



Research reactors and nuclear weapons capability

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Dr Green is currently a member of Sutherland Shire Council's Nuclear Reactor Taskforce and has recently undertaken a range of nuclear research projects including several for MAPW.

Jim will discuss the links between research reactors and nuclear weapons proliferation



Research reactors and nuclear weapons capability

This talk is a brief summary of a paper I've recently completed on this topic of research reactors and weapons proliferation for MAPW.

www.geocities.com/jimgreen3/rrweapons.html

Firstly I'm going to map out the connections between research reactor programs and covert weapons proliferation and then for the second half of my talk I'll address the Australian situation where we've got a much more convoluted and complex debate going on.

Firstly, the various ways in which reactor programs can contribute to weapons proliferation. Plutonium production, diversion of highly enriched uranium, weapons related research, production of isotopes for use in nuclear weapons and finally the political elements of weapons proliferation. So to take each of these in turn.

Plutonium

Everyone will be familiar with India's nuclear weapons program based largely on the CIRUS Nuclear Research Reactor, CIRUS being Canada, India Reactor, United States. Canada supplied the reactor at a heavily discounted cost, the US supplied the heavy water, both supplies were on condition that it was used for peaceful purposes only and of course India asserted that its 1974 nuclear weapon test was a 'peaceful' nuclear explosion. India has also used power reactors to produce plutonium for bombs which undercuts another thread of the myth of the peaceful atom. Taiwan also got a research reactor from Canada, also planned to use it to produce plutonium for bombs but was constrained from doing so by the US. France supplied Israel with a research reactor which was and still is used to produce plutonium for Israel's nuclear arsenal, France supplied a similar research reactor to Iraq which would have been used for plutonium production in support of the weapons program if not for Israel's bombing of that reactor. They're the most well known examples but it's worth pointing out that quite a number of other countries have used research reactors to produce and then separate plutonium and this has been tangled up with covert weapons programs. Some of the examples are Iraq, North Korea, Romania, Yugoslavia, possibly Taiwan and I'm sure there would be one or two more apart from that and a more immediate threat is Pakistan which has recently completed the construction of a so-called research reactor and it could well already be operating and this research reactor will almost certainly be used to produce plutonium for bombs.

I was going to talk about this debate over reactor grade plutonium but Frank's done that so I'll skip over that one. The next issue is highly enriched uranium and research reactors are central to this problem because whereas power reactors are fuelled with low enriched uranium or non enriched uranium many research reactors have been fueled with highly enriched uranium which poses an immediate proliferation problem. There's the risk of diversion of fresh HEU fuel and in 1990 Iraq's long term weapons program gave way to a crash program and central to that crash program was the diversion of fresh HEU research reactor fuel. More recently there has been some talk about a stockpile of roughly 50 kgs. of HEU research reactor fuel in Yugoslavia.

Another risk is the extraction of HEU from spent research reactor fuel which is much, much more difficult than separating it from fresh fuel because of the issues of radiological contamination, but the problem here is that there is so much plutonium contained in spent fuel stockpiles around the world. Even in Sydney at Lucas Heights the



total spent fuel output from the HIFAR reactor contains roughly five Significant Quantities of HEU, enough to produce about five bombs.

Another risk is that enrichment facilities can be built and that construction can be justified partly or entirely with reference to a research reactor program. Now other things being equal it's incredible to argue that you're going to all the trouble and expense of building an enrichment plant solely to service research reactors, but nevertheless there are some concrete historical examples to look at. I think the most striking is Argentina where it was announced in the early 1980s that a secret enrichment program had been undertaken and the only civil justification given for that program was supplying enriched uranium fuel for research reactors.

And Australia has its skeletons in the closet. In the mid to late 60s, there was a uranium enrichment project at Lucas Heights, which was kept secret for the first 2-3 years. It was carried out in the basement of a building at Lucas Heights and if you get on a bus and go to the UNSW Library you can find handwritten notes from the infamous Phillip Baxter in which he's calculating how much enriched uranium they could get from this enrichment program and how many bombs they could build from that enriched uranium, so this is part of Australia's history, and there were several civil justifications given for Australia's enrichment program in addition to the covert weapons agenda. Those civil justifications included value adding to Australian uranium, the possibility of developing nuclear power in Australia and providing that fuel domestically and there were also questions about the ongoing supply of research reactor fuel for the HIFAR Reactor and that was another civil justification given for the enrichment program.

Now the risk of HEU is declining because of the RERTR Program, Reduced Enrichment for Research and Test Reactors Program which is aiming to eliminate the civil trade in highly enriched uranium and they're having quite a deal of success in so doing. There are some threats to that program. I think the most important one is the plan for a highly enriched uranium fuelled research reactor in Germany and that's still very much in open debate. So in reducing the civil trade in highly enriched uranium there has been considerable progress but there's been virtually zero progress in eliminating the civil trade in plutonium which is really just cranking up at the moment with the development of the MOX industry and this is such a contradiction and it's something which needs brief explanation, and in a nutshell the situation is that reducing the civil trade in HEU has effectively meant a modest amount of inconvenience for research reactor operators in quite a few countries around the world. There's been the political will to force that through and to make research reactor operators convert their reactors to LEU fuels and that has been encouraged both through carrot and stick.

Plutonium is of course a very different issue. If we were to come to the conclusion that a civil plutonium trade is non viable then that throws into question the whole reprocessing industry. If you stop reprocessing then spent fuel is treated as high level radioactive waste instead of being treated as a 'valuable asset' and the whole civil nuclear power industry starts to look pretty shakey, so I mean that's the reason why there's been so little political momentum to stop the civil trade in plutonium.

Now moving along, there are roughly 20 or 30 research reactors around the world with a power level to produce significant quantities of plutonium. Here we're talking roughly enough plutonium for one bomb every year or more and there would be a similar number of research reactors around the world with significant quantities of fresh HEU or significant quantities of HEU in spent fuel. So that's roughly 20 or 30 reactors in both



categories. There are 260 odd research reactors in the world so most of the research reactors in the world pose no direct risk of contributing via plutonium or the HEU proliferation routes. Nevertheless many, perhaps most of the other research reactors around the world could still be used in support of a weapons program either by producing isotopes such as tritium for weapons related research or for general operator training. In relation to research this is a very broad field. I'll just make one point which is that some low power reactors and even zero power reactors can be very useful for weapons related research and here I'm thinking specifically of critical assemblies, or split tables, which can be very useful for testing the behaviour of fissile materials. There was one built at Lucas Heights. It was almost certainly tied up with the covert agenda to take Australia towards a weapons capability. It was never used as far as I know because it was proving difficult to acquire plutonium or enriched uranium to carry out experiments using this split table.

As for the production of isotopes the most important example is tritium, an isotope of hydrogen which is primarily used in nuclear weapons to initiate the fission reaction to boost the yield or in thermo nuclear fusion weapons. Quite a few countries are believed to have used research reactors to produce tritium including India, Iraq, Israel and Pakistan. The US has recently announced its plan to use a power reactor to produce tritium for bombs, or should I say tritium for 'stockpile stewardship'.

One final link is the political element to the debates. Civil nuclear programs often add to the political constituency for nuclear weapons and again we don't have to look any further than Lucas Heights for a very clear example because Phillip Baxter, the head of our civil nuclear agency through the 50s, 60s and early 70s was the most persistent, determined and scientifically literate advocate of weapons production in Australia throughout that period.

Now I want to move on and talk about how these debates relate to the Australian situation and it's, in some ways it's a similar argument but in other ways it's very, very different and it's complex and convoluted so I'm just going to try and give a flavour of the debate here in the five or so minutes that are left to me.

Firstly, we should be clear that this new reactor has little or nothing to do with medical isotopes and the same applies to science. In fact the rhetoric about medical isotopes has become so implausible that the most recent government report acknowledged that the debate over isotope supply options has "not been resolved satisfactorily". In the case of scientific research, yes you can do some useful research with the new reactor but the government didn't even consult its own science advisors before announcing its decision to replace the HIFAR Reactor. It didn't consult CSIRO, didn't consult Astec, didn't consult the Chief Scientist, so they don't take this argument about needing a reactor for science seriously and nor should we.

And at the same time as the government's been backing away from its own lies about medical isotopes it has been a bit more honest about the real agenda which goes under the rubric of 'national interest'. For example the Parliamentary Public Works Committee released a report last year which said that national interest forms the cornerstone of the need for a new reactor. Department of Foreign Affairs and the Safeguards Office in a joint report said that the need for a new reactor first and foremost rests on national interest grounds. Now the question on everyone's lips of course is what the hell do they mean by national interest?



It has to be made clear from the start that there's very little likelihood that a new research reactor in Australia will become embroiled in another push for nuclear weapons. That's conceivable but highly unlikely and technically the new reactor is not likely to be much use for a weapons program in that it will be fuelled with low enriched uranium and it's not likely to be a big plutonium producer. Nevertheless there is a military angle to this whole national interest dimension and I think this was put quite neatly by a bureaucrat several years ago who said that a reactor is part of the national kit, which is a very apt military metaphor and the two aspects I'll talk about today are firstly intelligence gathering and secondly, the US military alliance.

So first on intelligence gathering, the argument is that Australia should be actively involved in the nuclear industry, to find out what's going on and the reactor essentially acts as an "in" to the international nuclear industry. Now this ties in with this debate about Australia's position on the Board of Governors of the International Atomic Energy Agency. Australia is the permanent regional member of the Board of Governors and the significance of this position on the Board of Governors was summarised by a Foreign Affairs bureaucrat a few years ago and I'll read out his words. He said:

"Our role on the Board of Governors is central to our ability to influence the direction of the nuclear industry and the control of nuclear weapons. It's the only body in the world which looks at those issues on a week to week basis and that is fundamental."

Now there he was stressing Australia having influence, but Foreign Affairs bureaucrats are as realistic as we are about Australia's capacity to influence international events.

I think the agenda is more about getting information by being right on the inside running of forums such as the Board of Governors of the IAEA. Now two arguments here. Firstly it's not certain, it's by no means certain that a new reactor in Australia is necessary to maintain Australia's position on the Board of Governors. The second argument is that the IAEA is a highly problematic organisation and I've just got the wind up so I'll move ahead as quickly as I can. There are the problems with the IAEA's role in promoting nuclear technology, including promoting dual use technology, the ongoing problems with the safeguards efforts of the IAEA and so on. So a good, powerful, compelling argument could be made that Australia should be on the outside of the IAEA and should be a strong critic of that organisation.

The government's argument that being on the inside of these institutions gives us better access to knowledge and some degree of leverage ignores the fact that Australia is deeply compromised through that involvement. How could Australia possibly take a leading role in exposing the proliferation risks of research reactors and in advocating responses such as the replacement of research reactors with alternative technologies such as particle accelerators when Australia is itself parroting all the lies about needing a new reactor for medical isotope production, and trivialising the risks, including the proliferation risks.

And it also needs to be understood that Australia doesn't use its position on the Board of Governors to advantage. If Australia was in there pushing hard for stricter safeguards Australia would probably lose its seat. If Australia was pushing for a separation of promotion and watchdog activities Australia would probably lose its seat.

If Australia was protesting about Japan's plutonium program Australia would probably lose its seat on the Board of Governors, and as we know Australia is actively contributing



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to Japan's plutonium program by allowing Australian obligated plutonium to be separated and stockpiled in Japan.

Lastly, this issue of the US alliance and the broader alliance between Australian and US militarism involves Australia playing a watchdog role in the Asia Pacific region and that's precisely how it works in the nuclear field too. Australia plays a watchdog role through channels such as the regional arm of the IAEA and also forums such as the International Conference for Nuclear Cooperation in Asia, and in return for playing this watchdog role and hosting the bases and Australia's in principle support for NMD and all the rest of it, Australia gets coverage under the US nuclear weapons umbrella.

So to sum up, research reactors are part of the problem and they need to be understood as such. What we've got in Australia is a real perversion of reality where the government is actually arguing that a new reactor in Australia will actually make a positive contribution to non-proliferation initiatives around the world. So I'll just leave you with the thought that I wonder how long it will be before a would-be nuclear weapons state is arguing that it also needs a reactor to contribute to non proliferation initiatives around the world. Australia is obviously setting a dangerous precedent there.

Now homework between now and the next MAPW Conference is to read Jean McSorley's paper on these national interest issues. It not only throws a lot of light on this reactor issue but also on everything that's happening in the nuclear field in Australia. You can get that paper off the internet at www.geocities.com/jimgreen3/mcsorley.html

Thank you.