tailings dump of 100 million tonnes, growing at 10 million tonnes annually. If the proposed expansion proceeds, tailings production will increase to 68 million tonnes annually.

The Ranger mine in the NT has generated over 30 million tonnes of tailings waste. In 2005, ERA was found guilty and fined $150,000 in relation to a contamination incident in March 2004 when about 150 people were exposed to drinking water containing uranium levels 400 times greater than the maximum Australian safety standard.

A 2003 Senate Inquiry into the regulation of uranium mining in Australia reported "a pattern of under-performance and non-compliance", it identified "many gaps in knowledge and found an absence of reliable data on which to measure the extent of contamination or its impact on the environment", and it concluded that changes were necessary "in order to protect the environment and its inhabitants from serious or irreversible damage".

The environmental problems don't end at the mine sites. Australian uranium is converted into high-level nuclear waste in nuclear power reactors around the world, yet there is still not a single repository anywhere in the world for the disposal of high-level nuclear waste.

Nuclear weapons proliferation

Six countries have used "peaceful" nuclear programs to prevent technical support and political cover for nuclear weapons programs — India, Israel, Pakistan, South Africa,

North Korea, and France.

Australia's uranium exports have resulted in the production of over 120 tonnes of plutonium — enough to build 12,000 nuclear weapons. Yet it is widely acknowledged that the "safeguards" system is fundamentally flawed and limited.

Racism

Mining company ERA and the Howard government were determined to override the opposition of the Mirarr Traditional Owners to the Jabiluka uranium mine in the NT, but the Mirarr prevailed. The Jabiluka mine site has been rehabilitated and the Mirarr have a veto over any future development of the mine. However, ERA still hopes to mine Jabiluka at some stage in the future, and it still operates the Ranger uranium mine near Jabiluka.

Heathgate Resources, owned by General Atomics, succeeded in imposing the Beverley uranium mine on the Adnyamathanha people in north-east SA in the late 1990s. The company negotiated with a small number of Native Title claimants, but did not recognise the will of the community as a whole. This divide-and-rule strategy, coupled with the joint might of industry and government, resulted in inadequate and selective consultation with the Adnyamathanha people.

The racism associated with the Olympic Dam uranium mine in South Australia is enshrined in legislation. WMC Resources was granted completely unjustifiable legal privileges under the SA Roxby Indenture Act. This legislation overrides the Aboriginal Heritage Act, the Environment Protection Act, the Water Resources Act and the Freedom of Information Act. The new mine owner, BHP Billiton, refuses to relinquish these legal privileges.

Occupational health & safety

Uranium mine workers are often told that the radiation doses they receive are below or close to background levels and below permissible limits — the implication being that the radiation doses are "safe". However, the doses received at the mine site are additional to background radiation so workers are at additional risk of fatal cancers.

Over the years the permitted levels of radiation exposure for workers and the public have dropped dramatically as research, particularly from radiation biologists, indicates harmful effects still exist at much lower exposure levels. For workers, the permitted dose was set at 500 millisieverts per year in 1934, 150 mSv in 1950, 50 mSv in 1956, and 20 mSv (averaged over five years) in 1991. The limit for members of the public is 1 mSv per year.

Public opposition

A June 2006 Newspoll of 1200 Australians found that 66% of Australians (including 78% of ALP voters and 53% of Coalition voters) oppose any new uranium mines. (More recent polls have been less strongly anti-uranium " but the issue is still hotly contested.)

A survey of 1020 Australians released in 2005 by the International Atomic Energy Agency found that 56% considered the Agency's "safeguards" inspection system to be ineffective, whereas only 29% thought that it was effective.

Export revenue & jobs

Uranium accounts for just 0.2% of Australian export revenue and less than 0.02% of Australian jobs.

Claims about greenhouse 'benefits'

Claims about the greenhouse "benefits" of nuclear power typically ignore more greenhouse-friendly renewable energy sources and the use of several types of renewables to supply reliable baseload power (e.g. geothermal, bioenergy, solar thermal with storage, and sometimes hydro).■

Lizards Revenge protest, Olympic Dam uranium mine, July 2012 (photo by Zeb Parkes)

In Situ Leach Uranium Mining Far From 'Benign'

By Gavin Mudd

The mining technique of *in situ* leaching (ISL), often referred to as solution mining, is becoming an increasingly favoured method for the extraction of uranium across the world. This is primarily due to its low capital and operating costs compared to conventional mining. Little is known about the environmental impact of this method, and mining companies have been able to exploit this to promote the method as "environmentally benign".

The ISL process involves drilling ground water bores or wells into a uranium deposit, injecting corrosive chemicals to dissolve the uranium within the ore zone, then pumping back the uranium-laden solution.

The method can be applied only to uranium deposits located within a ground water system or confined aquifer, commonly in palaeochannel deposits (old buried river beds).

Although ISL is presented in simplified diagrams by the nuclear industry, the reality is that geological systems are inherently complex and not predictable.

There are a range of options for the chemistry of the mining solutions. Either acidic or alkaline chemical agents can be used in conjunction with an oxidising agent to dissolve the uranium.

Typical oxidising agents include oxygen or hydrogen peroxide, while alkaline agents include ammonia or sodium-bicarbonate or carbon dioxide. The most common acidic chemical used is sulphuric acid, although nitric acid has been tried at select sites and in laboratory tests.

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The chemicals can have potentially serious environmental impacts and cause long-term changes to ground water quality.

The use of acidic solutions mobilises high levels of heavy metals, such as cadmium, strontium, lead and chromium. Alkaline solutions tend to mobilise only a few heavy metals such as selenium and molybdenum. The ability to restore the ground water to its pre-mining quality is, arguably, easier at sites that have used alkaline solution chemistry.

A review of the available literature on ISL mines across the world can easily counter the myths promulgated about ISL uranium mining. Whether one examines the USA, Germany, Russia and associated states, Bulgaria, the Czech Republic, Australia or new ISL projects across Asia, the truth remains the same — the ISL technique merely treats ground water as a sacrifice zone and the problem remains "out of sight, out of mind".

ISL uranium mining is not controllable, is inherently unsafe and is unlikely to meet "strict environmental controls". It is not an environmentally benign method of uranium mining.

The use of sulphuric acid solutions at ISL mines across Eastern Europe, as well as a callous disregard for sensible environmental management, has led to many seriously contaminated sites.

Perhaps the most severe example is Straz pod Ralskem in the Czech Republic, where up to 200 billion litres of ground water is contaminated. Restoration of the site is expected to take several decades or even centuries.

Solution escapes and difficult restorations have been documented at ISL sites in Texas and Wyoming.

Australia has encountered the same difficulties, especially at the controversial Honeymoon deposit in South Australia during pilot studies in the early 1980s and at Manyingee in Western Australia until 1985.

The Honeymoon pilot project used sulphuric acid in conjunction with ferric sulphate as the oxidising agent. The wells and aquifer experienced significant blockages due to the minerals jarosite and gypsum precipitating, lowering the efficiency of the leaching process and leading to increased excursions. The aquifers in the vicinity of Honeymoon are known to be connected to aquifers used by local pastoralists to water stock.■

How Low Can Australia's Uranium Export Policy Go?

By Jim Green

Australia's choice of uranium customer countries has gone from bad to worse with the decision at Labor's national conference in December 2011 to ditch its policy of banning uranium sales to India.

We have uranium export agreements with all of the "declared" nuclear weapons states (the US, UK, China, France, Russia) although none of them are serious about their obligation under the Nuclear Non-Proliferation Treaty (NPT) to pursue disarmament in good faith. That weakness, among others, is now being used to justify disregarding the NPT altogether.

We claim to be working to discourage countries from producing fissile (explosive) material for nuclear bombs, yet we export uranium to countries blocking progress on the proposed Fissile Material Cut-Off Treaty. And we give Japan open-ended permission to separate and stockpile plutonium although that stockpiling has fanned regional proliferation risks and tensions in North-East Asia for many years.

In theory, Australia has a "strict" policy of requiring Australian consent to separate and stockpile plutonium produced from Australian uranium; in practice, we have failed when put to the test and permission to separate plutonium has never once been refused.

We sell uranium to countres with a recent history of weapons-related research. In 2004, South Korea disclosed information about a range of weapons-related R&D over the preceding 20 years. Australia has supplied South Korea with uranium since 1986. We don't know whether Australian uranium or its by-products were used in any of the illicit research in South Korea. The Howard government and its safeguards office showed no interest in finding out the answer to that question.

The 2006 approval to sell uranium to China set another new low: uranium sales to an undemocratic, secretive state with an appalling human rights record (such as jailing

nuclear whistle-blowers). That precedent was reinforced with the subsequent approval of uranium sales to Russia (another undemocratic nuclear weapons state, though Russia prefers to deal with dissidents by poisoning them with radioactive polonium).

The Russian agreement set some new lows of its own: uranium sales to a country which is very rarely visited by International Atomic Energy Agency (IAEA) safeguards inspectors — just two inspections over the past decade. Federal parliament's treaties committee recommended against uranium sales to Russia until some sort of safeguards system was put in place, only to have its recommendation ignored by the Rudd government.

The decision at Labor's national conference in December 2011 to allow uranium sales to India sets a new low — uranium sales to a country which is outside the NPT altogether and is not subject to the requirement of the "declared" weapons states to pursue nuclear disarmament in good faith.

And another low: India would be the only one of Australia's uranium customers which is definitely continuing to produce fissile material for weapons (China may also be doing so).

We take pride in Australia's "leadership" role in the development of the Comprehensive Test Ban Treaty (or at least Alexander Downer does). Yet we sell uranium to countries that have signed but not ratified the CTBT (the US and China) and the government now plans to sell uranium to India, which has neither signed nor ratified the CTBT. Another new low. The CTBT remains in limbo because those three countries, and a few others, refuse to sign and ratify it.

And another low: if uranium sales to India proceed, it will be the first time since the Cold War that we have sold uranium to a country which is engaged in a nuclear arms race. India and Pakistan are expanding their nuclear weapons arsenals at an alarming rate; both continue to develop nuclear-capable missiles; both are expanding their capacity to produce fissile material; both refuse to sign or ratify the CTBT.

And the India decision marks a low-point in Australia's international diplomacy. To permit uranium sales with no commitment by India to curb its weapons program, and no commitment to de-escalate the South Asian nuclear arms race, is spineless, irresponsible, dangerous sycophancy.

How low can we go? Plans are in train to sell uranium to the United Arab Emirates, probably followed by other countries in the Middle East. We were planning uranium sales to the Shah of Iran months before his overthrow in 1979. The Middle East has been (and remains) a nuclear hot-spot with numerous covert nuclear weapons programs — successful, aborted, destroyed or ongoing. The Middle East has also seen numerous conventional military strikes and attempted strikes on nuclear plants — in

Iraq (several times), Iran, Israel and most recently Syria.

In theory it would be possible to leverage worthwhile non-proliferation and disarmament outcomes though uranium export policy; in practice, and in Australia, it works the other way around.

Short of selling uranium deliberately and specifically for weapons production — as we did after World War II — I don't think its possible for Australian uranium export policy to sink any lower.■

Uranium mining companies turned a blind eye to grossly inadequate nuclear safety standards in Japan for over a decade (photo by Tim Wright).

Uranium & Nuclear Weapons Proliferation

By Jim Falk & Bill Williams

Nuclear proliferation is a key threat facing Australia. The uranium export industry is worthy of consideration in this context given that uranium is not only the fuel for electricity-generating reactors but also feedstock for nuclear weapons — the most destructive weapons ever devised.

The uranium industry and its supporters routinely claim that the safeguards system of the International Atomic Energy Agency (IAEA) "ensures" that Australian uranium (and by-products such as plutonium) will not be used for nuclear weapons.

However, only a fraction of safeguards-eligible nuclear facilities and stockpiles are actually inspected by the IAEA. The director-general of the IAEA, Dr Mohamed El Baradei, is remarkably frank about the limitations of safeguards. In speeches and papers in recent years, Dr El Baradei has noted the IAEA's basic rights of inspection are "fairly limited", that the safeguards system suffers from "vulnerabilities", "clearly needs reinforcement" and runs on a "shoestring budget … comparable to a local police department".

The problems with, and limitations of, safeguards are manifold. Nuclear accounting discrepancies are just one of these intractable problems. These discrepancies are commonplace and inevitable due to the difficulty of precisely measuring nuclear materials. These accounting discrepancies are known as material unaccounted for (MUF). This problem of imprecise measurement provides an obvious loophole for diversion of nuclear materials for weapons production. In a large plant, even a tiny

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percentage of the annual through-put of nuclear material will suffice to build one or more weapons with virtually no chance of detection by IAEA inspectors — if indeed the IAEA carries out any inspections at all.

Australia's uranium has resulted in the production of more than 103 tonnes of plutonium. If just 0.1% of this plutonium is written off as MUF, that is sufficient for 10 plutonium bombs similar to that which destroyed Nagasaki. Government agencies refuse to release MUF figures; for plutonium, it may well be significantly greater than 0.1%.

In addition to IAEA safeguards, countries buying Australian uranium must sign a bilateral agreement. However, there are no Australian inspections of nuclear stockpiles or facilities using Australian uranium. Australia is entirely reliant on the partial and underfunded inspection system of the IAEA.

The most important provisions in bilateral agreements are for prior Australian consent before Australian nuclear material is transferred to a third party, enriched beyond 20% uranium-235, or reprocessed. However, no Australian government has ever refused permission to separate plutonium from spent fuel via reprocessing (and there has never been a request to enrich beyond 20% U-235). Even when reprocessing leads to the stockpiling of plutonium (which can be used directly in nuclear weapons), open-ended permission to reprocess has been granted by Australian governments. Hence there are stockpiles of "Australian-obligated" separated plutonium in Japan and in some European countries.

As for the alleged benefits of the industry, uranium accounts for just one-third of 1% of Australia's export revenue. The industry makes an even smaller contribution to employment.

Claims about the greenhouse "benefits" of nuclear power typically ignore more greenhouse-friendly renewable energy sources and the use of several types of renewables to supply reliable base-load power (for example, geothermal, bioenergy, solar thermal with storage, and sometimes hydro). Furthermore, as the limited reserves of high-grade uranium ore are used up and low-grade ore has to be used, greenhouse emissions from mining and milling uranium will become substantial.

The federal government would do well to establish a wide-ranging, independent public inquiry into the risks and benefits of the uranium industry. Such an inquiry should also consider the role of the Australian Safeguards and Non-Proliferation Office (ASNO), as now constituted, which has, at times, offered seriously misleading claims about the uranium industry and nuclear power. For example, ASNO has claimed that Australia sells uranium only to countries with "impeccable" non-proliferation credentials. In fact, Australia has uranium export agreements with nuclear weapon

states (all of which are failing to meet their disarmament obligations under the Non-Proliferation Treaty), with states with a history of weapons-related research based on their "civil" nuclear programs (such as South Korea and Taiwan) and states (including the US) blocking progress on the Comprehensive Test Ban Treaty and the proposed Fissile Material Cut-Off Treaty.

Other seriously misleading statements made at one time or another from ASNO include that safeguards "ensure" that Australian uranium will not contribute to weapons proliferation, that all nuclear materials derived from Australia's uranium exports are "fully accounted for" and that nuclear power does not present a proliferation risk. While no agency should be judged simply on the basis of isolated statements, there is enough smoke to suggest that it would be sensible for any inquiry to check that in relation to the need for balanced advice, there is not a smouldering fire.■

Nagasaki, Japan, 1945 after US atomic bombing.

NUCLEAR POWER

Ten Reasons to Say 'No' to Nuclear Power in Australia

By Friends of the Earth, Australia

1. Unnecessary

We don't need nuclear power. Several renewable energy sources — such as bioenergy, geothermal hot rocks, solar thermal electricity with storage, and sometimes hydroelecticity — can provide reliable baseload electricity.

2. Nuclear weapons

Nuclear power is the one and only energy source with a direct and repeatedly-demonstrated connection to the proliferation of Weapons of Mass Destruction. For example, the first and only serious push for nuclear power in Australia was driven by a weapons agenda as then PM John Gorton later acknowledged.

3. Accidents & attacks

In addition to the risk of accidents, nuclear power reactors are vulnerable to disasters from sabotage, terrorism, or the use of conventional forces to attack nuclear facilities during war.

4. Routine emissions — radiation & cancer

The United Nations Scientific Committee on the Effects of Atomic Radiation notes that international cancer incidence and mortality data demonstrate statistically-significant links between radiation and all solid tumours as a group, as well as for cancers of the stomach, colon, liver, lung, breast, ovary, bladder, thyroid, and for non-melanoma skin cancers and most types of leukaemia.

5. Nuclear waste

The 2006 government-commissioned Switkowski report envisages the construction of 25 power reactors, which would produce up to 45,000 tonnes of high-level nuclear waste. There is not a single permanent repository for spent fuel or high-level nuclear waste anywhere in the world.

6. Democratic rights

Democratic rights have often been trampled in the pursuit of nuclear projects. The current (2012) Labor government is working to impose a nuclear waste dump at Muckaty in the NT despite the opposition of many Traditional Owners, an unresolved Federal Court challenge, and NT legislation banning the imposition of nuclear dumps.

7. Cost

Too cheap to meter, or too expensive to matter? The nuclear power industry survives only because of huge taxpayer subsidies.

8. Water

Nuclear power is the most water-intensive of all the energy sources. Reactors typically consume 35-65 million litres of water per day.

9. Too slow

It would take 15 years or more to develop nuclear power in Australia. Clean energy solutions can be deployed immediately.

10. Greenhouse emissions

Nuclear power emits three times more greenhouse gases than wind power according to the 2006 Switkowski report. Nuclear power is also far more greenhouse intensive than energy efficiency measures.■

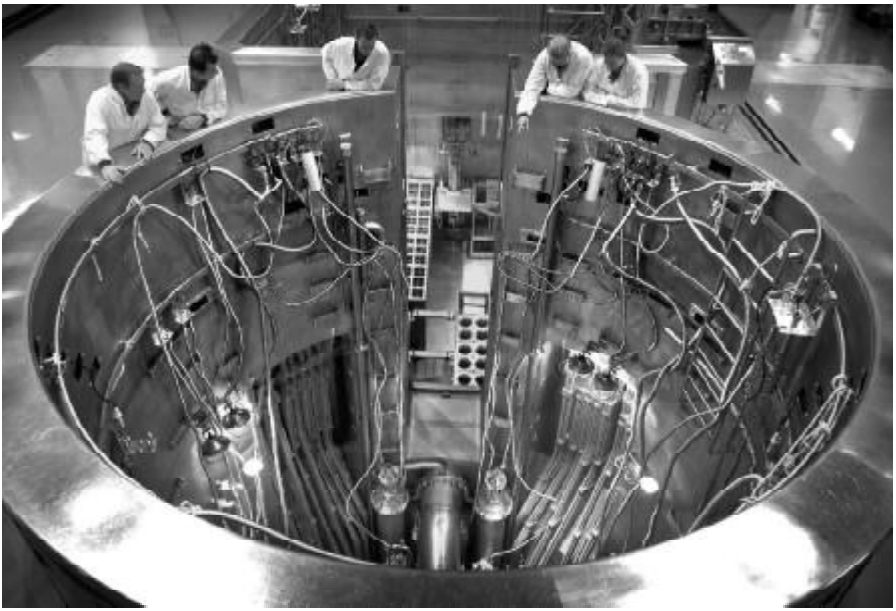
How to Make Nuclear Power Safe in Seven Easy Steps!

By Friends of the Earth, Australia

1. Acknowledge immediate deaths that were undoubtedly caused by a nuclear accident. Ignore long-term deaths from exposure to lower levels of radiation. For example, immediate deaths from Chernobyl were about 50, credible estimates of long-term deaths range from 9000 to 93,000.
2. Consider nuclear power reactor accidents and ignore the impacts of accidents across the nuclear fuel cycle, e.g. serious and sometimes fatal accidents at uranium mines, uranium enrichment plants, reprocessing plants etc.
3. Fudge the science. For example, studies of the death toll from Chernobyl necessarily rely on statistical/epidemiological studies, and even epidemiology is a fairly blunt instrument because of the "statistical noise" in the form of widepsread cancer incidence from many causes. Another way to estimate the death toll is to multiply the estimated total human radiation exposure from Chernobyl by a standard risk estimate. This is legitimate though, of course, no better than the underlying estimates. By contrast, nuclear apologists ignore altogether these long-term predicted deaths.
4. Ignore the impacts of routine emissions. The United Nations Scientific Committee on the Effects of Atomic Radiation has estimated the collective effective radiation dose to the world population over a 50-year period of operation of nuclear power reactors and associated nuclear facilities to be two million person-Sieverts. Applying a standard risk estimate (0.05 fatal cancers per Sievert of exposure to low-dose radiation) gives an estimated 100,000 fatalities.
5. Ignore the greatest danger of nuclear power, a problem that is unique among energy sources — its direct and repeatedly-demonstrated connection to the production of nuclear weapons.
6. Make wild claims about the safety of "new generation" reactors. Impossible to

prove or disprove these claims, since the new reactors exist only as designs on paper. One cynic from within the nuclear industry has quipped that "the paper-moderated, ink-cooled reactor is the safest of all".

7. And, among many other ways to "prove" the safety of the nuclear industry, claim that a nuclear accident did not effect any member of the "community" without mentioning that a number of nuclear industry workers were harmed or killed. For example, the Lucas Heights nuclear agency ANSTO pretends that no research reactor accident has ever harmed a member of the surrounding community, which is a disingenuous way of avoiding mention of five or six fatal research reactor accidents that have killed workers.■



Lucas Heights, NSW: OPAL nuclear reactor pool.

Japan: One Year After Fukushima, People Speak Out

By Daniel P. Aldrich

Tens of thousands filled the square as the echoes of the speaker at the podium boomed through huge speakers. Some came in anger, others in grief, but all agreed: it was time for a change. Many carried banners, others carried drums; some had taken their children out of school to attend.

No, this wasn't Tahrir Square; it was Tokyo, Japan, on a chilly Monday last September.

Ever since the devastating earthquake and tsunami that crippled the Fukushima Daiichi nuclear power station, Japanese civil society has become less, well, polite.

The compounded disaster has energised segments of Japanese civil society to be more proactive, innovative, vocal and even contentious about everything from personal safety to nuclear power.

These changes in can be seen in four main areas: mass protests, local and national referenda and petitions, renaissance of citizen science, and public uproar.

Until recently, Japan's large-scale protests were mostly in the past. Activists speak nostalgically of the huge rallies against the US-Japan Security Treaty in the 1960s.

And back in the mid-1990s, large numbers of residents marched in protest of the rape of an Okinawan schoolgirl at the hands of US marines.

But over the past year, civil dissent has become a routine feature of Japanese society. Mass, anti-nuclear protests have been held country-wide.

The two-day Nuclear Free World conference was held in Yokohama in mid-January, drawing more than 12,000 participants. There have been semi-regular Tokyo rallies, which draw upward of 40,000 participants, with organisers calling for continued direct action.

Abridged from the *Bulletin of Atomic Scientists.*

Protests have also included smaller-scale events, such as the activists who set up and occupied tents last year on the properties of the civil servants who regulate and promote nuclear power in Tokyo's Kasumigaseki district. They have remained ever since despite threats of eviction.

More than 5 million citizens have signed a new petition against nuclear power in Japan, asking the government to shut down all atomic plants permanently.

An Osaka-based group has filed for a referendum on nuclear power after collecting the requisite signatures — more than 2% of voters in the city.

Other groups in Tokyo and in Shizuoka are seeking the approval of local assemblies to hold nuclear referenda. Citizens' referenda have no binding legal power in Japan, but past referenda on nuclear power have still had a lasting effect.

In Maki village in the mid-1990s, for example, a referendum resulted in wins for those who sought to end siting processes in their communities.

Along with local-level referenda on nuclear power, some groups have pushed for an advisory-style national referendum on nuclear power based on a similar process held in Sweden in the 1980s.

Such a national referendum would be a first. It could push the government to consider new ways in which citizens can be more fully integrated into decision-making procedures on nuclear power.

Many observers noticed the radiation data after the accident at Fukushima were released slowly and with little explanation of the consequences. Others took the complaint further, claiming the government and public utilities deliberately sought to reduce public alarm by withholding critical information.

Deciding to take matters into their own hands, a wide swath of citizens across Japan joined together for a creative-commons-based project known as SafeCast.

SafeCast encourages citizens to use their own radiation-measuring devices to measure levels of radioactivity and post that data directly to the forum. Personal-radiation devices can be created with modified smart phones and personal computers along with standard, off-the-shelf radiation detectors.

This crowd-sourcing on Japan's radiation levels has resulted in more than one million pieces of data published in an open forum that provides a dynamic map of radiation levels throughout the country.

This form of democratisation of data collection and analysis provides a new channel for citizens to move beyond the opaque nuclear industry institutions of the past.

Many scholars have argued that citizens in Japan privatise protest or seek to avoid direct conflict with authorities. But the vast disaster at Fukushima has brought out open backlash against bureaucrats in very public forums.

Many citizens feel that the government has failed to demonstrate enough flexibility, openness and transparency in its response to public concerns. Residents in Fukushima and elsewhere have vocally expressed their outrage with authorities at heated public exchanges and town-hall-style meetings — events often taped by citizens and posted to YouTube.

Hugh Gusterson, in his book *People of the Bomb: Portraits of America's Nuclear Complex*, deemed interactions in which scientists and other authorities go through the motions of public forums, but leave little room for questioning from citizens on scientific and technical matters, "rituals of assent".

Given that past meetings between Japanese state representatives and civil society on issues of nuclear power often resembled rituals of assent as a matter of course, this public outcry is a sea change in Japan's style of interaction.

These new methods of state-civil society interaction in Japan illuminate not only an anger about the way government and private-sector authorities have handled the nuclear disaster, but also shed light on a broader dissatisfaction with a continued exclusion of civil society from the policy arena over the past decades.

Through mass protests, petitions, citizen science, and direct — and often uncomfortable — confrontation with the state, Japanese citizens are pushing for a new, more vocal role in policy making.■

International Atomic Energy Agency officials at Fukushima, Japan.

Nuclear Power & Water Scarcity

By Sue Wareham & Jim Green

The connections between water scarcity, power generation and the federal government's promotion of nuclear power are worth reflecting on with National Water Week held from October 21-27.

Some problems associated with nuclear power are much discussed – such as its connection to the proliferation of weapons of mass destruction. Less well known is the fact that nuclear power is the most water-hungry of all energy sources, with a single reactor consuming 35-65 million litres of water each day.

Water scarcity is already a serious problem for Australia's power-generation industry, largely because of our heavy reliance on water-guzzling coal-fired plants. Current problems in Australia's power industry resulting from water shortages include: expensive long-distance water haulage to some power plants as local supplies dwindle; reduced electrical generating capacity and output at some coal and hydro plants; higher and more volatile electricity prices; increased risks of blackouts; and intensified competition for water between power plants, agriculture, industries, and environmental flows.

Introducing nuclear power would exacerbate those problems. A December 2006 report by the Commonwealth Department of Parliamentary Services notes that the water requirements for a nuclear power station are 20-83% higher than for other power stations. Moreover, those calculations do not include water consumption by uranium mines. The Roxby Downs mine in South Australia uses 35 million litres of water each day, with plans to increase this to 250 million litres each day. Mine operator BHP Billiton does not pay one cent for this water despite recording a record $17 billion

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profit in 2006-07.

Water outflows from nuclear power plants can damage the local environment. The US Environmental Protection Agency states: "When nuclear power plants remove water from a lake or river for steam production and cooling, fish and other aquatic life can be affected. Water pollutants, such as heavy metals and salts, build up in the water used in the nuclear power plant systems. These water pollutants, as well as the higher temperature of the water discharged from the power plant, can negatively affect water quality and aquatic life."

A report by the US Nuclear Information and Resource Service details the destruction of delicate marine ecosystems and large numbers of animals, including endangered species, by nuclear power plants. Most of the damage is done by water inflow pipes, while expulsion of warm water causes further damage.

Another documented problem is "cold stunning" — fish acclimatise to warm water but die when the reactor is taken off-line and warm water is no longer expelled. In New Jersey, local fishermen estimated that 4000 fish died from cold stunning when a reactor was shut down.

Nuclear reactors in numerous European countries have been periodically taken off-line or operated at reduced output in recent years because of water shortages driven by climate change, drought and heat waves. Nuclear utilities have also sought and secured exemptions from operating conditions in order to discharge overheated water.

The water consumption of renewable energy sources and energy efficiency and conservation measures is negligible compared to nuclear or coal. Operating a 2400 watt fan heater for one hour consumes 0.01 litres of water if wind is the energy source, 0.26 litres if solar is the energy source, 4.5 litres if coal is the energy source, or 5.5 litres if nuclear power is the energy source.

Tim Flannery, the 2007 Australian of the Year, notes that hastening the uptake of renewable energy sources such as wind, solar, and geothermal 'hot rocks' will help ease the water crisis as well as reducing greenhouse gas emissions – a win-win outcome.

Globally, there is another compelling reason to ensure that decisions on water allocation — including its use in energy production — are made wisely and equitably. Limited access to water is already contributing to armed conflicts ("water wars") in a number of places around the globe. UN Secretary-General Ban Ki-moon recently noted that shortages of food and water in sub-Saharan Africa were a precursor to the current tragic violence in Darfur. The problem goes "far beyond Darfur", he warned, as many other places are now suffering water shortages.

Australia can ill-afford to replace one thirsty industry, coal, with an even thirstier one, nuclear power.■

James Lovelock & the Big Bang

By Jim Green

James Lovelock, famous for his "Gaia Theory" of the Earth as a self-regulating organism, was in Adelaide last weekend [July 2007] speaking at the Festival of Ideas. He has had a fascinating career across a range of disciplines and he had much of interest to say. But on the topic of nuclear power, Lovelock is inaccurate and irresponsible.

"Modern nuclear power stations are useless for making bombs", Lovelock told ABC's Lateline television program in 2006.

That is in stark contrast to comments made last year by former US Vice-President Al Gore: "For eight years in the White House, every weapons proliferation problem we dealt with was connected to a civilian reactor program", Gore said. "And if we ever got to the point where we wanted to use nuclear reactors to back out a lot of coal … then we'd have to put them in so many places we'd run that proliferation risk right off the reasonability scale."

So which of these climate campaigners is right — James Lovelock or Al Gore?

A typical nuclear power reactor produces about 300 kilograms of plutonium each year, sufficient for about 30 nuclear weapons. There is no dispute that this "reactor-grade" plutonium can be used in weapons, though the use of weapon-grade plutonium increases their reliability and destructive force.

Power reactors can also be used to produce weapon-grade plutonium which is ideal for nuclear weapons. This could hardly be simpler — all that needs to be done is to shorten the amount of time that the nuclear fuel is irradiated in a reactor. This results in a higher percentage of plutonium-239 relative to other, unwanted isotopes such as plutonium-240, 241 and 242.

The proliferation risks associated with nuclear power are not just hypothetical. We know that India uses power reactors in its nuclear weapons program (although research reactors have been the main source of plutonium).

This article was originally published in *Online Opinion*, 17 July 2007.

North Korea's nuclear bomb test last October used plutonium produced in a so-called "Experimental Power Reactor".

The United States uses a power reactor to produce tritium, which is used to increase the destructive force of nuclear weapons. The US has also published details of a successful weapon test carried out in 1962 using reactor-grade plutonium.

Australia's nuclear history provides another demonstration of the link between nuclear power and weapons. From 1969 until his resignation in 1971, Prime Minister John Gorton pursued a plan to build a power reactor at Jervis Bay on the New South Wales coast. He later acknowledged that the purpose of the reactor was to produce not just electricity but also plutonium for potential use in weapons. The Jervis Bay plan was scrapped by Gorton's successor, Billy McMahon.

Nuclear power programs have indirectly supported a number of weapons programs by providing a rationale for acquiring uranium enrichment plants, research and training reactors, or reprocessing plants. Five of the 10 countries to have developed nuclear weapons did so under cover of a "civil" program. India and Israel use research reactors to produce plutonium for weapons; South Africa and Pakistan acquired enrichment technology and produced highly-enriched uranium bombs; and, as mentioned, North Korea used its "Experimental Power Reactor" for plutonium production.

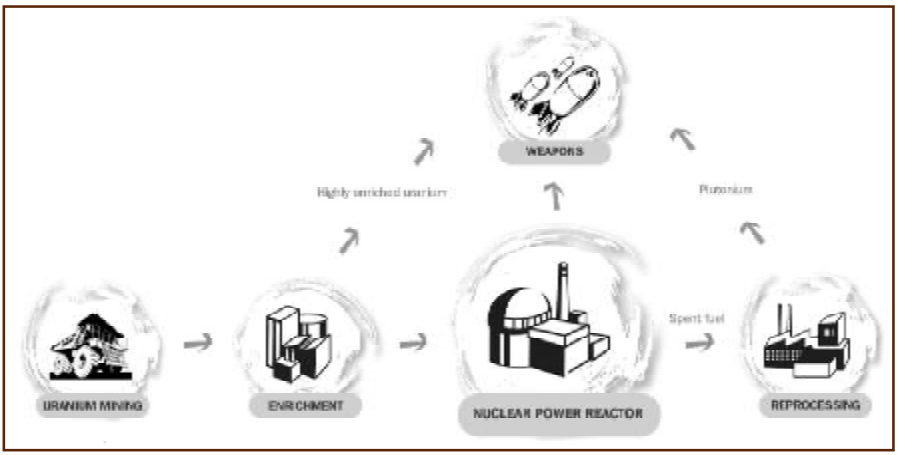
Iraq's nuclear weapons program from the 1970s to 1991 illustrates the indirect links between power and weapons. Iraq never actually built power reactors but its professed interest in nuclear power facilitated the acquisition of a vast amount of nuclear technology and expertise which was put to use in the weapons program. It was later described as a "shop-till-you-drop" weapons program in the *Bulletin of the Atomic Scientists*, with much of the shopping done openly.

According to Khidhir Hamza, a senior nuclear scientist involved in Iraq's weapons program: "Acquiring nuclear technology within the [International Atomic Energy Agency] safeguards system was the first step in establishing the infrastructure necessary to develop nuclear weapons. In 1973, we decided to acquire a 40-megawatt research reactor, a fuel manufacturing plant, and nuclear fuel reprocessing facilities, all under cover of acquiring the expertise needed to eventually build and operate nuclear power plants and produce and recycle nuclear fuel. Our hidden agenda was to clandestinely develop the expertise and infrastructure needed to produce weapon-grade plutonium."

Israel demonstrated its lack of faith in the IAEA's safeguards system by bombing a research reactor in Iraq in 1981, but Iraq's nuclear weapons program continued until the 1991 Gulf War. The IAEA failed to detect Iraq's nuclear weapons program or its use of "safeguarded" research reactors to produce materials used in tests of "dirty" radiation bombs.

The Iraq debacle prompted efforts to tighten the safeguards system, yet the current Director-General of the IAEA, Dr. Mohamed El Baradei, characterises those efforts as "half hearted".

Nuclear power is the one and only energy source with a repeatedly-demonstrated connection to the proliferation of Weapons of Mass Destruction. To deny that connection — as James Lovelock does — is inaccurate, irresponsible and potentially dangerous.■



The nuclear cycle is inescapably linked to nuclear weapons.

NUCLEAR WASTE

Nuclear Power: Watt a Waste

Radioactive wastes can be solid, liquid or gaseous and are produced at every stage of the nuclear fuel cycle:

- Underground and open pit uranium mines generate large volumes of long-lived, low level waste which is kept on site.
- *In situ* leach uranium mines pollute groundwater with radioactive particles, heavy metals and acid.
- Enrichment plants generate large volumes of depleted uranium waste.
- Reactors produce high level radioactive waste in the form of spent nuclear fuel.
- Reactors and other nuclear fuel cycle facilities discharge radioactive emissions to air and water.
- Reprocessing plants generate a high level radioactive waste stream.

Some waste streams have military potential — depleted uranium is used in munitions, and spent nuclear fuel from reactors contains weapons-useable plutonium.

Nuclear reactors

The waste produced in nuclear reactors — called spent nuclear fuel — is much more radioactive than fresh uranium fuel. This is because irradiation of uranium produces many types of radioactive particles.

It takes about 200,000 years for spent fuel to break down to a state where it is at a safe level of radioactivity.

Spent fuel is stored in reactor cooling ponds for several years after its removed from the reactor. This is usually followed by longer term storage away from the reactor, pending reprocessing or eventual disposal.

A detailed, referenced version of this paper is posted at www.choosenuclearfree.net.

Repositories & reprocessing

Not a single repository exists anywhere in the world for the disposal of high-level waste from nuclear power reactors. Only a few countries have identified a repository site.

Shallow repositories for low and short-lived intermediate level waste have been established in over 30 countries. Many have experienced problems. Three repositories in the USA have been closed because of environmental problems. Farmers in the Champagne region of France have taken legal action in relation to a leaking radioactive waste dump. In Asse, Germany, all 126,000 barrels of waste already placed in a repository are being removed because of large-scale water infiltration over a period of two decades.

Reprocessing involves dissolving spent nuclear fuel in acid and separating the unused uranium (about 96% of the mass), plutonium (1%) and high level wastes (3%). It is arguably the most dangerous and dirty stage of the nuclear fuel cycle. Reprocessing generates large waste streams and it separates weapons-useable plutonium from spent fuel.

What to do with radioactive waste?

A common-sense approach to radioactive waste involves the following three steps:

- Minimising the production of radioactive waste.
- Thoroughly assessing all options for the management of radioactive waste.
- Using scientific and environmental citing criteria rather than choosing politically "soft" targets.

Nuclear power in Australia — how much waste?

Former Chair of the Board of the Australian Nuclear Science and Technology Organisation, Ziggy Switkowski, has been promoting the construction of 50 nuclear power reactors in Australia.

Over a 50-year lifespan, 50 reactors would:

- Be responsible for 1.8 billion tonnes of low level radioactive tailings waste (assuming the uranium came from Olympic Dam).
- Be responsible for 430,000 tonnes of depleted uranium waste.
- Produce 75,000 tonnes of high level nuclear waste (approximately 25,000 cubic metres).
- Produce 750,000 cubic metres of low level waste and intermediate level waste.
- Produce 750 tonnes of plutonium, enough for 75,000 nuclear weapons.

As the 2006 Switkowski Report noted: "Establishing a nuclear power industry

would substantially increase the volume of radioactive waste to be managed in Australia and require management of significant quantities of high level waste."

Australia as the world's nuclear waste dump?

An international consortium — Pangea Resources — planned to establish a high-level nuclear waste dump in Australia from the late 1990s until 2001. In 2002, Pangea Resources rebranded itself as ARIUS — the Association for Regional and International Underground Storage — and a decade later ARIUS is still scheming to build an international high-level nuclear waste dump.

Professor John Veevers from Macquarie University wrote in the *Australian Geologist* in August 1999: "Tonnes of enormously dangerous radioactive waste in the northern hemisphere, 20,000 kms from its destined dump in Australia where it must remain intact for at least 10,000 years. These magnitudes — of tonnage, lethality, distance of transport, and time — entail great inherent risk."

Pressure to dump nuclear waste in Australia will persist — about 300,000 tonnes of high-level nuclear waste have been produced in power reactors, increasing by 12,000 to 14,000 tonnes annually, and there is still no repository for high-level nuclear waste anywhere in the world.

Politicians and ex-politicians supporting the development of a high-level nuclear waste dump in Australia to take waste from overseas include former Prime Minister Bob Hawke and former foreign ministers Gareth Evans and Alexander Downer.■

Protest against proposed nuclear waste dump at Muckaty, NT (2011).

NUCLEAR RACISM

Indigenous World Uranium Summit, 2006: Declaration

Window Rock, Navajo Nation (Arizona, USA)

We, the Peoples gathered at the Indigenous World Uranium Summit, at this critical time of intensifying nuclear threats to Mother Earth and all life, demand a worldwide ban on uranium mining, processing, enrichment, fuel use, and weapons testing and deployment, and nuclear waste dumping on Native Lands.

Past, present and future generations of Indigenous Peoples have been disproportionately affected by the international nuclear weapons and power industry.

The nuclear fuel chain poisons our people, land, air and waters and threatens our very existence and our future generations.

Nuclear power is not a solution to global warming. Uranium mining, nuclear energy development and international agreements … that foster the nuclear fuel chain violate our basic human rights and fundamental natural laws of Mother Earth, endangering our traditional cultures and spiritual well-being.■

The complete document is posted at www.sric.org/uraniumsummit.

Dumping on Traditional Owners: The Ugly Face of Australian Racism

By Jim Green

The nuclear industry has been responsible for some of the crudest racism in Australia's history. This racism dates from the British nuclear bomb tests in the 1950s but it can still be seen today.

The British government conducted 12 nuclear bomb tests in Australia in the 1950s, most of them at Maralinga in South Australia. Permission was not sought from affected Aboriginal groups such as the Pitjantjatjara, Yankunytjatjara, Tjarutja and Kokatha. Thousands of people were adversely affected and the impact on Aboriginal people was particularly profound.

Many Aboriginal people suffered from radiological poisoning. There are tragic accounts of families sleeping in the bomb craters. So-called "Native Patrol Officers" patrolled thousands of square kilometres to try to ensure that Aboriginal people were removed before nuclear tests took place. Signs were erected in some places — written in English, which few of the affected Aborigines could understand. The 1985 Royal Commission found that regard for Aboriginal safety was characterised by "ignorance, incompetence and cynicism". Many Aboriginal people were forcibly removed from their homelands and taken to places such as the Yalata mission in South Australia, which was effectively a prison camp.

In the late-1990s, the Australian government carried out a clean-up of the Maralinga nuclear test site. It was done on the cheap and many tonnes of debris contaminated with kilograms of plutonium remain buried in shallow, unlined pits in totally unsuitable geology. As nuclear engineer and whistleblower Alan Parkinson said of the "clean-up" on ABC radio on August 5, 2002: "What was done at Maralinga was a cheap and nasty solution that wouldn't be adopted on white-fellas land."

Despite the residual contamination, the federal government has off-loaded responsibility for the land onto the Maralinga Tjarutja Traditional Owners. The government portrays this land transfer as an act of reconciliation, but the real agenda was spelt out in a 1996 government document which states that the clean-up was "aimed at reducing Commonwealth liability arising from residual contamination".

A win for the Kungkas

In 1998, the federal federal government announced its intention to build a national radioactive waste dump near Woomera in South Australia. Leading the battle against the dump were the Kupa Piti Kungka Tjuta, a council of senior Aboriginal women from northern South Australia. Many of the Kungkas personally suffered the impacts of the British nuclear bomb tests at Maralinga in the 1950s.

The Kungkas were sceptical about the government's claim that radioactive waste destined for the Woomera dump was "safe" — after all, the waste would be kept at the Lucas Heights reactor site south of Sydney if it was perfectly safe, or simply dumped in landfill.

The proposed dump generated such controversy in South Australia that the federal government secured the services of a public relations company. Correspondence between the company and the government was released under Freedom of Information laws. In one exchange, a government official asks the PR company to remove sand-dunes from a photo selected to adorn a brochure. The explanation provided by the government official was that: "Dunes are a sensitive area with respect to Aboriginal Heritage." The sand-dunes were removed from the photo, only for the government official to ask if the horizon could be straightened up as well.

In July 2003, the federal government used the Lands Acquisition Act 1989 to seize land for the dump. Native Title rights and interests were extinguished at the stroke of a pen. This took place with no forewarning and no consultation with Aboriginal people.

The Kungkass continued to implore the federal government to "get their ears out of their pockets", and after six long years the government did just that. In the lead-up to the 2004 federal election, with the dump issue biting politically, the government decided to cut its losses and abandon its plans for a dump in SA.

The Kupa Piti Kungka Tjuta wrote in an open letter: "People said that you can't win against the government. Just a few women. We just kept talking and telling them to get their ears out of their pockets and listen. We never said we were going to give up. Government has big money to buy their way out but we never gave up."

Toxic trade-off: dumping on Northern Territorians

The ears went straight back in the pockets the following year with the announcement that the government planned to establish a radioactive waste dump in the Northern Territory.

A toxic trade-off of basic services for a radioactive waste dump has been part of this story from the start. Governments have systematically stripped back resources for remote Aboriginal communities, placing increased pressure on them to accept projects like the radioactive waste dump.

The nomination of the Muckaty site in the Northern Territory was originally made with the promise of $12 million compensation for a small group identified as the exclusive Traditional Owners. While a small group of Traditional Owners support the dump in return for financial compensation, a larger group have been ignored and they have initiated legal action in the Federal Court challenging the nomination of the Muckaty site.

Even though the court case is unresolved, the government has passed legislation targeting Muckaty as the only site under active consideration for a radioactive waste dump. The National Radioactive Waste Management Act 2012 is draconian, overriding the Aboriginal Heritage Act and bypassing the Aboriginal Land Rights Act. It allows for the imposition of a dump on Aboriginal land with no consultation with or consent from Traditional Owners. Nuclear racism in Australia is bipartisan — both the Labor government and the Liberal/National Opposition voted in support of the legislation.

Muckaty Traditional Owner Penny Phillips said: "The government should wait for the court case before passing this law. Traditional Owners say no to the waste dump. We have been fighting against this for years and we will keep fighting. We don't want it in Muckaty or anywhere in the Northern Territory."

The Central Land Council expressed "profound disappointment" at the passage of the National Radioactive Waste Management Act. David Ross, Director of the Land Council, said: "This legislation is shameful, it subverts processes under the [Aboriginal] Land Rights Act and is clearly designed to reach the outcome of a dump being located on Aboriginal land in the Northern Territory, whether that's the best place for it or not. This legislation preserves the Muckaty nomination without acknowledging the dissent and conflict amongst the broader traditional owner group about the process and the so-called agreement. The passage of this legislation will further inflame the tensions and divisions amongst families in Tennant Creek, and cause great stress to many people in that region."

Federal resources minister Martin Ferguson has refused countless requests to meet with Traditional Owners opposed to the dump. Muckaty Traditional Owner

Dianne Stokes says: "All along we have said we don't want this dump on our land but we have been ignored. Martin Ferguson has avoided us and ignored our letters but he knows very well how we feel. He has been arrogant and secretive and he thinks he has gotten away with his plan but in fact he has a big fight on his hands."

Dianne Stokes is not alone. Many Traditional Owners are determined to stop the dump and they are supported by the Northern Territory Government, key trade unions including the Australia Council of Trade Unions, church groups, medical and health organisations, and environmental groups. If push comes to shove, there will be a blockade at the site to prevent construction of the dump.

Uranium mining

The patterns of nuclear racism are also evident in Australia's uranium mining industry. Racism in the mining industry typically involves some or all of the following tactics: ignoring the concerns of Traditional Owners insofar as the legal and political circumstances permit; divide-and-rule tactics; bribery; "humbugging" Traditional Owners (exerting persistent, unwanted pressure); providing Traditional Owners with false or misleading information; and threats, most commonly legal threats.

To give one example, the 1982 South Australian Roxby Downs Indenture Act, which sets the legal framework for the operation of the Olympic Dam copper-uranium mine in South Australia, was amended in 2011 but it retains exemptions from the SA Aboriginal Heritage Act. Traditional Owners were not even consulted. The SA government's spokesperson in Parliament said: "BHP were satisfied with the current arrangements and insisted on the continuation of these arrangements, and the government did not consult further than that."

That disgraceful performance illustrates a broader pattern. Aboriginal land rights and heritage protections are feeble at the best of times. But the legal rights and protections are repeatedly stripped away whenever they get in the way of nuclear or mining interests.

Thus the Olympic Dam mine is largely exempt from the SA Aboriginal Heritage Act. Legislation was passed specifically to exempt the Ranger uranium mine in the Northern Territory from the Aboriginal Land Rights Act. Native Title rights were extinguished with the stroke of a pen to seize land for a radioactive waste dump in South Australia. And Aboriginal heritage laws and Aboriginal land rights are being trashed with the current push to dump in the Northern Territory.

The situation is scarcely any better than it was in the 1950s when the British were exploding nuclear bombs on Aboriginal land.■

Quotable Quotes

If a country with a full nuclear fuel cycle decides to break away from its non-proliferation commitments, a nuclear weapon could be only months away. In such cases, we are only as secure as the outbreak of the next major crisis. In today's environment, this margin of security is simply untenable.

— Former IAEA Director-General Dr Mohamed El Baradei, 2005

In five years, the world has changed. Our fears of a deadly nuclear detonation "whatever the cause" have been reawakened. In part, these fears are driven by new realities. The rise in terrorism. The discovery of clandestine nuclear programmes. The emergence of a nuclear black market. But these realities have also heightened our awareness of vulnerabilities in the NPT regime. The acquisition by more and more countries of sensitive nuclear know-how and capabilities. The uneven degree of physical protection of nuclear materials from country to country. The limitations in the IAEA's verification authority particularly in countries without additional protocols in force. The continuing reliance on nuclear deterrence. The ongoing perception of imbalance between the nuclear haves and have-nots. And the sense of insecurity that persists, unaddressed, in a number of regions, most worryingly in the Middle East and the Korean Peninsula.

— Former IAEA Director-General Dr Mohamed El Baradei, 2005

Why, some ask, should the nuclear-weapon states be trusted, but not others — and who is qualified to make that judgment? Why, others ask, is it okay for some to live under a nuclear threat, but not others, who continue to be protected by a "nuclear umbrella"?

— Former IAEA Director-General Dr Mohamed El Baradei

Nuclear energy is a bad fuel, a dirty fuel, a dangerous fuel. This is not a good industry to encourage, and anyone that has an electricity program, *ipso facto* ends up with a nuclear weapons capability."

— Former Prime Minister Paul Keating

Again and again it has been demonstrated here and overseas that when problems over safeguards prove difficult, commercial considerations will come first.

— Former SA Premier Mike Rann, 1982

[T]he Nuclear Non-proliferation Treaty disintegrates before our very eyes … the current non-proliferation regime is fundamentally fracturing. The consequences of the collapse of this regime for Australia are acute, including the outbreak of regional nuclear arms races in South Asia, North East Asia and possibly even South East Asia.

— Kevin Rudd, Shadow Minister for Foreign Affairs, 2006.

A world free of nuclear weapons will be much more readily achieved and sustained were nuclear power generation being phased out.

— Assoc. Prof. Tilman Ruff

On top of the perennial challenges of global poverty and injustice, the two biggest threats facing human civilisation in the 21st century are climate change and nuclear war. It would be absurd to respond to one by increasing the risks of the other. Yet that is what nuclear power does.

— Dr Mark Diesendorf, University of NSW

Increasing the risk of nuclear war brings us back to climate change. Recent scientific research details the climatic impacts of nuclear warfare. The use of 100 weapons in nuclear warfare — just 0.03% of the explosive power of the world's nuclear arsenal — would result directly in catastrophic climate change with many millions of tonnes of black, sooty smoke lofted high into the stratosphere. Needless to say the social and environmental impacts would be horrendous.

— Greens Senator Scott Ludlam

We were interested in this thing [a planned nuclear power reactor at Jervis Bay] because it could provide electricity to everybody and it could, if you decided later on, it could make an atomic bomb.

— Former Australian Prime Minister John Gorton reflecting on the plan to build a nuclear power plant at Jervis bay in the late 1960s.

[T]he rise in nuclear power worldwide … inevitably increases the risks of proliferation.

— US State Department, 2008

For eight years in the White House, every weapons-proliferation problem we dealt with was connected to a civilian reactor program. And if we ever got to the point where we wanted to use nuclear reactors to back out a lot of coal … then we'd have to put them in so many places we'd run that proliferation risk right off the reasonability scale.

— Former US Vice President Al Gore, 2006

The push to bring back nuclear power as an antidote to global warming is a big problem. If you build more nuclear power plants we have toxic waste at least, bomb-making at worse.

— Former US President Bill Clinton, 2006, Clinton Global Initiative

We are approaching a point at which the erosion of the non-proliferation regime could become irreversible and result in a cascade of proliferation.

— UN High-Level Panel on Threats, Challenges and Change, 2004

A phase-out of civilian nuclear energy would provide the most effective and enduring constraint on proliferation risks in a nuclear-weapon-free world.

— International Panel on Fissile Materials, 2009

In international affairs, nuclear energy trumps just about everything. Even so-called arms controllers fall over themselves trying to establish their bona fides by supporting nuclear energy development and devising painless proposals that grandfather everything that's already in place. … It's time to take a more serious view. Security should come first — not as an afterthought. We should support as much nuclear power as is consistent with international security; not as much security as the spread of nuclear power will allow.

— Victor Gilinsky, former member of the US Nuclear Regulatory Commission

As we see it, however, the world is not now safe for a rapid global expansion of nuclear energy. Such an expansion carries with it a high risk of misusing uranium enrichment plants and separated plutonium to create bombs … As two of our board members have pointed out, "Nuclear war is a terrible trade for slowing the pace of climate change".

— Editorial, *Bulletin of the Atomic Scientists*, January 14, 2010

I do not like this word bomb. It is not a bomb; it is a device which is exploding.

— Jacques Le Blanc, French Ambassador to New Zealand, describing France's nuclear tests.

I know not with what weapons World War III will be fought, but World War IV will be fought with sticks and stones.

— Albert Einstein

The splitting of the atom has changed everything save our mode of thinking, and therefore we drift toward unparalleled catastrophe. The solution to this problem lies in the heart of mankind. If only I had known, I should have become a watchmaker.

— Albert Einstein

The discussion of the peaceful applications of nuclear explosives has produced some concrete ideas that surely can be realized and it has also produced some promising possibilities which for the time being we must consider as dreams. First, we shall mention those applications about which we can feel quite sure. They boil down to a single fact: We can make a hole in the earth — if anybody wants to do that.

— Edward Teller, "father" of the hydrogen bomb, 1963.

The problem of nuclear power is it's not built on concrete, it's built on lies.

— Greg Palast, author and investigator

I deeply regret believing in the security myth of nuclear power.

— Then Japanese Prime Minister Naoto Kan at the Hiroshima Day commemorations, 2011

I wish there wasn't a nuclear plant.

— Suicide note, Japanese farmer from Fukushima, 2011

Sure, you can say nuclear power is somewhat less carbon-intensive than burning fossil fuels for energy; beating your children to death with a club will prevent them from getting hit by a car. Ravaging the Earth by one irreparable means is not a sensible way to prevent it from being destroyed by another. There are alternatives. We should choose them and use them.

— Rebecca Solnit, *Reasons Not to Glow*, 2007

Only one nuclear furnace — our Sun — is an energy source that is effectively endless, and can promote both peace and prosperity.

— David Suzuki, scientist and broadcaster

Sooner or later, in any foolproof system, the fools will exceed the proofs.

— Arnie Gundersen, nuclear engineer

The reason why the nuclear industry talks about a nuclear renaissance is because they're still in the Dark Ages.

— Dr. Gordon Edwards

Chernobyl opened my eyes like nothing else: it showed the horrible consequences of nuclear power, even when it is used for non-military purposes. The 20th anniversary of the Chernobyl catastrophe reminds us we should not forget the horrible lesson taught to the world in 1986. We should do everything in our power to make all nuclear facilities safe and secure. We should also start seriously working on the production of alternative sources of energy.

— Mikhail Gorbachev, 2006

As we have discovered the hard way, you cannot make atoms work for peace without making them available for war.

— Tom Burke

The nuclear industry has grasped at climate change like a drowning man clutching a passing log.

— Tom Burke

The government would not listen and forced the Ranger uranium mine on us, but the old people were right and today we are dealing with everything they were worried about.

— Yvonne Margarula, Mirarr Senior Traditional Owner

The greatest minds in the nuclear establishment have been searching for an answer to the radioactive waste problem for 50 years, and they've finally got one: haul it down a dirt road and dump it on an Indian reservation.

— Winona LaDuke, Indigenous World Uranium Summit, 2006

If nuclear power is the answer, it must have been a pretty stupid question.

— Prof. Ian Lowe

We now that the paper-moderated, ink-cooled reactor is the safest of all. All kinds of unexpected problems may occur after a project has been launched.

— Unnamed nuclear industry representative, 2003

It is clear that no international safeguards system can physically prevent diversion or the setting up of an undeclared or clandestine nuclear (weapons) program.

— International Atomic Energy Agency, 1993

Saying that nuclear power can solve global warming by itself is way over the top.

— Alan McDonald, senior International Atomic Energy Agency analyst, 2004

Logo of Australian Nuclear Free Alliance.

More Information

- Interactive Australian nuclear map: www.australianmap.net
- Choose Nuclear Free: www.choosenuclearfree.net
- Australian Nuclear Free Alliance (Aboriginal/environmental alliance): www.anfa.org.au
- Daily nuclear news updates (Australian and international news): www.antinuclear.net and http://nuclear-news.net
- Friends of the Earth: www.foe.org.au/anti-nuclear
- Beyond Nuclear Initiative: www.beyondnuclearinitiative.com
- Australian Conservation Foundation: www.acfonline.org.au/nuclear
- International Campaign to Abolish Nuclear Weapons: www.icanw.org
- Medical Association for the Prevention of War: www.mapw.org.au
- Greens' Senator Scott Ludlam: http://scott-ludlam.greensmps.org.au
- EnergyScience Coalition: www.energyscience.org.au
- Japanese for Peace: www.jfp.org.au
- Dr. Gavin Mudd — technical papers on uranium mining: http://users.monash.edu.au/~gmudd
- Let the Facts Speak (an indictment of the nuclear industry): www.letthefactsspeak.org

Dollars for Death addresses many of the problems associated with uranium mining and nuclear power: the adverse environmental impacts; the limitations of 'safeguards' which purport to preclude the use of Australian uranium in nuclear weapons; the sale of uranium to nuclear weapons states, dictatorships, etc; the huge water consumption of nuclear power plants; the after-effects of the Fukushima disaster; the many and varied interconnections between 'peaceful' and military nuclear facilities and programs; the nuclear waste legacy; and last but not least, the crude racism which is so often a feature of nuclear politics.

Although touted by its advocates as a solution to climate change, uranium and the nuclear industry is not. Why turn to a technology which has so many inherent and intractable problems when renewable alternatives are so abundantly available?

Resistance books