Response to Nuclear Fuel Cycle Royal Commission Tentative Findings

The South Australian government and the Federal Government should not allow the importation of nuclear waste material into Australia as it has the potential to harm Australian citizens. The importation of international nuclear waste into South Australia is illegal, dangerous and costly.

The *Nuclear Waste Storage Facility (Prohibition) Act 2000* was passed "to protect the health, safety and welfare of the people of South Australia and to protect the environment in which they live by prohibiting the establishment of certain nuclear waste storage facilities in this State." As such, the Act prohibits the:

1. Construction or operation of nuclear waste storage facility
2. Importation or transportation of nuclear waste for delivery to a nuclear waste storage facility
3. 13—No public money to be used to encourage or finance construction or operation of nuclear waste storage facility Despite any other Act or law to the contrary, no public money may be appropriated, expended or advanced to any person for the purpose of encouraging or financing any activity associated with the construction or operation of a nuclear waste storage facility in this State.

Any South Australia government that attempts to change this act will be doing just the opposite ie. Harming the health, safety and welfare of the people of South Australia and damaging the environment in which they live.

The only way to ensure that the majority of South Australians are willing to accept the risks of exposure to radioactive material is to have a Referendum.

Countries that have created nuclear waste by using nuclear power will have to design and pay for the storage of their own waste in their own country. They should not be allowed to throw it over the fence and into our backyard.

I will cover some of the safety and risk issues that I, as an Australian citizen, will be exposed to if the State and Federal governments allows international nuclear waste to come to Australia.

1.Risks associated with transportation of nuclear waste (1)

The casks used to transport nuclear waste have had limited safety testing. They have only been tested to resist a drop of 9 metres. They have only been tested to resist a fire of 800 degrees for 30 minutes. Fires can reach higher temperatures and last for longer than 30min. So casks could rupture under more severe fire conditions. There has been limited puncture testing. The casks are only tested to be able to withstand 15 metres of water for eight hours and 200 metres of water for one hour.

So recovery crews only have 8 hours to retrieve a radioactive cask from the bottom of shallow waters before it starts leaking. Any cask that ends up dropping to 200 metres, or more, (anywhere on Australia's continental shelf) will not be retrievable. It will be left there to leak radioactive material into the ocean and ultimately onto the beaches where people live. Shipments of radioactive

waste will pass by Perth, The Great Barrier Reef, Brisbane, Sydney, Melbourne and Adelaide. All Australians will be affected by nuclear waste transport as an accident could happen anywhere in Australian waters. Transportation overland by rail or road is also very risky.

The importation, transport and storage of nuclear waste will result in all Australians running the risks of exposure to highly radioactive waste, so governments should not change the current laws that protect Australian citizens against this risk.

Transportation security (1)

Armed guards are not required on ships carrying high level nuclear waste so they would be vulnerable to attack.

2. Risks associated with Storage of nuclear waste above ground.

The commission suggested that 138,000 tonnes heavy metal (tHM) (high level nuclear waste spent fuel rods) and 390,000 cubic metres intermediate level nuclear waste will be stored above ground in an interim storage facility for the first 30-40years. Above ground storage of spent fuel is not safe. The radioactive material is dangerous for 100,000 + years but will be placed in containers that are only expected to last for two decades. Under current regulations, NRC licenses CSNF dry-storage systems initially for 20-year periods. (2)

There is no evidence that dry storage of spent fuel can be carried out safely for more than 15-20 years due to degradation of the storage packaging. The storage of high burn fuels could degrade packaging faster and be more dangerous. This could result in a criticality event/explosion.

The following is and extract from the *United States Nuclear Waste Technical Review Board* Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel December 2010."**Only limited references were found on the inspection and characterization of fuel in dry storage, and they all were performed on low-burnup fuel after only 15 years or less of dry storage. Insufficient information is available on high-burnup fuels to allow reliable predictions of degradation processes during extended dry storage, and no information was found on inspections conducted on high-burnup fuels to confirm the predictions that have been made.**"(2)

The commission proposes that the spent fuel be stored above ground for at least 28 years when there is no evidence that this is safe. The commission does not appear to have carried out its role to investigate and consider the safety risks involved in above ground high level spent fuel storage.

No government has been foolish enough to store a huge quantity of nuclear waste above ground at one large site. The royal commission provided no detailed description of how the nuclear waste will be stored at the above ground dump or how to secure the site. The potential for accidents such as explosions, fires, containers rupturing and the leaking of highly radioactive material into the environment is a real risk that has not been considered by the commission. It could be impossible to secure the site. It could be vulnerable to missiles or terrorist attack. There must be no storage of nuclear waste above ground in Australia.

3. Risks associated with storage of nuclear waste underground.

There are no operating underground storage facility anywhere on this planet.

In 1987 the American congress passed a bill to force Nevada to accept an underground nuclear waste dump. The dump site is located in the Yucca Mountains, 100 miles northwest of Las Vegas.

Then $8 Billion was spent digging a 5 mile exploration tunnel but the site was found to have too much ground water leaking into it. The project was shut down in 2010 (3)(4)

In 1999 America started burying nuclear waste underground at The Waste Isolation Pilot Plant (WIPP) in New Mexico, but in 2014 they had two accidents (one a fire and the other an explosion) that closed the dump.

Twenty two workers were exposed to internal radioactive contamination caused by ingesting and /or inhaling radioactive particles (5)

Radioactive material also escaped through air vents into the environment. They have not determined what caused it. (6),(7)

On October 18th 2015 there were explosions at a low level nuclear dump near Beatty USA. The explosion closed 140 miles of U.S. Highway 95. This indicates that storing even Low level nuclear waste underground may not be safe. (8)

Other countries have failed in their attempts to build safe underground storage dumps for their nuclear waste. So there is a real risk that an underground nuclear waste dump proposed by the Royal Commission cannot and will not be built. This would leave South Australia with an above ground nuclear waste dump leaking radioactive material into the environment for eternity. As a nation we must not expose our citizens to the effects of radioactive waste it is also a betrayal of future generations who will be left with this toxic legacy.

Problems with Posiva's design

The Royal Commission presented Posiva's Olkiluoto site, in Finland, as a solution for an Australian underground nuclear waste storage dump. The Olkiluoto site is experimental and is only designed to store 5500tHM under the specific conditions found in Finland. It is total nonsense to suggest that the method is transferable to Australian conditions at a scale that is large enough to store 138,000 tHM and 390,000cubic metres of other nuclear waste. Finland has been working on the project since 1983 and they are still finding problems with the design.(As identified in the commission transcripts.)

The problems were identified in the Mr. Aikas and Dr.Hantakangas transcripts to the commission. (9) and are listed here:-

Design problems noted in transcripts:-

Tunnels must be extremely smooth to avoid wear or punctures of casks

The copper must be specially made with the addition of phosphorus to make it harder

The copper must be welded shut using specially develop methods

The water moving into tunnels must be low in oxygen and sulphide /sulphate as these can corrode the copper.

Bentonite must stay in place tightly around the containers to avoid the growth of microbes that secrete sulphate/sulphite and cause copper corrosion

Special low pH concrete must be developed so that the concrete does not affect the bentonite

The structures used to seal the tunnels must be strong enough to resist the pressure of the expanding bentonite (As it absorbs water it expands). These structures are crucial but they have not

been designed and tested yet. If the seal structures fail radioactive material can escape from the tunnels.

Independent research carried out by Peter Szakalos has shown that the copper casks could disintegrate 1,000 to 10,000 times faster than SKB assumes in its safety analysis.(10)

The Posiva project is an experiment with unresolved design problems. Australian governments should not consider using unproven technology to store radioactive nuclear waste here.

Currently, the facts are:-

1.The Posiva design ,as proposed by the Royal Commission, is not suitable as it is experimental and not designed for large scale nuclear waste storage.

2.There is no proven safe method for underground storage of nuclear waste as all other attempts to store nuclear waste underground have failed.

3. The Royal Commission is suggesting that South Australia take huge amounts of radioactive waste (that is deadly for over 100,000 years) and store it above ground in containers that may only last a few decades. Then they suggest that the nuclear waste could be safely stored underground when no other country has been able to do this. Companies, lobbyists and consultants will be paid to get the nuclear waste here and dumped in the cheapest and riskiest way, above ground. There is then a very high risk that they can't start or finish an underground storage dump due to financial, geological or commercial reasons. The royal Commission stated that Operators/Companies are only liable for their insurance and assets so it would not be difficult for companies to walk away from an underground storage solution if it proved difficult or unprofitable. The radioactive waste will then be left (above ground) to leak into the environment forever. No government should allow this.

4. With regard to safety, the nuclear industry has a very poor track record.eg. Three Mile Island, Chernobyl, Fukushima. Currently, radioactive tritium is leaking from 75% of American Nuclear Power Plants. (11) (12)

The nuclear Industry has caused leaks and meltdowns around the planet so I have absolutely no trust in their capacity to deliver a safe nuclear waste storage solution. If they could do it, why haven't they done it? Especially, in countries with large amounts of nuclear waste such as America. Radioactive waste should not be brought into the country as it can't be stored safely.

Employment

The commission draft report suggested the acceptance of other countries radioactive waste would create thousands of jobs. The Posiva project (used as an example by the commission) will only provide employment for 120 people.(From royal commission transcript of Mr. Aikas and Dr.Hantakangas)(9)

Any jobs created in Australia would most likely be filled by skilled migrants and not Australians who have no industry experience.

There are many other ways to create jobs for South Australians that don't expose people to radiation and radioactive particles.

Impact on other sectors

The royal Commission said that the nuclear waste dump would have no effect on other economic sectors provided it is operated safely. It did not consider the impact if safety standards are not

followed or there is an accident. The nuclear industry has had and continues having accidents. This could be devastating for some sectors that produce a premium food and wine products that rely on South Australia's clean green image to get premium prices. For example a leak of radioactive material into the sea could destroy our fisheries and Tuna industry. A nuclear waste accident would also have a huge impact on tourism the international student sector. People would stay away. We should not risk our economy on a nuclear waste dump.

Potential loss of future mineral wealth

The Finland project specified that nuclear waste dumps must not be located in areas that provide mineral wealth. The mineral wealth should not be contaminated with radioactive waste as current and future generation will not be able to use those minerals. There is the risk that future generations (thousands of years from now) will dig into the radioactive dump if they do not know it is there. This would be a disaster for them.

The Gawler Craton appears to be the chosen site for the South Australian nuclear waste dump as it has some volcanic igneous rock and it would allow the use of existing port of Whyalla and the Trans Australian railway. This is an area that has provided huge mineral resources for the state. It has not been fully explored and has the potential to deliver future wealth for South Australia. Eg. Drilling at Carrapateena discovered large mineral deposit 6.3 Million Tonnes of copper 8.4 Million ounces of gold worth $22 Billion. www.ga.gov.au

Current and future generations of South Australians must be allowed to access their mineral resources so the nuclear waste dump must not be located in the Gawler Craton.

Health risks

Exposure to radiation and/or radioactive particles can kill within a few days or it can cause cancer and birth defects years later. After Chernobyl there was a significant increase in thyroid cancer amongst children and adolescence. The aftermath of Fukushima is expected to be an increase in cancer especially amongst children. We should not import radioactive nuclear material that could give Australians cancer, birth defects and other health problems.

What happens if there is an accident?

Radioactive particles can escape into the environment if safety procedures are not followed or there is an accident during transport or storage of radioactive waste. It can then spread over long distances by air, wind and water and then be inhaled or ingested. It then damages DNA and other cell components, causing cancer, birth defects and other health problems. The Fukushima site continually released radioactive material into the ocean from the unit that had a meltdown as the fuel is exposed to ground water.

The Royal Commission states" There may be an increased risk of thyroid cancer in more vulnerable groups in Fukushima (the most exposed workers, and infants and children in the evacuation zone)."

A recent study demonstrated a 12 fold higher risk of developing thyroid cancer among residents of Fukushima compared to the rest of Japan.(13) The International Society for Environmental Epidemiology (ISEE) sent a letter to Japanese Authorities and the World Health Organization (WHO) to make them aware of the increased Thyroid cancer risk.(14)

The Royal Commission also states that in relation to the Fukushima Daiichi accident2011 “To date, the most important health impact has been on psychological wellbeing.” This simplistic statement suggests that all their problems are just in their mind. I feel that this shows a lack of understanding of the impact of a nuclear disaster and is an insult to the Fukushima survivors.

Financial risks

Insurance cover for accidents, evacuations and compensation.

Who is held responsible for any accident?

Under the Heading INSURANCE the Royal Commission makes it clear that the Nuclear Industry (be it Power Plants, nuclear waste transport or storage) cannot obtain adequate insurance to cover nuclear accidents. The commercial insurance industry has considered the risks and damages involved in nuclear accidents and won’t provide the amount of cover needed for a nuclear/radiation accident, evacuation and compensation. The nuclear industry appears to be so dangerous that it is uninsurable.

The commission then states that beyond the limited insurance and the assets of the operator, the state and federal government would become insurers. **Australian tax payers would have to pay for any attempt to clean up a nuclear radioactive accident on land or sea.** It would also be responsible for evacuation and compensation as well as the health problems that occur because of the exposure to radioactive material. The cost of a clean-up attempt could cost of billions of dollars. A clean up may not even be possible, so Australians would have to suffer the health consequences of being exposed to uncontainable radioactive material. Plus the loss of their assets, income and health.

State and federal Governments should keep the laws put in place by previous governments to protect current and future Australians from the effects of exposure to radioactive material. These laws ban the importation of nuclear waste. Governments have an obligation to protect and not harm their citizens. As a mother, I expect our governments to protect future unborn generations from radioactive waste that will be deadly for more than a hundred thousand years.

References

(1)Nuclear fuel cycle royal commission transcript BROWN Alastair 1315-1329

(2) *United States Nuclear Waste Technical Review Board*

Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel

http://www.nwtrb.gov/reports/eds_rpt.pdf

(3)In 1987 the American congress passed a bill to force Nevada to accept an underground nuclear waste dump. $8 Billion was spent digging a 5 mile exploration tunnel but the site was found to have too much ground water leaking into it. The project was shut down in 2010. www.yuccamountain.org

(4)Why Yucca Mountain Would Fail as a Nuclear Waste Repository

(5) http://www.wipp.energy.gov/wipprecovery/protective_actions.html

(6) The New Mexico Environment Department is seeking an independent review of the incident near Carlsbad that contaminated 22 workers and shut down operations indefinitely at the nation’s only underground nuclear materials repository. It’s estimated it could cost more than $500 million to resume full operations, which could take years. www.no2wipp.org

(7) “Closure of WIPP casts long shadow” by Lauren Villagran/Journal staff writer-Las Cruces Bureau Sunday, June15th 2014 at 12.05 www.abqjournal.com

(8) ” Dump blasts feed concerns about Yucca Mountain”

By Keith Rogers Las Vegas Review-Journal Oct 27, 2015

www.reviewjournal.com

(9) Nuclear fuel cycle royal commission transcript AIKAS Timo and HAUTKANGAS Seml 1413-1440

(10) “Sweden plans first ultimate storage site for nuclear waste.” Author, Alexander Budde/ai, Editor Michael Lawton. 22.03.2011 www.dw.com

(11) Nuclear Power Plants are not safe as they are leaking radioactive material into groundwater. Massive leak at nuclear facility in New York causes 65,000% increase in radioactivity of ground water Sunday, February 14, 2016 by: David Gutierrez, staff writer

(12) PART II: AP IMPACT: Tritium leaks found at many nuke sites

By Jeff Donnbraceville,111 (AP)-Radioactive tritium has leaked from three-quarters of U.S. commercial nuclear power sites, often into groundwater from corroded, buried piping, an Associated Press investigation shows.

(13) Tsuda T et al, Thyroid Cancer Detection by Ultrasound Among Residents Ages 18 Years and Younger in Fukushima,Japan: 2011 to 2014. Epidemiology 2015 DOI: 10.1097/EDE.0000000000000385

(14) www.iseepi.org/documents/Fukushimaletter.pdf