



Comments to the National Radioactive Waste Management Project

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INTRODUCTION

The Medical Association for Prevention of War (MAPW) is an organization of Australian medical and other health practitioners, formed in 1981, which addresses the health consequences of warfare and associated social and industrial aspects of modern warfare. Although the majority of Australia's radioactive waste had its origin in research, medical and civil industrial processes, its potential for diversion into terrorist activities makes its future management highly relevant to our cause.

The Public Health Association of Australia (PHAA) is recognised as the principal non-government organisation for public health in Australia and works to promote the health and well-being of all Australians. The Association seeks better population health outcomes based on prevention, the ecological and social determinants of health and equity principles. This includes, but goes beyond the treatment of individuals to encompass health promotion, prevention of disease and disability, recovery and rehabilitation, and disability support. This framework, together with attention to the social, economic and environmental determinants of health, provides particular relevance to, and expertly informs the Association's role.

Both the MAPW and the PHAA have a long and sustained history of advocacy in relation to issues relating to radioactivity and the nuclear fuel chain. In 2011, along with other peak health organisations, we released a Joint Health Sector Position Statement into Nuclear Medicine in Australia which addressed the issues relating to Australia's nuclear medicine industry and storage of its waste. For many years we, along with other health, scientific, environmental, Indigenous and community groups have been calling for a comprehensive independent inquiry into Australia's nuclear industry and waste storage options to take place before any new waste repository development is embarked upon.

COMMENT

Thank you for the opportunity to comment on the National Radioactive Waste Management Project. As organisations of health professionals we are acutely aware of the importance of stringent management of radioactive materials and the need for best practice in the production, storage, transport, use and long-term stewardship of radioactive materials.

Australia's radioactive waste inventory consists of several thousand cubic metres of low level waste and approximately 500m³ of intermediate level waste, presently stored at numerous locations

across the country. A small volume of intermediate level reprocessed nuclear fuel rods from the Lucas Heights nuclear reactor is scheduled to return to Australia in the coming years.

Nuclear medicine involves the use of radioisotopes for the diagnosis and treatment of medical conditions. Nuclear medicine is actually only responsible for a small proportion of the overall waste burden. Nearly all radioactive medical waste is sufficiently short-lived to enable 'delay and decay' whereby local storage is utilised until its activity is reduced to enable it to be classified as 'exempt waste' and thus enabling subsequent safe disposal in the conventional waste disposal streams. An exception is the significant stockpiles of radium, not used medically since 1976 but constituting intermediate level waste sitting at various sites (including hospitals) around the country and requiring long term safe disposal. An approximately equal amount of the total radium burden was also used for industrial and defence purposes. Significant concerns exist within the Australian community and amongst health professionals and scientific experts regarding current research reactor-based production of medical isotopes and the Commonwealth Government's position regarding the disposal of reactor and processing waste derived in their production.

Risk

There is no level of radioactive waste that is regarded as risk-free, hence the need for appropriate management. Even low-level exposure poses a small but finite risk of harm, especially the development of cancers. The 2005 report of the National Academy of Sciences in the US, BEIR (Biological Effects of Ionising Radiation) VII, stated "A comprehensive review of available biological and biophysical data supports a "linear-no-threshold" risk model – that the risk of cancer proceeds in a linear fashion at lower doses without a threshold and that the smallest dose has the potential to cause a small increase in risk to humans." This risk is greater for children than for adults, and greater for females than for males. There are also risks of genetic damage to humans and other life forms.

Minimisation

Australia's current radioactive waste management plan fails to address the clear need for waste minimisation. Most of Australia's accumulated and future nuclear waste derives from the past (HIFAR) and existing (OPAL) nuclear reactors in Sydney.

The best strategy regarding radioactive waste is to produce as little as possible. The best form of waste management is for the Federal Government to 'turn off the tap' - reduction at source.

Transport

Transport of nuclear waste to centralised storage or disposal facilities increases the risk of accidents, sabotage and contamination. It is the phase during which it is most difficult to secure the material, and the risk of terrorist access is greatest. The manufacture of a "dirty bomb" (radioactive material dispersed by conventional explosive) would be a relatively easy task for a terrorist organisation as long as there is less secure access to the radioactive material. Therefore transport must be minimised.

There are ongoing concerns about the preparedness of local emergency service to respond in the event of an accident. Questions have been raised in various jurisdictions about the capacity of local authorities to manage accidents involving radioactive waste. There is confusion between the relevant jurisdictions and combat agencies with regard to appropriate responses and respective areas of responsibility.

Transportation of radioactive waste through key agricultural regions and across major river systems could have negative impacts on key Australian agriculture, food, wine and tourism industries.

Storage/Disposal/Stewardship

Radioactive waste management necessitates particular scrutiny because of its long-term threat to human and other organisms' health. We cannot be certain how robust a waste facility will be over such an extended period of time, let alone how robust political oversight and management will be. While nuclear proponents generally downplay or deny the risks of unexpected consequences, evidence indicates that, even in the short term, plans and predictions can go awry.

Current international best practice dictates that low-level waste can be buried at a depth of about 30 metres, while intermediate-level waste should be buried in geologically stable ground well away from groundwater, at a depth from 30 to 300 metres. However current plans in Australia are for *above-ground storage* of intermediate level waste with institutional controls required indefinitely. The overall picture of international best practice is that countries should have a policy and strategy for management of radioactive waste, in which storage has a legitimate temporary role ***provided there is a further strategy for ultimate disposal of the waste. Australia's current policy of indefinite storage for intermediate level waste is inconsistent with international best practice.***

Furthermore, in developing a national strategy it is necessary to ensure an appropriate infrastructure is in place to manage radioactive waste. Unlike the case in Australia, some countries have achieved this by establishing a radioactive waste management organisation. A national strategy of this standard would include elements such as:

- Analysis of present and likely situations regarding radioactive waste;
- Options for managing radioactive waste;
- Responsibility and funding;
- Radioactive waste management system;
- Legal framework;
- Return to supplier;
- Discharge/disposal;
- Security.

It is important that Government policy and strategy for radioactive waste management should consider developments in international best practice, and in particular the guidance published in safety standards published by the IAEA. One important concept to consider in regard to disposal solutions is that of '**retrievability**': better ways to deal with the waste are likely to emerge in the future.

This understanding is implicit in the IAEA 'Safety Standards':

1.8. The term 'disposal' refers to the emplacement of radioactive waste into a facility or a location with no intention of retrieving the waste.

*Disposal options are designed to contain the waste by means of passive engineered and natural features and to isolate it from the accessible biosphere to the extent necessitated by the associated hazard. The term disposal implies that retrieval is not intended; ***it does not mean that retrieval is not possible.***" [http://www-pub.iaea.org/MTCD/publications/PDF/Pub1449_web.pdf]*

Whatever transpires in terms of Australia's long-term radioactive waste management, *all* facilities generating such wastes need to be as secure and safe as possible. Even if we bury radioactive waste in a remote centralised location, the producers of waste will continue to need on-site storage. Such institutions – hospitals and industrial facilities - generally have (or ought to have) the expertise to manage their waste safely. Where storage facilities are inadequate they need to be remedied, pending longer-term management processes.

Under the current radioactive waste management proposals, waste would be transported to the centralised facility only every few years anyway, so the *interim* storage has to be secure, i.e., its security needs to be every bit as rigorous as that of *any* centralised facility. There is no point having a fortified, impenetrable centralised facility if the radioactive materials at sites of generation or interim storage are any less secure. So if *current* storage facilities for Australian radioactive waste are in some way inadequate or flawed - as proponents of the centralised facility have suggested - this should be a loud wake up call to rectify that situation, not a justification for building a remote centralised facility.

Impacts on Indigenous Peoples

We note with concern the strongly expressed rejection by local Aboriginal representatives (the Kungka Tjuta in South Australia, leaders from Muckaty, and more recently from the Tanami region) of the location of the proposed repository on their country.

Population health studies in other communities around the world suggest likely deleterious impacts on health if their right to control their lives is further eroded. The imposition of a national radioactive Waste Repository against the wishes of the Traditional Owners is likely to cause further deterioration in health parameters via influence on the social determinants of their health. Given the well-documented current poor health status of Australian Aboriginal peoples, this potential health effect should be a critical determinant in radioactive waste management planning.

It should be noted that indigenous Australians in particular have already suffered from imposition of nuclear contamination. The British nuclear bomb tests at Maralinga in the 1950s were conducted with scant regard for their welfare, and the “clean-up” of their lands left plutonium-contaminated debris in shallow burial trenches.

Application of radioisotopes in medicine

Nuclear medicine relies on the ionising radiation released by radioisotopes. Ionising radiation is harmful to living organisms, and its use should be minimized, balancing potential benefits and risks in every application.

The overwhelming majority of nuclear medicine procedures performed are for *diagnostic* purposes.

Radioisotope production

The radioisotopes used in nuclear medicine are produced either by nuclear reactors or by particle accelerators such as cyclotrons. Australia presently utilises both technologies. Australia also draws on the international market through importation. There is an efficient and reliable global supply and distribution network that could supply Australia with most of its medical radioisotopes, including technetium-99m in the form of molybdenum generators.

Reactor-derived radioisotopes require uranium – and therefore the uranium industry - for their manufacture. Reactor and uranium-based nuclear medicine engenders significant problems – namely, long-term public health and environmental risks, and the repeatedly-demonstrated connection between the use of 'research' reactors and weapons programs.

Cyclotron derived radioisotopes do not require uranium and have substantially lower adverse health implications associated with their production and disposal, including a much-reduced waste stream.

Overseas practice shows that it is feasible for radioactive isotopes to be supplied through non-reactor sources. The Canadian Government has recently decided to support research and development in expanding non-reactor based isotope production (using particle accelerators) and that the development of a new research reactor could not be justified on the grounds of isotope production. By diversifying the sources of isotope production, greater certainty in access to isotopes will be achieved whilst simultaneously reducing the health risks associated with the operation of nuclear research reactors.

The production of radioactive isotopes for nuclear medicine comprises a small percentage of the output of research reactors. The majority of the waste that is produced in these facilities occurs regardless of the nuclear medicine isotope production.

Linking the need for a centralized radioactive waste storage facility with the production of isotopes for nuclear medicine is misleading.

Waste incurred from medical radioisotopes

Despite claims of numerous senior Commonwealth Ministers, a Commonwealth waste dump is *not* required for Australia to continue to provide world-class nuclear medicine procedures. The “medical necessity” claim is worse than fallacious: it is deliberately misleading. It is a particularly disturbing manipulation of the emotions of the sick and the dying – and their carers. The majority of waste produced from medical radioisotopes decays almost entirely in a few days and is then classified as exempt waste (EW) which can be disposed of in the existing general environmental waste systems. The vast bulk of the remainder is ‘very low level waste’ (VLLW) which similarly does not require a specific waste repository and usually can be disposed of by the user in landfill. Only a small fraction of the balance is ‘low level waste’ (LLW) requiring only specific shallow burial, and does not require dedicated storage at a Commonwealth repository. An extremely small amount of medical waste is designated ‘intermediate level waste’ (ILW) and is presently safely stored at hospitals and research facilities.

A nuclear reactor creates highly radioactive spent fuel rods as waste. The nuclear reactor at Lucas Heights (OPAL) is predominantly a research reactor. Radioisotope production therefore only accounts for a small proportion of its waste.

The production of radioisotopes by particle accelerators does not produce waste that would require storage at a specific repository.

Dialogue and transparency

For decades now Commonwealth governments – both Labor and Liberal – have been committed to the development of a centralised radioactive waste facility at a variety of sites across Australia. When attempts to locate such a facility in South Australia failed due to local opposition, the project shifted to the Northern Territory, initially focusing on three Department of Defence sites - Harts Range, Mt Everard and Fisher's Ridge and then to Muckaty Station. When the latter project failed – again due to local opposition – the Minister launched a new, nation-wide search for a volunteered site.

The principle of “community acceptance” is a core feature of international ‘best-practice’ in radioactive waste management systems (according to the principles promoted by the International Atomic Energy Agency - IAEA). This does not simply mean *post hoc* “consultation”: the community must give *informed consent* to the facility. The concept is well-illustrated in the following account of Sweden’s advanced nuclear waste program:

*“The special character of the nuclear waste issue will by necessity lead to a need for local understanding and support for the project in order to be able to construct and operate a repository ... It was judged necessary to create a participatory and voluntary process in order to achieve such understanding ... **Dialogue and transparency is essential for a fair and successful decision process.** This can be as much of an important and difficult task as the questions concerning geology and technology.”* Claes Thegerström, President of SKB, the Swedish Nuclear Fuel and Waste Management Co. (1)

By contrast the ‘fast-track’ approach of the Australian government to date has been characterized by deception and authoritarianism. The over-arching theme of imposition was highlighted by the Minister with carriage of the radioactive waste portfolio in 2005, when he asked:

“Why on Earth can’t people in the middle of nowhere have low level and intermediate level waste?”
- Liberal MP Brendan Nelson, Minister for Science ABC TV, 15th July 2005

The advice of Canada’s senior authority on nuclear waste management is poignant:

*“How we approach this challenging public policy issue will say a lot about **our values and priorities as a society**”.* Elizabeth Dowdeswell, President of Canada's Nuclear Waste Management Organization (2)

Canada and Sweden are world leaders in the field of radioactive waste management and whilst their programs are far from flawless, their emphasis on *community acceptance* reflects very badly on Australia’s radioactive waste management approach to date.

CONCLUSION

It is disturbing that the proposed facility is planned to serve as an indefinite store for ILW with no final disposal solution, in contravention of international best practice. Indeed, Australia has come under significant criticism for its failure to address this.

The proposals for management of Australia’s waste have failed: technically failing to ensure an acceptable long-term management pathway for the most serious intermediate level waste - in contravention of international best practice and IAEA requirements - even if it is able to meet the needs of low level waste disposal. And failing procedurally: the discredited “Decide, Announce, Defend” method of imposing a government’s will whilst attempting to stifle all means of redress.

Australia needs to dispose of this radioactive waste legacy appropriately and minimise further waste burdens on future generations and the environment. As a society we need therefore to move towards a sense of pro-active stewardship and “harm-minimisation” with “disposal” being the final option. A fundamental principle must be that no new activities involving radioactive materials should be introduced without a full life-cycle waste management plan, with exploration of alternatives, minimisation of waste, and a proper disposal plan: the so-called ‘cradle-to-grave’ strategy. A crucial aspect of this approach is to find alternatives to nuclear power and medicine to minimise the future production of radioactive waste.

What is needed is an independent public inquiry, honest and transparent policy bodies, regulation that is based on world's best practice and adequate funding through an independent body to handle our radioactive waste. We also need the government to stop misrepresenting the medical profession.

And we need to reassess the need for a nuclear reactor, *now*, not in 40 years time when the OPAL reactor has reached its usable life. We need to be planning and actively researching, perhaps jointly with Canada, the non-reactor production of predominantly technetium-99m with a view to transitioning to a non-nuclear source of radiopharmaceuticals. The vested interests at ANSTO should not have sole carriage of this process. The interests of human health and the biosphere need representation as well.

RECOMMENDATIONS

1. Reduction at source (waste minimisation) is the fundamental principle in reducing the risks of environmental contamination from nuclear waste:
 - a. phase out of the nuclear reactor program at Lucas Heights. Australia's world-class nuclear medicine capability can be sustained by a combination of importation and local isotope generation - as occurs during shutdown periods at the current OPAL reactor without any adverse medical consequences.
 - b. The use of reactor-produced isotopes in medicine should be minimised in favour of those techniques and imaging modalities that do not rely on them.
 - c. promotion of safer imaging technologies including MRI, advanced CT, ultrasound and positron emission tomography
 - d. Increased research and development of non-reactor technologies for the production of medical isotopes
2. An Australian **national radioactive waste management policy** should be developed, informed by experts and members of the public through a **comprehensive independent inquiry**. An inquiry would assess:
 - a. all options for radioactive waste management
 - b. current activities in international best practice
 - c. radioisotope production
 - i. assessing non-reactor based isotope production of medical radioisotopes
 - ii. exploring Australia's capacity to utilize current facilities to research, develop and produce our isotopes in particle accelerators; and
 - iii. assessing necessary infrastructure requirements to ensure economic viability of a non-reactor based isotope industry.
 - d. nuclear medicine waste disposal
 - i. establishing the number and type of nuclear medicine procedures being performed annually and
 - ii. the number of Australians on whom these procedures were performed
 - iii. quantifying the true volume and nature of medical waste presently in storage and the expected volume in the future
 - iv. investigating capacity of hospitals and research institutions to continue to store this waste indefinitely, especially if Australia shifts away from reactor derived radioisotopes; and

- v. establishing the importance of the nuclear medicine waste stream to the proposal to establish a centralized Commonwealth waste storage facility.
3. As part of this process it will be necessary to develop and publish a full inventory of radioactive waste in Australia - what it is, where it is, and who has jurisdiction.
4. Pending the development of a policy, all radioactive waste must remain accessible for monitoring. It should be stored in a dry, monitored and retrievable fashion at or near the site of production. In the case of the intermediate level reprocessed fuel rods set to return to Australia soon, it is most appropriate that they be stored for the time being at their place of production, Lucas Heights. Lucas Heights is the best equipped facility in Australia to store such waste at present.
5. Should it be decided to embark on deep geological disposal in Australia then the issues of access and retrievability need to be considered in the planning and implementation processes, in the event of advances in disposal technologies.
6. Transportation of radioactive material should be minimised. There must also be consultation with all those communities along the proposed route, including emergency, police, health and environmental protection services.
7. Radioactive waste transport or storage should not be imposed on unwilling communities.
8. Radioactive waste storage facilities and practices should be subject to regular independent audits and public review to increase transparency and ensure compliance with Australia's policy.



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