

# Managing Australian Radioactive Waste in an International Environment

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## 1. Introduction

There is world wide growth in the interest in nuclear power, driven by the increases in fossil fuel prices and by increasing concern about the impacts on climate of CO<sub>2</sub> emissions. In Australia, the recent decision by the Government to export uranium to China has intensified the on-going discussion in the media on the broad topic of nuclear energy.

The questions being aired in the Australian discussions are typically the following

- Should we (Australia) be mining uranium?
- Should we be exporting uranium?
- Should we generate nuclear power?
- Should we host a nuclear waste repository?

The decision to proceed with any or all of these actions cannot be taken by any one group of people within the community. The choices cannot be made by politicians, or scientists, or economists alone. These decisions require the “informed consent” [1] of the community as a whole. Such consent can only arise on the basis of widespread informed discussion.

Unfortunately, the on-going discussion in the media has done little to inform the community, and very often the discussion has been misleading and has given rise to confusion. This confusion has been generated by all parties involved in the discussions, both proponents and opponents of nuclear power.

The following are some examples of recent confusing messages to the community by governments, industry, proponents and opponents of nuclear power.

- The federal opposition has a “three mines policy”, that is there should be no new uranium mines. However, it does not object to doubling the output of Olympic Dam, the largest uranium mine in the world.
- Despite the fact that we inhabit one of the biggest, most sparsely settled and geologically stable continents in the world, Australians still can’t agree about where to store their own relatively small quantities of low and medium level radioactive waste.
- The Prime Minister speaking on nuclear power says “At the moment it’s not economically attractive enough to do so, but my philosophy is that if it becomes economically attractive, I would not oppose it any more than I oppose the export of uranium”.
- The Resources Minister states that “our abundance of clean coal makes it very very hard for nuclear power to stand up economically”.
- Helen Cauldicott, a prominent opponent of nuclear power, claims to seek an informed national debate about production, export and use of Australian uranium, while simultaneously emphasising to the public the dangers of misuse of this material, implying that it will be misused.

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- The anniversary of the Chernobyl reactor disaster stimulated a lot of public discussion, most of it very emotional suggesting that Chernobyl disasters will be the norm rather than the exception in a future with nuclear power.
- Ian Hore-Lacy, a proponent of nuclear power, states that “nuclear wastes are arguably a distinct positive due to their relatively low quantity and ease containment, storage and disposal”.
- The Treasurer stated that “far from being the dirty energy source, it may in fact turn out to be the clean energy source when compared to fossil fuels”. Also “Australia cannot mine uranium and sell it to other people and then pretend it would never use it in its own country”.
- New Scientist reports that nuclear power continues to prompt concerns based on safety issues, regulatory problems and the risk that it encourages proliferation of nuclear materials and weapons.
- The Australian Conservation Foundation asserts that there are six quick reasons nuclear power can't solve climate change – too slow, too costly, too ineffective, too destructive, too dirty, too dangerous.

A lot of words have been written, but the community has not been informed. Most of the information is presented as one liners with no substantiating evidence. The community is not able to provide or refuse “informed consent” on nuclear power, or disposal of nuclear waste in Australia on the basis of the information available.

## **2. Managing Radioactive Waste in Australia**

In recent years, there has also been an on-going public discussion in Australia about radioactive waste and the search for suitable sites for their storage and disposal. Much of the debate has revolved around the Australian Government plans for building a near surface repository in South Australia and for finding a temporary storage site for the radioactive waste that will not be acceptable at a near surface repository. During the same period, a private initiative (the Pangea Project) studied the feasibility of disposing of waste deep down in the geologically very stable rock formations underlying much of the desert regions of Western and South Australia.

In 1992 the Australian government initiated a technical process to establish a natural low level waste repository. However, after a repository site was selected in South Australia, the state challenged the project and the acquisition of the site was invalidated by the Federal Court [2]. The federal government is now proceeding with the establishment of a Waste Management facility for Commonwealth low level and intermediate level waste but not for state waste

These diverse repository projects have led to confusion – sometimes deliberately provoked - between the various initiatives for storage and disposal of radioactive waste in Australia. However, these are three very different objectives.

The Australian Government is pursuing two goals: building the National Low-Level Waste Repository for Australian low level radioactive waste (LLW) and identifying a suitable location for a National Store for intermediate-level waste (ILW) created in Australia. A separate objective, promoted earlier by Pangea Resources and more recently by various individuals, is to study the feasibility of siting an international repository for high-level radioactive waste or spent nuclear fuel (HLW/SF) in Australia .

All these proposals are concerned with the safe and economic management of radioactive waste, but they are three distinctly separate initiatives aimed at different types of waste. Some of the confusion between the projects has been deliberately encouraged by anti-nuclear groups and those who hope to oppose progress in any area by wrongly asserting that direct links exist between them. There are others – mainly in politics - who have tried to deflect opposition from national projects by stirring up feelings against an international repository.



### 3. Type of Repositories

The accepted approaches to safe management and disposal of radioactive waste depend on the properties of the waste. Most important is the length of time for the natural process of radioactive decay to reduce the hazards to levels which do not endanger people or the environment. This has led to three types of technical facilities being developed throughout the world.

- *Near surface repositories*, such as a National Low Level Waste Repository: These are for permanent disposal of LLW on, or near to, the ground surface. The technique is widely applied around the world, for example in France, Spain, USA and UK, and is suitable for waste whose radioactivity decays to insignificant levels in a few hundred years.
- *Surface storage facilities*, such as the proposed National Store for ILW: This is an interim or temporary measure used for long-lived waste that must eventually be disposed of in a deep geological repository. Surface stores, if properly maintained and safeguarded, can be operated for many decades, but they are not a permanent solution. The burdens of maintenance are passed to future generations which may not have the resources to perform these functions properly.
- *Deep geological repositories*, such as those proposed in many countries and previously also for Australia by Pangea: This is the safe and permanent solution, technically accepted worldwide, for disposal of high-level radioactive waste, spent fuel from nuclear reactors and all other long-lived waste. Geological repositories provide permanent secure isolation, without placing any technical, financial or institutional burdens on future generations.

Which of these facilities does Australia need?

### 4. Options for Australia

Australian LLW, which originates from medical, industrial and scientific applications that are of benefit to the whole country, must be managed responsibly. A repository facility for disposal of LLW already exists in WA at Mount Walton and a National Low Level Waste Repository is proposed by the Australian Government. It makes environmental and economic sense to build and operate a centralised disposal facility. The problems associated with successfully implementing the project are, as for all radioactive waste facilities, more societal than technical. One fundamental reason for opposition to such a repository is that waste is produced over the whole country but a common national disposal facility providing a service to all must be hosted by one specific community. Overcoming this perceived inequity is the challenge currently facing the Australian Government. However, disposing of LLW in a near surface repository is a relatively straightforward and technically simple task and the requirements for a suitable site are not very demanding. The comprehensive technical effort that was undertaken in Australia to screen potential sites for LLW disposal could well be interpreted as driven by politicians hoping to find a technical solution to a societal problem.

The political handling of the Australian ILW issue is an even more obvious mix of science and politics. The small quantities of ILW produced in Australia, primarily from operating a research reactor and production of medical isotopes, can be safely stored on the surface for a long time. However, the only safe and ethical ultimate solution is disposal in a deep geological repository. The surface store is simply a robust and secure building – a sophisticated warehouse. It can be safely built and operated at almost any location if proper care and maintenance activities are assured. The Government's declared intention to set top scientists to work to identify the best location for such a store is a blatant example of misuse of science in government policy.

On the other hand, the requirements for siting a deep geological repository for the ILW are very stringent and world-class science is indeed required here. Demonstrating long-term safety depends upon gaining an understanding of the deep geological environment upon which the isolation of the waste depends. Australia does not generate nuclear power, and thus does not have significant quantities of long-lived waste, but this does not remove the need for a deep repository. Australia will ultimately need such a facility if it chooses to manage its own ILW without international co-operation. This is recognised even by the Australian

Government in raising the concept of a National Geological Repository, but the establishment of such a facility has been postponed - to be done at some undefined later date using funding from some unidentified source.

The good news for Australia is that, should it eventually choose to build a deep geological repository for its ILW, there is no other region of the world more suitable for such a facility from a scientific point of view. The ancient stable continent of Australia has huge expanses of dry, flat, geologically simple regions which would be ideally suited for safe deep geological disposal. The scientific and technical issues would not, therefore, be the major constraint. A siting programme for an ILW repository will, however, run into unavoidable societal problems, just as the LLW programme has done. Moreover, for disposal of ILW, the bad news for Australia is that implementing geological repositories is a technically challenging and a very expensive task, even for small quantities of waste. It has taken many years of research and investment of billions of dollars around the world to bring repository projects close to implementation; only a few countries, for example Sweden, Finland and USA, have as yet advanced this far.

The costs predicted for developing deep geological repositories are in the range of billions of dollars. These costs do not depend strongly on the quantity of waste for disposal, because the expensive activities are the preparatory work, site investigations and the construction of the surface infrastructure and the access shafts and declines, rather than the tunnels needed for waste emplacement underground. This means that huge economies of scale are possible, and it is one reason why many countries with small quantities of waste requiring deep disposal are interested in the concept of shared international repositories. The Australian Government also notes in its own 1999 publication [3] that “the cost of constructing a deep disposal facility for long lived intermediate level waste is not presently justified given the small quantity of such waste”. How or when it will ever be justified is not expanded upon. So what should Australia do with its ILW?

One option for Australia is simply to store the ILW indefinitely, hoping that future generations will come up with new ideas for permanent disposal and the financial resources to implement them. This is an unethical neglect of responsibility. An ethically acceptable and politically defensible option is for Australia is to export the ILW waste – provided this is done in agreement with a trusted and responsible foreign host country that will dispose of it safely. This could be either a country which has a large national waste disposal programme and chooses to offset costs by accepting waste for disposal, or a country willing to host an international repository operated for the benefit of many countries. The third option is that Australia itself could become a willing host country, able to dispose of its own waste in a facility also open to others.

Australia is one of the relatively few countries which could easily and credibly host an international repository. There are huge incentives for Australia doing this. These include contributing to world environmental safety and establishing a high technology industry bringing significant economic benefits. A further point of increasing global significance is that a trusted and responsible host country disposing of radioactive waste in an internationally-monitored facility could also contribute greatly to enhancing world security. Recent initiatives from Russia and the USA propose that the world stocks of sensitive nuclear materials including spent fuel should be looked after by trustworthy countries. There is no country in the world that would be more welcomed by the global community as a reliable and competent host nation for an internationally monitored disposal facility than Australia.

While not as important as finding a demonstrably safe repository, the financial benefits to the host country would be substantial. Australia could receive billions of dollars in investment and billions in revenue over decades and could also benefit from the thousands of jobs created. This could be achieved by disposing of just a part of the world's nuclear waste, in concert with other international repositories. In addition to the economic benefits, Australia would ensure a safe, permanent and cost-effective solution for disposal of Australian ILW and any other long-lived waste. The positive national and global environmental impacts of a radioactive waste disposal project are a stark contrast to the global CO<sub>2</sub> emissions that will result from using the Australian coal and natural gas sold to other countries. The national economic benefits of a disposal facility would far outweigh the much lauded benefits to Australia from the sale of coal and gas to other countries.

## **5. The Informed Consent Should Be Based on Informed Discussions Rather than Emotive Assertions**

The work done to date provides evidence that Australia has very large regions suitable for a demonstrably safe deep geological repository. The technical studies done, and subsequently reviewed by eminent Australian and foreign scientists are available to the public and can be judged by any interested body. An international repository in Australia could be Australian owned and its operations would certainly be regulated by the appropriate State and Federal Agencies as well as monitored by international bodies. The concept can progress only if the scientific and economic merits are understood and accepted by the Australian people. Australians can decide whether the advantages of hosting an international facility outweigh the disadvantages. But an open and informed discussion on the facts should precede any consent. The question is whether an open discussion on the international repository concept has ever taken place.

When the issue arose recently, some politicians, before any informed discussion took place, jumped in with popularity seeking declarations that Australia will not accept radioactive waste from other countries. However, there is no clear evidence, as opposed to loudly voiced opinions of opponents to nuclear power that are interested in the waste problem remaining unsolved, that this view is indeed shared by the majority of Australians.

One thing is clear. Whipping up sentiment against an international repository will not divert attention from the real challenges facing Australia over the issues involved in safely managing its own radioactive waste. The recent debacle on the LLW repository and the ILW store has made many Australians aware that they do face these challenges, independently of the issue of international repositories. But is an expensive and controversial and purely national waste management programme the sensible way for Australia to tackle its waste problem? A more rational approach would be to consider how the concept of international repositories might benefit Australia, either by opening a route for disposal of its ILW in another country or by turning an expensive future commitment into a positive boost for Australia's world standing and national economy. Before either of these options is rejected, it is important to ensure that the people are aware of the whole picture concerning radioactive waste and fully realise the choices they face. Decisions should be based, not on emotional and irrational assertions, but on sound ethical principles, impeccable science and good economic sense. The responsibility for informing the community rests with the politicians, the media, the industry and the non government organisations.

## **6. The Global Situation Today**

What is happening globally today to encourage such a rational international approach? The Pangea Project, a UK funded commercial venture pursuing the implementation of an international repository, proved problematic. The approach was seen as too commercial. However, the environmental, ethical and economic advantages of an international repository are so clear that the concept has continued to progress. In early 2002, Arius, a non-commercial cooperative association was formed in Switzerland, with the immediate goal of helping countries with small amounts of waste to identify access routes to safe and economic geological disposal facilities. The founding organisational members of Arius were from Belgium, Bulgaria, Hungary, Italy, Japan and Switzerland. The declared mission of the new association is to promote regional and international cooperation initiatives that will contribute to optimising the safety, security and economy of storage and disposal of radioactive waste by development of shared facilities. Arius has been awarded research contracts by the European Commission for work on establishing the feasibility of shared regional repositories in the European Union. Other initiatives for regional repositories have also been launched, e.g. in Latin America. As a modest step towards facing up to its real long term responsibilities for caring properly for its own waste, Australia could participate as a potential user of an international geological repository. As a visionary step towards simultaneously providing a global environmental service AND also massively benefiting the national economy, Australia could consider being the host country for such a repository.

## **7. References**

- [1] Outhred, H., “Public Perceptions, Nuclear Power & Alternatives”, ANA 2005.
- [2] Daveron, P., “Progress with Establishment of Commonwealth Radioactive Waste Management Facility”, ANA 2005.
- [3] Industry, Science, Resources, “National Radioactive Waste Repository Site Selection Study, Phase 3”, June 1999.