

# **Nuclear Safeguards: some Canadian questions about Australian policy**

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## **Introduction**

Richard Leaver of Flinders University writes that the current regime of IAEA inspections in Nuclear Weapon States characterized by “discretionary and partial coverage of inspections, can have no future in a world aiming for nuclear disarmament.” Leaver seeks the “missing lessons” for Australian uranium export safeguards policy of Canada’s experience in supplying two Candu-6 reactors plus heavy water to China’s massive Qinshan complex. “To go straight to the point: given the abject gutting of Canada’s safeguards policy in China in 2002, why would one believe that Australian safeguards on uranium exports are anything more than another triumph of form over content?” Leaver concludes that “the nuclear suppliers that have commercially profited from dealings with the Nuclear Weapon States are most likely to be the raw materials suppliers - and they therefore bear a particular responsibility for raising the standard of these safeguards. In addition, they also have the point of leverage needed to do so.”

## **Essay: Nuclear Safeguards: some Canadian questions about Australian policy**

Everyone knows that Australia’s thirty year old system of bilateral safeguards on uranium exports was the major policy recommendation to emerge from the Ranger Inquiry established by the Whitlam government. What is much less well known is that this system was essentially a Canadian invention from few years earlier, part of Ottawa’s reaction to India’s ‘peaceful nuclear test’ of 1974.

When it turned out that the fissile material for that test came from a Canadian research reactor supplied on the written condition that it be used for peaceful purposes only - and that the Indians were rubbing salt into the raw Canadian wound by calling their test peaceful [1] - then Ottawa decided there was no option but to move on from the 'gentleman's agreements' of end-use guarantees on their nuclear exports. [2] One result was a system of bilaterally negotiated agreements on uranium exports which were then handed on to the IAEA for verification - the very same system of safeguards [3] that the Fraser government adopted with great vigour (as a Model Safeguard Agreement, or MSA) on the back of the Ranger Inquiry. So the Australian MSA of 1977 was essentially Canadian, even if Canberra liked to think about that issue while moving to the rhythm of 'the colonial strut'. [4]

So there is an early, if relatively ignored, series of Australian copies of Canadian policy prototypes in the nuclear arena. This article, however, deals with a much less dignified Canadian precedent of recent vintage. It shaped up in Beijing in 2002, a few years before the Howard government began engaging Chinese authorities over the subject of uranium safeguards and sales. This time, however, no one was looking, and no lessons were drawn. What the missing lessons might be is my point of conclusion.

## **Canada: answers begging questions**

The origins of this recent experience go back to the 1980s when Beijing first sought to expand its civil nuclear power sector - and the Canadians looked back with hopes for reactor sales. Then, as in India thirty years earlier, they brought a unique design to market - the Canadian Deuterium (CANDU) reactor, a reactor whose primary characteristic is its use of natural uranium as fuel. At that time there was no American commercial presence in the China shop, but competition from the French in particular was acute. For France and China, unlike Canada, were not signatories to the NPT at that time. China, therefore, did not have to accept safeguards on its purchases, and France was not bound to insist upon them as a condition of supply. This probably helped the French company Framatome to win the first round of commercial competition in the China shop, and it obtained the initial contract for the two reactors at Daya Bay - reactors whose primary purpose was the export of electricity to Hong Kong.

By the mid-1990s, Atomic Energy of Canada (AECL) was re-doubling its efforts by aligning its sales pitch behind Jean Chrétien's 'Team Canada' diplomacy, with ten reactor sales in a decade as their target. The French, in the meantime, had signed the NPT and brought their nuclear export policies into line with the norms expected of Treaty members, thereby erasing what marginal marketing advantage they might have previously enjoyed. And indeed, on their second try, AECL was duly rewarded with contracts for two CANDU 6 reactors plus accompanying heavy water for the massive Qinshan complex being put together south of Shanghai. [5] As required by Ottawa's post-1974 legislation and its NPT obligations, the peaceful purposes of these CANDUs would now have to be secured by safeguards.

It is pertinent to recall at this point that CANDU reactors have a very demanding safeguards regime, and for two reasons. First, as mentioned, they are fuelled by natural uranium - which thereby allows their owners to avoid the need for uranium enrichment. Given that enrichment is the most technically demanding and economically costly stage of the nuclear fuel cycle, natural uranium reactors therefore offer their operators a cheap and quick short cut to plutonium. [6] This short cut has historically exercised great appeal, for with the exception of the US in 1945 and Pakistan in 1998, all other states known to have tested nuclear weapons have obtained their initial supplies of plutonium from natural uranium reactors of some kind. [7] The second distinguishing characteristic of the CANDU is that, unlike all other commercial reactors currently in operation, it can be refuelled

without being shut down. The importance of this is that reactor shutdown is relatively easily detected by one or another mode of intelligence, and it therefore offers a clear trigger to an international inspectorate that fuel assemblies are about to be moved around. With the CANDU, however, fuel assemblies can be taken out of and inserted into the reactor core with no external tell-tale signs. Consequently, inspectors wishing to verify the peaceful purposes of a CANDU have to inspect the reactor very frequently – about once every nine days, to be sure. And frequent inspections are, needless to say, economically costly.

Back to the Qinshan storyline. As the CANDUs moved closer to operational status in 2002, the Canadian suppliers discovered two uncomfortable things – that the Chinese were still not interested in safeguards; and that the IAEA was not interested in paying for them. China was now an NPT member state, having signed more or less in tandem with France in 1992, but these two signatures gave them standing as ‘recognised’ Nuclear Weapon States under that treaty (states, that is, which had tested a nuclear device before 1967). And under the NPT, these five original nuclear powers are not required to accept safeguards, despite the fact that safeguards were demanded of Non-Nuclear Weapon States. However, in the name of the appearance of equality, all of the recognised weapon states had in fact voluntarily offered up to the IAEA inspections over some civil elements in their national fuel cycles. [8] China had been the last of the NPT’s recognised Nuclear Weapon States to make this voluntary offer; it foreshadowed it at the 1985 General Conference of the IAEA, and reached agreement four years later as a prelude to its NPT accession. But like the other recognised weapon states, a double-blind process swung into operation at this point. First, Chinese authorities got to draw the line between what was offered for inspection and what was not. And second, the IAEA then got to choose from the Chinese offerings what it would inspect and what it would not. Canada’s demand for safeguards on the Qinshan CANDUs therefore required Chinese authorities to do more than international law asked of them. And as they are great legal literalists, they gave no sign of accepting this notion.

The other thing that may have disturbed the Canadians even more concerned the new attitude of the IAEA to inspections under its recently agreed regime of so-called ‘Integrated Safeguards’. Previously, the IAEA had placed its inspections capability more or less at the disposal of supplier nations: if a nuclear exporter demanded safeguards over its supplies, then the Agency stood ready to provide the service. Now, however, this traditional ‘public goods’ attitude of the Agency was being compromised by a new drive for cost efficiencies. Largely at American insistence, the IAEA budget had since December 1985 been subject to a zero growth restriction. This already dire situation was then seriously compounded after the 1991 Gulf War when existing IAEA procedures were exposed as manifestly inadequate, and a drive to upgrade the NPT verification regime kicked into operation (which ended up with the drafting of an Additional Protocol that allows for challenge inspections). Instead of just verifying the *correctness* of the facilities lists provided to the Agency by its Non-Nuclear Weapon States, the IAEA was now going to establish the *completeness* of these lists. In practice, this amounted to an inversion of the presumption of innocence behind inspections; the absence of the diversion of nuclear materials would set the new safeguards standard. And in the right circumstances, the absence of non-compliance risked becoming a task without end.

Since the upgrading of mandatory NPT safeguards was now going to become more costly, the IAEA therefore began searching for compensatory savings in other areas. Without much fanfare, this relatively quickly resulted in the creation of Integrated Safeguards, where latent complementarities inside the various elements the NPT regime in its broadest sense would be used to lower the aggregate inspection burden upon the IAEA and its members. This subject is particularly opaque, since much of the very small amount written about it is penned in the near-impenetrable bureaucratise of those who live and work in the penumbra of the international inspectorate. [9] In theory, Integrated Safeguards are meant to be non-discriminatory, applicable to the civil fuel cycle

in Nuclear and Non-Nuclear Weapon States alike, but none of the Nuclear Weapon States have as yet signed on. Any country which does - and to date, very few have [10] - will be required to provide to the Agency a complete history of their past dabblings across the nuclear fuel cycle. And benchmark history of this kind can indeed be very useful in focussing and narrowing current Agency inspections - that, as previously noted, have the potential to become almost endless under the AP. But above all else, integrated safeguards are primarily intended to reap an efficiency dividend for the Agency that will help offset the economic burden of the Additional Protocol.

The Canadians had never made a sale to a recognized Nuclear Weapon State, and had gone a long time between drinks over CANDU exports. In the intervening period, previously accepted 'public goods' practices about IAEA safeguards had changed a great deal. So they were babes in the wood so far as old and new dispensations went. This was reflected in the safeguards regime they eventually obtained for their Qinshan CANDUs, where China placed the two CANDUs on the Facilities List that it forwarded to the IAEA for Voluntary Offer safeguards - on the understanding that the IAEA would not actually choose these reactors for inspection. [11] This might best be described as the triumph of form over content. Thirty years of the Canadian non-discriminatory approach to fullscope safeguards was short circuited, with Ottawa essentially retreating into a modern form of the gentleman's agreement that had been so totally discredited two decades earlier. Not surprisingly, ordinary Canadians barely have knowledge about this, while those in the know give expression to their embarrassment by letting the sleeping dog lie.

## **Australia: questions begging answers**

This warning shot from inside the China shop slipped under the radar of public attention in Canada - and also in Australia, where the nuclear scene was in deep political slumber at that time. So deep, indeed, that in 2002 the Howard government was able to obtain passage through parliament (and, indeed, through the Parliamentary Joint Standing Committee on Treaties [12]) of an Exchange of Notes that enables Australian-obligated uranium to be transferred indirectly to Taiwan via the US, even though Taiwan is not (and can never be) a signatory to either the NPT or to an Australian bilateral safeguards agreement. [13] Four years later, however, the public slumber had definitely lifted as Australia and China concluded their own bilateral safeguards agreement, allowing lucrative uranium sales (ultimately up to, some suggest, 20,000 tons per annum) to begin flowing.

There was, of course, considerable public interest at the time in the shaping of Canberra's safeguards agreement, and it was followed up by some analysis - sufficient, at least, to establish its basic consistency with past Australian texts and practices. But like the CANDU safeguards of 2002, the real questions do not concern the internal logic of the agreement so much as the political context in which it will be enacted. To go straight to the point: given the abject gutting of Canada's safeguards policy in China in 2002, why would one believe that Australian safeguards on uranium exports are anything more than another triumph of form over content?

There are three good reasons to suspect that the answer is nothing at all. They drive to: the low strategic value of uranium; the institutionalized place of omission in Australian understandings of the workings of safeguards; and current commercial efforts to change the physical form in which Australian uranium might be sold to China. A brief discussion of each is warranted.

First, in the realm of safeguards, reactors have always mattered more than raw materials. For the IAEA, there is a sliding scale between the increasing sophistication of nuclear technology and the increasing intensity of safeguards. The Agency uses probabilistic mathematics to shape its safeguards effort; hence a country with uranium but no reactor or enrichment plant will not attract any safeguards effort since its chances of diverting a significant quantity of source material to military uses is zero. Its attitude to safeguards in Nuclear Weapon States is therefore something it

would prefer not to talk about. In general, it supports the voluntary offer safeguards of the Nuclear Weapon State, since these help create a political climate that supports the NPT. In practice, it regards the Nuclear Weapons States as horses that have already bolted from the non-proliferation stable, and sees no useful purpose being served by safeguarding their civil nuclear plants. Occasionally, where high-tech facilities appear on their lists, the IAEA will safeguard them to increase its competence with an eye to the future. But it is no surprise that the Agency spends only a few per cent of its safeguards budget in the Nuclear Weapon States, even though more than fifty per cent of global stocks of civilian reactors are found in these five states.

Australians like to believe that uranium is a strategically scarce raw material, or that a looming boom for nuclear energy is about to make it so. The brutal truth, however, is that physical scarcity has been lifting more or less since the Menzies government made its first uranium sales into the US-UK bomb programmes. Given the Agency's technological sliding scale, its lack of interest in Nuclear Weapon States, and in particular its failure to impose an inspections regime on Beijing's CANDUs, what are the chances that it will regard the Australia-China bilateral agreement with any seriousness at all? An agreement that is all shell and no content seems inevitable.

Second, we can be sure that this oversight will be easily hidden from public sight, because the public history of Australia's bilateral safeguards is already marked by massive omissions. On uranium issues, Australian politics is full of low grade moralists seeking high ground to stand on, while simultaneously exhibiting gross ignorance about some very basic matters. So, for example, there is an immense amount of Australian discussion given over to safeguards – but virtually no local commentary on Voluntary Offer safeguards, let alone China's highly legalist interpretation of them. [14] This is in spite of the fact that, with the exception of the communist world's nuclear powers, the three other recognised Nuclear Weapon States have provided Australia's main customer for uranium for the past quarter century. So, also, there is still great interest in the Ranger Inquiry's 1977 discovery that the IAEA had no actual safeguards on uranium and the clever way that the Fraser government's MSA sought to cover up that gap – but no attention at all to the fact that Australian governments had a large hand in fashioning this very same gap a decade earlier. [15] Given this history of deeply embedded omissions, this is not a country where there the will to ask hard questions about safeguards readily exposes itself.

Third, Australian players in the nuclear fuel cycle are currently making it progressively easier for the Chinese to escape any requirement to live up to their apparent obligations. Consider, for instance, the proposals coming from BHP over the last eighteen months to export relatively unprocessed uranium-bearing copper ore direct to China for smelting. As with everything else leaving Roxby Downs in recent times, this is tied up, at least in part, with the looming re-negotiation of the Indenture Agreement for the mine; and the ability to deny the SA government a fair portion of the rewards that it foresaw in the expansion of the mine helps tilt the balance of bargaining power in favour of BHP. At the time it was announced, however, a full bore mining boom was driving up the cost of the Roxby expansion in leaps and bounds, and it appeared to make good sense to geographically shift copper smelting for new ore to China. [16]

Precise details about this 'China Option' have, of course, been hard to come by, but what we do know is that the uranium concentration of the ore at Olympic Dam is very low. If the option is exercised, there will be huge volumes of unrefined ore leaving the country with just small volumes of uranium contained within it. Can we really believe that materials accountancy practices developed for an industry where volumes are relatively small can simply be scaled up inside China to cover modest mountains of unrefined Australian ores?

It may well be that BHP's China plans will, if implemented, come to function as the *reductio ad absurdum* of Australia's bilateral safeguards agreements – much as the Qinshan CANDU safeguards

would have done for Canadian policy had they been known about. For then, like the Canadians, Australians will have the choice between doing something about it or ignoring the subject completely. That is the looming fork in the road that we should currently be preparing to address.

## **Conclusion: the road ahead**

The argument so far might appear to suggest that the future of safeguards is, like their recent past, very gloomy, and that they are hardly worth the bottle. Let me introduce two qualifications that will, I trust, dispel any impression of this kind. First, I have only been discussing safeguards in one of the Nuclear Weapon States, China. Second, safeguards (understood, once again, as peaceful end-use obligations plus verification mechanisms) are an absolutely indispensable part of any future that includes nuclear disarmament. It is simply not conceivable that countries which currently have nuclear capability can be taken at their word on nuclear rollback without there being a credible regime of international inspections to verify those reductions. The current regime of inspections in Nuclear Weapon States was not designed to the high standards that will be required for future nuclear disarmament. It was, instead, a bolt-on adaptation made to a political rather than a technical formula. The major features of this adaptation, the discretionary and partial coverage of inspections, can have no future in a world aiming for nuclear disarmament.

Since each and every one of the recognized Nuclear Weapons States achieved their standing through their own efforts, it goes without saying that they approach a disarmed future with a high degree of self-sufficiency built into their nuclear fuel cycle. [17] But if there is any systematic chink in their national wall of nuclear self-sufficiency, it is most likely found in low-tech areas like raw materials supply, where the large scale commercial requirements of our time cannot be serviced with the back-yard uranium deposits of yesteryear. So the nuclear suppliers that have commercially profited from dealings with the Nuclear Weapon States are most likely to be the raw materials suppliers - and they therefore bear a particular responsibility for raising the standard of these safeguards. In addition, they also have the point of leverage needed to do so. In my view, the use of this leverage to raise the bar on safeguards standards in Nuclear Weapon States is something that major raw materials suppliers like Australia should think about, both individually and collectively.

## **References**

[1] The aggravation also extended to the newly operational Nuclear Non-Proliferation Treaty, which contained an article allowing peaceful nuclear explosions. Needless to say, the Indians had by 1974 dug in behind a very dim view of the NPT.

[2] The upgrading process is ably described and analysed in Ron Finch, *Exporting Danger: A History of the Canadian Nuclear Energy Export Programme*, Black Rose, Montreal-Buffalo, 1986, pp. 82-99.

[3] In the modern *lingua franca*, safeguards equal agreements plus verification mechanisms.

[4] The term comes from Robert Hughes, who defined it as ‘...march[ing] up and down to the tune of *Waltzing Matilda* pretending that nothing made outside Australia is relevant to Australians’: R. Hughes, *The Culture of Complaint: The Fraying of America*, Oxford University Press, Oxford, 1993, p. 91. It is, of course, the inversion of the better known colonial cringe.

[5] See Duane Bratt, *The Politics of CANDU Exports*, University of Toronto Press, Toronto, 2006, esp. pp. 183-4.

[6] Because it does not consume enriched uranium, the CANDU could, in theory, have been regarded as a faithful servant of the cause of non-proliferation, for countries that install the CANDU do not create a secondary need for enrichment capacity. Paradoxically, in the early phases of the civil nuclear age, and largely because the US held a monopoly over commercial-scale enrichment technology in the non-communist world, this potential virtue was turned into a defect. Precisely because it offered a low-cost pathway around the American monopoly, the CANDU came to be regarded as a dangerous technology with considerable proliferation potential.

[7] Except for the absence of a test, South Africa should also be included on this list. Its six original explosive devices, which date from the late 1970s, were fuelled by high enriched uranium made in its Pelindaba enrichment plant: see 'Slow but Steady', *The Bulletin of the Atomic Scientists*, 49(6), 1993.

[8] To be technically correct: France has never made any offer, but as a member of the Euratom system, its civil facilities are automatically subject to Euratom safeguards. That is to say, unlike the NPT, Euratom does not accept any distinction about the treatment of civil nuclear facilities between its nuclear and non-nuclear signatories.

[9] For example, see Jill N. Cooley, 'Integrated nuclear safeguards: genesis and evolution', in Trevor Findlay (ed.), *Verification Yearbook 2003*, VERTIC, London, 2003. For a more accessible treatment, see Jack Boureston and Yana Feldman, '[Integrated nuclear safeguards: development implementation, future challenges](#)', *Compliance Chronicles*, no. 4, Canadian Centre for Treaty Compliance, Carleton University, Ottawa, January 2007 <<http://www.carleton.ca/cctc/docs/CC4.pdf>>.

[10] It was notable that the Howard government, a vigorous supporter of the Additional Protocol, was quick to sign on to Integrated Safeguards and sell their virtues. Indeed, a considerable amount of the sales effort for Integrated Safeguards has come from a team in the Australian Safeguards and Non-Proliferation Office; see, for example, Victor Bragin, John Carlson and Russell Leslie, 'Integrated Safeguards: Status and Trends', *Nonproliferation Review*, 8(2), 2001.

[11] For reportage by the legendary Mark Hibbs, see his 'China or its suppliers must pay for added safeguards, IAEA says', *Nuclear Fuel*, 27(15), 2002, and also 'Fuel Loaded at Qinshan-III PHWRs After Ottawa Passed on Safeguards', *Nuclear Fuel*, 27(18), 2002.

[12] See Parliament of Australia, Joint Standing Committee on Treaties, [Four Nuclear Safeguards Treaties tabled in August 2001](#), Report 44, May 2002, Chapter Three <<http://www.aph.gov.au/house/committee/jsct/nst/report.htm>>.

[13] This, oddly enough, mirrors a Canadian arrangement from 1993. At the time it was made, the president of Cameco, the giant Canadian conglomerate, suggested that Australia would 'be next in line' to get a similar agreement with Washington: see Alan Freeman, 'New treaty lets Canada sell

uranium to Taiwan: U.S. would handle nuclear fuel', *The Globe and Mail*, 8<sup>th</sup> March 1993. He was right, albeit nearly a decade later than he thought.

[14] For a partial exception, see Marko Beljac *et.al.*, An Illusion of Protection: the unavoidable limitations of safeguards on nuclear materials and the export of uranium to China, a Report prepared for the Australian Conservation Foundation and the Medical Association for the Prevention of War (Australia), October 2006, p. 33.

[15] For my own attempt to address this particular issue, see 'The Illusion surrounding *The Illusion of Protection*', paper presented at the Australasian Political Science Association conference, University of Queensland, July 2008.

[16] Appearances, as always, might have been deceptive: China's electricity consumers were becoming accustomed to brown-outs when BHP's 'Plan B' was first floated. But that is another matter.

[17] China is a partial exception to this rule of self-sufficiency, for in the late 1950s, the USSR gifted it the designs for the industrial infrastructure of the nuclear fuel cycle. Even today, the most modern of China's enrichment plants is a Russian import, albeit on commercial rather than gift terms.

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