



MAPW

health professionals promoting peace

Radioactive waste in Australia

What is radioactive waste?

Radioactive waste is material for which no further use is foreseen. Only the three most hazardous categories of waste require a repository: LLW (low level waste), ILW (intermediate level waste) and HLW (high level waste – generated in power reactors of which we have none in Australia).

What is the purpose of a radioactive waste dump (repository)?

To secure radioactive waste permanently and ensure the safety of people and the environment for as long as it poses a threat.

Where does the radioactive waste to be deposited in this repository come from?

The repository is designed for “low level” and “intermediate level” waste; as of 2014 a total of 4,906 cubic metres (m³).¹

- Low level waste will be the largest amount by volume with 4250m³ (87%). More than half is contaminated soil in ten thousand drums (located at Woomera) from CSIRO ore research in the 1950s and 1960s. Less than half is Lucas Heights’ reactor waste. The remainder is contaminated soil (20m³), old industrial gauges, smoke detectors, medical equipment, luminous signs and CSIRO waste and research sources.
- Material from the old Radium Hill mine site will also be sent to the repository.
- Intermediate level waste (656m³, 13%) is the most hazardous and requires the most isolation from the environment and humans. Most of it is ANSTO reactor operational waste, with much of the rest from past mineral sands processing. Much of the 100m³ of state/territory waste comes from industrial, medical and research equipment. There is a small proportion of radium legacy waste part of which was used in cancer treatments until about 1976.
- Future intermediate level waste will nearly all come from waste/spent fuel from the decommissioning the HIFAR and MOATA nuclear reactors. These were replaced by the OPAL reactor. This spent fuel has been sent to Scotland and France for reprocessing. The first returning shipment in 2015 comprised of 25 tonnes in concrete containers.

When will the repository be operational?

Who knows? The previous deadline of 2015 was missed

requiring further interim storage at Lucas Heights until a permanent repository is found.

How much medical waste will be deposited in the repository?

Less than 1% is medical waste (leftover radium and some disused sources). Most states and territories each only have a few cubic metres of low level medical waste.

Less than 1% is old medical waste.

There are broadly two areas in which radioactive material is used for medical purposes:

Nuclear scans for investigating disease. These produce the vast bulk of medical nuclear waste. This is short-lived and decays on the medical facilities’ premises until its activity is negligible. It then is disposed of safely and appropriately in the usual manner of most waste (sewers, incineration, landfill tips etc.) according to set standards.

Cancer treatment radiotherapy. Most radiotherapy uses X-rays or electromagnetic radiation which do not produce any waste at all. A very small proportion of cancer treatment actually relies on radioactive materials, which almost all decay rapidly. Longer lived sources must be returned to their (overseas) sources when used up and so do not need local disposal.

The provision of nuclear medicine services does not depend on a permanent waste repository.

What about the radioactive waste derived from the production of medical isotopes at Lucas Heights?

• Firstly, most countries import their medical isotopes and clearly do not store the waste involved in its production. Medical isotope supply is a globalised industry with five reactors supplying over 95% of the world’s supply. Australia’s domestic production of medical isotopes is a policy choice not a medical necessity.

• Secondly, Canada (the world’s biggest supplier) is switching to non-reactor isotope production, which does not create radioactive waste. This will significantly reduce Canada’s accumulation of waste. In contrast, ANSTO is proposing to dramatically increase reactor isotope production to sell to 30% of the world market. As a result Australia will



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accumulate much more waste from international isotope sales. Developing cyclotrons instead (like Canada) would eliminate radioactive waste from isotope production.

• Thirdly, as outlined above, the majority of waste requiring long term disposal is not medically related at all. ANSTO emphasizes “only 40% of low level radioactive waste” arises from its activities. But ANSTO does not just make medical isotopes; it also produces isotopes for industrial research activities, manufacture of semiconductors and analysis of minerals and samples². The contribution to waste production of medical radiopharmaceuticals has been overstated.

Although 61% of Intermediate level waste is ANSTO related, this is only 5.8% of the total waste for the repository. Furthermore, this does not include the returning reprocessed spent fuel, since ANSTO does not classify spent fuel waste. And again it would be highly misleading to attribute this predominantly to medical isotope production given the broad range of uses of the HIFAR and MOATA reactors over the last 60 years.

What will the repository look like?

The low level waste will be permanently disposed of in a shallow trench covered by 5 metres of soil with plastic and clay lining to prevent water and other materials entering. The nuclear fuel waste, which is intermediate level waste, is too hazardous to be managed in this manner, so will be placed above ground in a temporary purpose-built store³.

Is the repository a permanent management solution?

No. This is merely an interim repository for the intermediate level waste. There is no timeline set for a permanent solution. Permanent disposal of intermediate level waste requires deep geological burial. So the Commonwealth repository follows IAEA recommendations only for the low level waste (see below). It does not meet the permanent disposal needs of the intermediate level waste, and defers accountability indefinitely.

Does the repository meet world’s best practice?

The IAEA stipulates that reprocessed spent fuel comprising long-lived intermediate level waste (e.g. the waste return

ing from Scotland and France) “contains long lived radionuclides in quantities that require a high degree of isolation 3 from the biosphere”. This is typically provided by disposal in geologic formations at a depth of several hundred meters⁴. Interim storage is permitted above ground until the deep geological repository is prepared. Best practice must dictate a plan and timeline to enable this. Currently we don’t have such a plan. Interim in this case really means indefinite. **Australia’s “interim storage” designation is a stealth method of avoiding an appropriate permanent solution.**

Will the repository be suitable for storing spent nuclear fuel, say from nuclear power stations?

No. It is not even suitable for permanently disposing of the reprocessed nuclear reactor fuel we will be receiving. Just one (average) nuclear power reactor produces 3000 cubic metres of low and intermediate level waste per year plus some 30 tonnes of high level solid packed waste per year.

We are currently struggling to deal with 4000 m³ of low and intermediate level waste accumulated over 50 or 60 years. High level waste requires permanent storage in deep geological formations for several hundred thousand years.

Every year around the world 12,000 tonnes of high level waste and 130,000 m³ of low and intermediate level waste are produced from the generation of electricity from nuclear power by 438 nuclear reactors.

There is no permanent repository for high level waste anywhere in the world.

References

1. <http://www.radioactivewaste.gov.au/radioactive-waste-australia/australias-radioactive-waste> (accessed January 5, 2016)
2. http://www.ansto.gov.au/discovering_ansto/anstos_research_reactor (Accessed May 10, 2012)
3. www.ret.gov.au/resources/radioactive_waste/waste_mgt_in_aust/facility_concept/Pages/FacilityConcept.aspx
4. www.iaea.org/Publications/Factsheets/English/manradwa.html

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