

SUBMISSION ON TENTATIVE FINDINGS OF THE
NUCLEAR FUEL CYCLE ROYAL COMMISSION

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INTRODUCTION

Having now had the opportunity to be updated and be informed about aspects of the nuclear fuel cycle during the process that the Royal Commission has been involving itself in the first phase, I now present this submission on the Tentative Findings.

With more than 43 years experience as a professional civil/municipal engineer, and with qualifications in management and environmental management, I am able to bring a degree of objectivity and critical judgment to the discussion.

I sincerely hope my views are considered for the final report in May 2016.

TENTATIVE FINDINGS DISCUSSION

I begin with comments on some of the findings, followed by more detailed comment on the issue that tends to escape some rational thinking - Ecologically Sustainable Development (ESD).

THE ENERGY FUTURE

Finding 8 The inference here is that nuclear power would provide a “more rapid action” pathway to reach “net zero emissions ... from energy generation by 2050”. The “energy generation” statement is but one part of the whole emissions scenario, not the only part. Would not an energy future involve first and foremost energy efficiency, sequestration, and land use (agricultural) change? These are the three actions that can be implemented in the shortest time, and would be much more palatable to the general community. The IPCC has acknowledged that land use change through a reforestation and revegetation pathway can provide significant carbon sequestration potential¹, conceivably far greater than adopting a nuclear power stance.

The impact of rising energy use into the future is brought about by population increase, human lifestyle energy expansion (e.g. air conditioning), and a plethora of energy consuming goods. Greater energy demand should not be the reason to contemplate nuclear power. It might be the logical choice for a nuclear power believer, but it rejects the fundamental issue about the role of energy efficiency, the rise of micro-hubs, the potential and opportunity for businesses to generate their own electricity requirements, and the transition (that is well under way right now) of the

¹ See <http://www.nap.edu/read/18805/chapter/5>

whole energy sector in Australia that embraces all of the afore-mentioned. Large grid networks are being challenged by less conventional modes. Large scale nuclear power, or even small modular reactors, ultimately require large scale networks to spread the energy produced; reactors can not be turned down to moderate demand, so there must be a system capable of accepting constant flow. This is not energy efficient, so the relevancy of nuclear in this context must be given serious consideration..

Finding 9 This is an ambiguous finding. On the one hand it is predicated on a belief about settling policy now “for the delivery and operation of nuclear power ... to potentially contribute to a reduction in carbon emissions”, but on the other hand “it is not clear whether nuclear power would be the best choice for Australia beyond 2030”.

Maintaining nuclear power as an option for Australia is a distraction from the necessity for serious, implementable, business and agricultural solutions, and on-ground action. It makes no sense to proffer a nuclear “solution” for decarbonising the economy, when it is plain wrong for Australia. It is an abiding curiosity why nuclear is seen as a panacea for climate change action, when indeed the opposite is the case². It is unfortunate that a particular favourable stance towards nuclear energy has been adopted by the Royal Commission.

ELECTRICITY GENERATION

A selection of comments is provided.

Finding 43 Whilst there is general acceptance that nuclear power is a “low-carbon generation technology”, the use of this term can be misleading to the general public. Often this statement is made in the media and by other sources (e.g. scientists, politicians), but the fact is there are significant greenhouse gas emissions involved in the life-cycle of nuclear power³, not simply the generation side. It would have been appropriate to have explained what these are so that the public is better informed. By way of comparison, the Australian government talks about national carbon emissions, but nearly twice these emissions are exported by way of coal and gas⁴. Other greenhouse gases such as nitrous oxides and methane, are also omitted from the general public discourse on greenhouse gas emissions, as if the public should not

² See article in Institute of Electrical and Electronics Engineers (IEEE) Journal, <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6021978>

³ <http://www.wiseinternational.org/nuclear-monitor/621-622/3-nuclear-power-and-greenhouse-gas-emissions>

⁴ See article by the author at <http://www.sustainablepace.info/blog/carbon-conundrums/truth-about-carbon-emission.html>

need to know about these highly polluting gases. The true picture is concealed and therefore the Australian (and South Australian) public does not understand the global costs of Australia's fossil energy dominated economy, particularly the contributions attributed to the mining industry. This is an issue about honest accountability.

Finding 45 Again, it is curious why such a Finding would be articulated, given South Australia's present policy about attaining 50% renewables penetration by 2025⁵. Even if the remaining 50% were to be sourced from nuclear energy, it would not be economically viable as acknowledged by the Tentative Findings, and certainly not for a small state population (currently) of 1.7 million.
What would happen to the other sources of energy, such as gas power stations?
So, why express this somewhat favourable view about nuclear power?

Finding 52 This finding presents a sense of confusion. On the one hand Finding 9 states that policy needs to be settled on "the delivery and operation of nuclear power", and yet this finding states that nuclear power would not be commercially viable in SA.

Finding 55 This Finding does not make sense when state government policies are almost the opposite. See comments in Finding 45 above.

Finding 56 Comment as above.

MANAGEMENT, STORAGE AND DISPOSAL OF WASTE

This section provides the most area of interest because of the conclusions reached by the Royal Commission.

Australian Low Level and Intermediate Level Waste

Finding 64 The quantities of low level and intermediate level wastes should be revealed.

Finding 72 Viability of South Australia hosting a low level nuclear waste facility
The implication of this Finding, in concert with the federal government's proposition about a **National Radioactive Waste Management Project**, is for a single site for "hosting such a facility". As we know, six sites have been shortlisted, three in South Australia. There should be concern about a single facility; separate nations (described in Finding 67), and a number in Europe, handle their own low level waste, so this allows spreading of risk. This issue is about separate responsibility, and a similar

⁵ See <http://www.renewablessa.sa.gov.au>

argument is applicable to Australian states and territories, although it is not suggested that every one of them should have their own facility. It is notable that Western Australia does not have a nominated site, given its very large expanse of land. Nevertheless, whilst there may be an argument about economy of scale for a single site, a contrary argument is about long transportation distances to the repository, and the much higher risk that could be attributed to a single site exposed to an act of terror or war.

It is fine for a community to “consider and be informed about the hosting of such a facility”, however, from the anecdotal evidence I have gathered, including the favourable statements from land owners in South Australia, who have offered their land for this facility, there is a very low level of understanding about the complexities of this issue. Favourability tends to be transfixed on economic gain.

Now to the most contentious Findings, those concerning high level and intermediate level waste.

International Used Fuel (High Level Waste) and Intermediate Level Waste

Consider the following Findings.

Finding 80 Disposal facilities

This Finding has drawn on the experiences of Finland and Sweden. However, having read the World Nuclear Association rebuttals⁶, and the “myths and realities” about radioactive wastes, one wonders why the Royal Commission would contemplate a high level waste storage facility. It seems that the world’s nuclear waste problem has been solved, so why then construct a case for South Australian involvement.

Finding 82 “...there are no operating models for the commercial transfer of used fuel for disposal. Any proposal to store and dispose of used fuel in South Australia would require agreements between customer countries and both the federal and state government.”

Finding 83 “Used fuel is an issue of global concern (and) Australia has a direct interest ...”

Of course, as a global citizen, Australia has a vested interest in how the country receiving uranium oxide deals with the waste. But is this sufficient for “Australia (to) derive a reputational and financial benefit by assisting other countries in providing a disposal solution for used fuel.” What about the disposal of all other wastes from the processing and production of materials from all the ores and minerals that Australia exports?

⁶ See <http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-wastes/radioactive-wastes-myths-and-realities.aspx>

How about the burning of Australian coal to fire the furnaces of overseas steel mills, and to generate electricity? Should the by-product Carbon Dioxide be returned to Australia? It can never be, it is almost impossible, and yet that same gas causes so much global damage. Should Australia pay for that harm?

This Finding is fallacious, and if it is all about economic benefit, then it is time that Australia, and South Australia, shifted its insatiable quest for wealth at any cost.

Finding 84 “... it is reasonable to conclude that there would be an accessible market of sufficient size to make it viable to establish and operate a South Australian repository.”

These, and the other companion Findings in this section, convey what appears to be an extraordinary economic opportunity, but there is also an absence of detail. As the old saying goes “if it sounds too good to be true, then it is”, and so we are left with what appears to be the great panacea for South Australia’s current economic ills. Suggesting that South Australia could make a lot of money from storing high level nuclear waste is tantamount to constructing a case to support pre-determined conclusions, because, as will be described later, the whole notion does not stand up to scrutiny.

An important factor that contests the notion is competition. Why would countries transport their nuclear waste vast distances, at great cost, to be stored in South Australia, when there would be closer facilities established for less cost?

Why would high level waste be transported across the world from countries with nuclear power stations to one with no nuclear power capability?

Finding 87 The costs of dry cask storage do not seem to be indicated. The cost of establishing an area between 2.5 and 4 square kilometres would be huge, given the perceived construction requirements involved.

Finding 88 “...operating over about 100 years would be highly profitable in a range of scenarios.”

So, what happens after 100 years? The World Nuclear Association states that high level radioactive wastes take from 1,000 years to 10,000 years to decay to a “level of an equivalent amount of original mined uranium ore”⁷.

The Tentative Findings have not addressed the matter of operation and management after 100 years. This is ultimately an issue about cognition, memory, and that “we have no clear script for the future”⁸. It is coded into the human condition, and of such great

⁷ See <http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-wastes/radioactive-wastes-myths-and-realities.aspx>

⁸ The Conversation, <https://theconversation.com/three-problems-with-the-way-we-think-about-nuclear-power-42260>

importance but so little understood. This is a significant aspect that the Royal Commission has omitted to address. I will return to this matter in Social and Community Consent.

Findings 91- 95 Economic Impacts

The huge capital and operating costs of the facility have not been described adequately, and the revenue figures are dubious. Indeed, the costs are predicated on securing a "pre-commitment" (Finding 94) from a nondescript customer(s). Acknowledging that there needs to be a starting point somewhere, the Findings embark on a journey that could be likened to the results of a research paper "On the reception and detection of pseudo-profound bullshit"⁹.

This, in my view, is another deeply important issue for South Australia, political decision-makers, and business. I encourage the Royal Commission to read this research paper, and ask the question ... is what we are contemplating doing the best for the state? Other than the introductory economic measures, it is not. And so the question then needs to be asked - why did it get to this?

I will now move focus, and begin with a small dose of history.

When the South Australian colony became settled by Europeans, there was an incredible hunger for land. The colonial governments of the day had one focus - economic development, at any cost. (See the parallels with today?)

Thus, uncontrolled land clearance began the destruction of the environment that is all-pervasive today. The legacy of those many decades of environmental disruption, species extinction, habitat loss, and dispossession of the indigenous people, continues to his day. It is a major issue that has still not been reconciled.

The decisions of those early colonial, followed by post-federation, governments ignored concepts about future harm. They could not, and would not, foresee the results 150 years hence. They lived for their time, and made decisions for the short-term.

Rural South Australia is now in structural decline, mostly because of poor decisions in those early years, of over-reach in terms of natural resources use, of excess exploitation, of greed, and of inconsistent policies from state governments. Much of rural South Australia will be adversely impacted from climate change.

For evidence of these problems we need look no further than State of Environment reports, the Climate Change Adaptation Framework, numerous reports on species loss, habitat loss, and environmental degradation. I recommend the Royal Commission refer to at least the past three State of Environment reports (2003, 2008, 2013) to gain

⁹ Journal, Judgment and Decision Making, Vol. 10 No. 6, November 2015, pp 549-563
<http://journal.sjdm.org/15/15923a/jdm15923a.pdf>

an understanding of the myriad natural resources issues, and more latterly, impacts now emerging of climate change.

Thus, the same decision-making as in those colonial government days seems to be permeating the Tentative Findings of the Royal Commission. I mean no dis-respect, but it is incongruous and totally inappropriate that South Australia would contemplate condemning the state and future generations to a nuclear waste storage facility when past environmental issues and problems have still not been addressed, let alone fixed. A high level nuclear waste storage facility presents so many risks, and would ignore the future. I will return to this particular aspect later.

Indeed, such is the poor condition of the environment that it almost appears that the state government has given up. Only a small proportion of concerned citizens try to arrest any further decline and salvage what remains. It's a sad plight.

The environment is not trendy, innovation (the new buzz word) is. Funding for environmental programs continues to be hit very hard in successive state budgets.

It is as if what happened scores of years ago, 150 years ago, has no relevance today.

So, what the Royal Commission is involved in has become a moral issue first and foremost, not an economic one.

It is my intention therefore, to expose some major environmental oversights in this state that have lingered unchallenged for decades. These same oversights have permeated the Tentative Findings. Let's now consider these.

SOCIAL AND COMMUNITY CONSENT

It is acknowledged that South Australia contains about "80% of Australia's economic demonstrated resources of uranium". Production and export of uranium oxide in 2014 from the state were about 75% of Australia's mined production, with an export value of \$370 million¹⁰. South Australia has four of Australia's six approved uranium mines. Exports are to twelve countries. The direct contribution to the State coffers by way of royalties has been an average of \$11.8 million per year for the past 10 years. The royalty income is very low for such a presumably valuable metal oxide.

The Department of State Development extolls the virtues and record of supply to the world, but is a mirage. Four additional projects are under feasibility/development progress.

¹⁰ See http://www.minerals.statedevelopment.sa.gov.au/invest/mineral_commodities/uranium

The uranium mining industry is sheltered within state legislation. Indeed, the state government “openly and actively supports uranium mining”.

Does all this mean that the people of South Australia have given a social licence for the moves by the state government to “unlock the full potential of all South Australia’s uranium assets”¹¹?

If the whole South Australian community knew and understood the extent of the uranium industry in the state, and the government’s plans for it, I suspect that there would be much more dissent. It is one of those issues that I believe is out of the public eye, whether by accident or intent, albeit that there is information online. Or, perhaps people just do not care today, there is so much more of life’s travails to bear. Or maybe, just as with the decline of general environmental duty, and the convergence of economic activity to cities, the uranium issue has slipped by un-noticed.

People I have spoken to have absolutely no idea of the involvement (present and past) of South Australia in the uranium industry and nuclear power.

The Tentative Findings have not explored existing environmental legislation, so for the benefit of the Royal Commission, here is a start.

Finding 104 “...the repeal or amendment of laws...”

Perhaps the pivotal environmental act in South Australia is the **Environment Protection Act 1993**. In **Part 1 - Preliminary** it is stated at **5-Environmental harm** that ;

- (1) For the purposes of this Act, **environmental harm** is any harm, or potential harm, to the environment (of whatever degree or duration) and includes—
 - (a) an environmental nuisance; and
 - (b) anything declared by regulation (after consultation under section 5A) or by an environment protection policy to be environmental harm.
- (2) For the purposes of this Act, **potential harm** includes risk of harm and future harm.

The Act goes on to inform about **material environmental harm** or **serious environmental harm**, with the latter described thus;

- (3) (b) environmental harm is to be treated as serious environmental harm if—
 - (i) it involves actual or potential harm to the health or safety of human beings that is of a high impact or on a wide scale, or other actual or potential environmental harm (not being merely an environmental nuisance) that is of a high impact or on a wide scale

¹¹ Foreword by Tom Koutsantonis, Minister for Minerals and Energy, “The Facts about uranium mining in South Australia”, information brochure undated

Any reading of the above-mentioned clauses means that a possible nuclear waste facility would be in direct contravention of the **Environment Protection Act 1993**. Even if there is potential harm, the facility should not be contemplated. It does not matter that there are already operating uranium mines in the state. The nuclear waste storage facility would be a very different type of development. The importation and storage of nuclear waste could never comply with the **Environment Protection Act 1993**, as there would always be “potential harm” and risks of “future harm”. Furthermore, it would be impossible to declare by regulation that there would be no harm from the proposed waste storage facility.

To repeal the Environment Protection Act 1993, or to amend the Act to repeal potential nuisance sections, to allow a proposed waste storage facility, would result in South Australia having no, or terminally diluted and weak, environmental protection laws.

Furthermore, although Clause 7(4) provides exemptions for certain activities, such as petroleum exploration and wastes produced from mining and other related work, and authorised by lease or licence, there is no such exemption for a possible nuclear waste facility because South Australia has no jurisdiction over wastes emanating from international sources and which would be interred in such a facility.

- 7 (4) This Act does not apply in relation to—
- (b) wastes produced in the course of an activity (not being a prescribed activity of environmental significance) authorised by a lease or licence under the Mining Act 1971, the Petroleum Act 2000 or the Roxby Downs (Indenture Ratification) Act 1982 when produced and disposed of to land and contained within the area of the lease or licence

And it goes on.

9—Territorial and extra-territorial application of Act

- (1) This Act extends in application to the coastal waters of the State and the air above and land beneath those waters.
- (2) Where—
 - (a) a person causes a pollutant to come within the State or causes environmental harm within the State, by conduct engaged in outside the State; and
 - (b) the conduct would, if engaged in within the State, constitute a contravention of this Act, the person is liable to a penalty in respect of the contravention as if the conduct were engaged in by the person within the State.

No pollutant can be brought into the state.

Now, it might be argued that legislation can be changed, or new over-riding legislation introduced, to accommodate such a nuclear waste facility. But to change legislation to suit a particular end, one with a great potential for future harm, is fraught with danger, would be deeply divisive, and would be absolutely contrary to the main object of the Act.

10—Objects of Act

(1) The objects of this Act are—

- (a) to promote the following principles (***principles of ecologically sustainable development***):
 - (i) that the use, development and protection of the environment should be managed in a way, and at a rate, that will enable people and communities to provide for their economic, social and physical well-being and for their health and safety while—
 - (A) sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations; and
 - (B) safeguarding the life-supporting capacity of air, water, land and ecosystems; and
 - (C) avoiding, remedying or mitigating any adverse effects of activities on the environment;
 - (ii) that proper weight should be given to both long and short term economic, environmental, social and equity considerations in deciding all matters relating to environmental protection, restoration and enhancement; and
- (b) to ensure that all reasonable and practicable measures are taken to protect, restore and enhance the quality of the environment having regard to the principles of ecologically sustainable development, and—
 - (i) to prevent, reduce, minimise and, where practicable, eliminate harm to the environment—

The whole concept about importing nuclear waste from overseas is totally contrary to THE MOST IMPORTANT object of the **Environment Protection Act 1993 ... ecologically sustainable development (ESD)**.

For the benefit of the Royal Commission, these very principles were endorsed by the Council of Australian Governments in December 1992¹² and were enshrined in the **National Strategy for ESD**.

It is with great concern that successive state and national governments since 1992 have ignored their own strategy and individual laws about ESD.

Now consider the following;

“The startling possibility with respect to pseudo-profound bullshit is that people will first accept the bullshit as true (or meaningful) and, depending on downstream cognitive mechanisms such as conflict detection, either retain a default sense of meaningfulness or invoke deliberative reasoning to assess the truth (or meaningfulness) of the proposition.”¹³

I will avoid a detailed dissertation on what I perceive to be an underlying trait in the Tentative Findings, but one can not help feel a sense of disbelief. However, there will likely be a group who unquestioningly will take on board the findings and embrace them as the way to the future. The BS antenna is absent with this group.

Of course, another group will detect a whiff of odour, and an unwelcome intrusion into the serious matters of the day.

It is incomprehensible that a small state such as South Australia, population just under 1.7 million, would take on such a potentially harmful activity that could compromise existing industries. Perhaps agricultural could be at risk, maybe the wine industry, if just from reputation. The “clean and green state” image would need to be abandoned. These aspects have not been explored in the Tentative Findings.

South Australia has no responsibility at law to take back the waste (or spent) products of mined material that is processed overseas into dangerous material. Indeed, it is the antithesis of safeguarding the people. So this is not only an ethical issue; it has a precautionary principle dimension. A substantial proportion of the waste material would have come from ore sourced in other countries, so why would South Australia condemn future generations to receiving radioactive material that originates from elsewhere.

Should South Australia become the nuclear waste conscience of the world?

¹² See <http://www.environment.gov.au/about-us/esd/publications/national-esd-strategy-part1>

¹³ <http://journal.sjdm.org/15/15923a/jdm15923a.pdf>, pp 550

Other countries already have their own solutions¹⁴ to deal with high level wastes produced within their own borders, so why would South Australia step into the fray? Why would it take on such high and unquantifiable risk?

There can be just one answer - economic. And yet, that too, is questionable.

RISKS AND CHALLENGES

Previously it was mentioned about cognition and memory. I will now raise further problems about these aspects in relation to the concept of the high level nuclear waste storage. The Tentative Findings has not addressed this matter.

Finding 88 has loosely mentioned a time of 100 years. In a fascinating insight into “the triple crown of cognitive challenges” and the “problems with the way we think about nuclear power”¹⁵, the problem humans have is deep future thinking. The vast majority of us are incapable of thinking beyond our own lifetimes, so what would happen if in 100 years or so following the closure of the high level nuclear waste storage facility, there is a rapid dilution of memory, subsiding to a total absence of memory. Does this present a risk to humanity?

We can not know what the political structure would be in the far future. We can not predict how safe the world will be.

Humans contrive a future based on hope, but it is the consideration of probability that eludes many experts.

“The reason why even experts can’t rationally use probability when it comes to the future is that it would be psychologically counterproductive to do so.”¹⁶

Thus, is this the underlying strategy to the Tentative Findings?

Paraphrasing a statement in the reference in the footer of this page, thinking about a high level nuclear waste facility evokes the perfect cognitive storm of considering *probability* about *risk* in the distant *future* - three things we do not intuitively understand well.

It is far easier to write a script about the economic gain that it is to describe the immense risks.

It is just not worth it.

¹⁴ <http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-wastes/radioactive-wastes-myths-and-realities.aspx>

¹⁵ <https://theconversation.com/three-problems-with-the-way-we-think-about-nuclear-power-42260>

¹⁶ *ibid*

We need to get on with fixing past mistakes before we take on a whole new bout of risk.

Now to a final, rather alarming and equally depressing, aspect about risk.

In today's world, there is no intentionally destructive act that can not be done. Consider the Twin Towers in New York, the targeting of the Pentagon, the rapid rise of ISIS (DAESH), the destruction of Palmyra in Syria and the great sculpture of Buddha in Afghanistan. Consider the destruction of two Japanese cities - Hiroshima and Nagasaki - when atomic bombs were dropped on them in World War II. Wiped out.

Nothing is off limits.

We hear frequently from world leaders about "rogue states".

So, imagine this. A high level nuclear waste storage facility has been constructed in South Australia. It is hit with a nuclear warhead, perhaps two in succession to penetrate deep into the recesses of the storage facility.

What would be the result?

Imagine.

The final solution.

Is this the morality that South Australians want?

CONCLUSIONS

There is no moral or ethical case for South Australia to receive nuclear waste from other countries.

There are environmental and legal issues that can not be reconciled with a high/medium level nuclear waste facility.

The concept of a nuclear waste facility would result in an abrogation of long-standing agreements about ecologically sustainable development with the international community.

There is no substantive case that can be articulated about receiving high level nuclear wastes from overseas countries just because South Australia has a few uranium mines.

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