8 November 2024

Dr Ashley Clements
Inquiry Secretary
House Select Committee on Nuclear Energy
Department of the House of Representatives
PO Box 6021
Parliament House, Canberra ACT 2600

By email nuclear.reps@aph.gov.au

Dear Dr Clements,

1. Submission re: Inquiry into the consideration of nuclear power generation in Australia

1.1. Further to the establishment of the house committee inquiry into nuclear power generation in Australia I am pleased to provide this submission.

1.2. I am currently the Chief Executive Officer of ASX listed company Cauldron Energy Limited (ASX: CXU), a uranium exploration and development company with a world class uranium project located in WA.

1.3. I am providing this submission on the basis of my relevant experience across the radiological value chain which has included:

1.3.1. Experience in uranium mining; uranium being the front end of the value chain and the fuel source for nuclear energy.

1.3.2. Experiencing in the financing and M&A of existing nuclear power stations and participation in the nuclear new build process in the UK and Europe.

1.3.3. Negotiating the approvals for financing and developing Australia's first commercially operated radioactive waste repository, being the Tellus Holdings Limited owned Sandy Ridge facility in WA. I was previously the CFO of Tellus and disclose that I am still a minor shareholder.

1.4. With respect to the terms of reference, my submission is focused on subsection D (*waste management transport and storage*) and subsection M (*any other relevant matter*, where the aspects of uranium mining and the opportunities therein are relevant). I have also provided some introductory commentary on the global growth in the nuclear sector, which is relevant to understanding the scale of the opportunity in the uranium mining industry.

2. Summary

The major points of this submission can be summarised as follows:

2.1. The global nuclear industry is in a strong growth phase given its broad recognition across the globe as a clean energy source. Many countries are relying on nuclear to meet their net zero objectives.

2.2. Australia has a moral obligation to sell our uranium to our trusted allies and trading partners to support their decarbonisation efforts.

2.3. Whilst mining is largely a State matter; the Federal government can provide supporting assistance to the industry and has a role to play in helping lift the uranium mining bans currently in place in various states.

2.4. Australia already handles significant volumes of radioactive wastes and has existing infrastructure in place. Whilst new infrastructure will be required; existing systems, regulations and lessons learned can be applied.

2.5. It makes commercial sense to co-locate any future civilian waste with future AUKUS material to maximise economies of scale at the permanent disposal facility.

3. The global nuclear renaissance

3.1. Whilst still a contentious issue in Australia, nuclear energy is now recognised globally as a key technology necessary for meeting Net Zero. Momentum is building in the global nuclear industry; with the signing of the Triple Nuclear Pledge at COP28 being a demonstration of that.

3.2. The global nuclear renaissance is proceeding on the back of new advanced reactor technologies; meaning any comparison to circumstances which created previous well known nuclear accidents is no longer technically relevant, although parties opposed to nuclear energy still try and highlight these historical issues based on old or soviet technology as potential outcomes that might be possible based on next generation, western technology that might be built in Australia. These scare campaigns are clearly not based in fact, and these aspects are getting better understood by communities, although admittedly social licence in Australia is still developing;

3.3. Advanced reactor technologies also provide significant improvements over older generation reactors on key issues which were often held out to be limitation for the nuclear industry being:

3.3.1.1. Passive safety

3.3.1.2. Cooling water – various cooling systems possible including air cooled.

3.3.1.3. Advanced fuels can reduce any proliferation concerns

3.3.1.4. “Modularity” to improve constructability and improve standardisation between the fleet

3.3.1.5. Improved flexibility allowing load following and fitting in to intermittent heavy grids.

3.3.1.6. Different scales of reactors (micro, SMR, large) ensuring there is a reactor size fit for purpose.

3.4. Importantly, countries are moving ahead from merely signing up at COP 28 with real implementation plans in order to get nuclear new builds progressing. Since then, a group of the world's largest banks has committed to supporting the Triple Nuclear Pledge; an important aspect given financing has historically been held out to be a major hurdle for nuclear projects to overcome.

3.5. In addition to Government based initiatives, the "Big Tech" sector has recently significantly increased its support of nuclear energy; recognising that nuclear is critical to delivering the energy density and scale required for the next generation of data centres and AI technologies. This has included support from and commercial deals from many of the world's largest technology companies such as Microsoft, Google, Amazon, Oracle and OpenAI amongst others.

3.6. This creates a substantially increased future demand for uranium; at the same time that existing supplies will be coming off through natural depletion; and there is an international bifurcation in the market, evidence by the ban on US imports of Russian nuclear fuels; and a growing understanding in the market that much of the supply from the world's largest producer (Kazakhstan) is being funnelled directly to Russia and China.

3.7. It is uncertain how the recent success by President-Elect Trump in the US Presidential election will affect the broader industry. Trump is understood to be strongly pro-nuclear energy (whilst also being loudly anti nuclear weapons). This is expected to be positive for the US industry with potentially improved regulatory processes. With respect to uranium pricing; any near term resolution to the Russia Ukraine war may be a headwind for uranium pricing in the near term; however the broader global growth positivity may lead utilities to move from a destocking to a restocking inventory stage of the cycle; again driving further uranium demand and hence pricing.

4. The opportunity for further uranium mining in Australia

4.1. Uranium is the most energy dense source of green energy that is commercially available. Australia currently exports approx. 5,000t of uranium out of South Australia as yellowcake. ASNO has historically done a calculation showing the forgone carbon attributable to these exports, which would currently sit at approx. 200 million tonnes per annum; an extraordinary proportion (c. 45%) of Australia's total carbon emissions of 440.2Mt CO2 according to the National Greenhouse Gas Inventory Quarterly Update: March 2024. The estimate of carbon abatement is an estimate only and is based on the alternative of generation from fossil fuels (coal), as described in ASNO historic annual reports.

4.1.1. If we are serious about global decarbonisation and doing our part to help the globe, exporting more uranium could have a great impact on global decarbonisation than decarbonising our own grid.

4.1.2. This is a concept that WA Premier Roger Cook has used to justify exporting further gas from WA to our major trading partners (ie India, Indonesia). He has argued that if we sell them more gas, they will burn less coal; which is good for global decarbonisation even if WA's own emissions might go up in the process.

4.1.3. If we export uranium – and we can do that with very low emissions, uranium for coal substitution has a much greater reduction in emissions than gas for coal substitution.

4.2. We should not ignore that there is a history of early uranium mining in Australia that has left a legacy; most recently the Ranger uranium mine in the NT which is currently being rehabilitated by ERA / Rio Tinto) as well as for historical Rum Jungle site amongst others. However, whilst providing lessons to learn from; these prior issues should not be used as a basis for refusing to develop a future industry;

4.2.1. These prior projects were approved back in a time where materially different approvals conditions were provided. There is simply no way that a mine would be approved and developed today on those same conditions.

4.2.2. Improvement to historical practice is not confined to the uranium or nuclear sector – this is true across all aspects of human endeavour. We must learn from the past; improve our practices; develop different ways of doing things, and ensure a holistic plan is in place from initial development through final remediation.

4.3. Uranium is currently mined in South Australia, its able to be mined in the NT although there are no operating mines; there is one approved project in WA which was grandfathered in prior to the WA uranium mining ban (3 other projects had been approved but as of current have not reached their substantial commencement obligations which means their approvals are in a grey area), no further mining in WA is possible due to a ban, mining is also essentially banned across the rest of the states.

4.4. Large scale commercial uranium mining has been done safely in South Australia now for ~40 years. There is bipartisan support from both Labor and Liberal state political parties in South Australia for the industry; proving this does not need to be a political issue.

4.5. Of the states with bans, WA and QLD have the most opportunity for economic mining of uranium deposits. I have much more experience within the WA system so have concentrated my submission on WA however many of these aspects are likely applicable to Queensland as well.

4.6. The contention that uranium mining cannot be done safely in WA (one of the reasons used to justify a continuation of the ban) does not make sense when you consider

4.6.1. Its safely done in SA;

4.6.2. WA has a world leading mining legal structure (the WA Mining Act) which is considered the gold standard the world over. In fact, Kazakhstan, the worlds largest uranium mining jurisdiction; has just implemented a new mining law based on the WA System and the WA DEMIRS even consulted on its implementation. The WA system can handle uranium; and

4.6.3. WA already handles significant radiation through the mineral sands sector (WA minerals sands are heavy in monazite); and therefore has the largest radiation monitoring programme in Australia that can be expanded to include the uranium sector. (see para 5.2.1 for further information)

4.7. Mining is largely a state based issue. However the Federal Government can still play an important role to encourage further development of the uranium mining industry across Australia; notwithstanding the main powers with respect to minerals lie with the States. These opportunities include:

4.7.1. Placing uranium on Australia's critical minerals list; which would open up a host of federal government funding and project facilitation services opportunities for uranium projects. Given the need for both state and federal approvals for uranium mining (due to the nuclear action trigger in the EPBC Act, project facilitation services provided by a federal government agency could be extremely beneficial – such as services provided by the Critical Minerals Facilitation Office for Critical Minerals projects or indeed the Major Projects facilitation services provided by projects designated as Major Projects.

4.7.2. Designation of some of the larger uranium projects as Major Projects and hence enable Major Projects Facilitation service. Major project designation is not only driven by project size; where projects are of national strategic importance then such a designation is possible.

4.7.3. Defining a s482 visa category for highly skilled migrants in the radiation space – this may include nuclear engineering, but also uranium mining experience people, as well as other radiation trained staff. Given the heightened concern currently over immigration clearly this needs to be delicately managed; but building up our skills base across the radiation sector will be important to ensuring a successful industry.

4.7.4. Ensuring the nuclear action triggers in the EPBC are appropriate and the interaction between Federal and State approvals bodies are efficient.

4.7.5. Resource sharing between federal agencies and state agencies where appropriate and possible to improve approvals timelines, recognising that radiation competencies within the States are under resourced.

4.7.6. Federal government could work with the States to address any concerns of union bodies with respect to uranium mining. (ie better education around exposure pathways and demonstrate learnings from the Mineral Sands sector that can be applied to the uranium industry).

5. Specific opportunity with respect to WA and uranium mining

5.1. Uranium mining is currently banned in WA via an unlegislated policy of the WA Labor party.

5.2. Notwithstanding this ban; WA already is a national leader in the handling of radiation for 2 established and 1 emerging reasons:

5.2.1. WA has the largest mineral sands mining operations in the country; and those sands are relatively highly radioactive; in fact likely more radioactive than the primary uranium ores likely to be mined in WA. WA has made great progress in dealing with the risks of handling radiation (ie in the extensive Mineral Sands industry) and those lessons learned can easily be applied to a uranium industry.

5.2.2. WA already has a low level radioactive waste repository in operation, the Sandy Ridge facility owned by Tellus Holdings Ltd. This is a truly world class facility; and ensures low level radioactive wastes from across a range of different industries – from mining, oil&gas, waste2energy, hospitals and defence can all be safely isolated. This facility is able to take low level radioactive wastes from across Australia. Lessons learned from the development of this asset include:

5.2.2.1. There was a comprehensive community consultation programme run

5.2.2.2. Indigenous Land Use Agreement was executed with the traditional owners

5.2.2.3. The Sandy Ridge site met appropriate IAEA Site survey and selection criteria for relevant installations.

5.2.2.4. Full radiation safety case was developed; and gold standard peer reviewed (by Eden Environment, the company that developed the safety case for the UK national repository).

5.2.2.5. Many tried to tell us we would never get such a facility approved by the government or by the community – we did both; relatively expeditiously.

5.2.2.6. The facility is an enabler for future growth for WA – given that this critical infrastructure already exists; it can encourage additional new heavy industry into the state; knowing that the incredibly difficult and contentious issue of waste management is already sorted out.

5.2.2.7. Uranium mining does not produce higher level wastes; it would only produce low level wastes. If these wastes are not able to be managed on site (they are allowed to be managed on site in the minerals sands sector) then such wastes could easily be sent to Tellus.

5.2.3. In addition to SA, WA will be home to one of the largest concentrations of radiation capable workforces due to the establishment and growth of AUKUS; with thousands of long term jobs earmarked for Perth's southern corridor. This will greatly increase the size of the radiation qualified workforce in Perth which could logically be used to support other industries such as uranium mining.

5.3. Independent polling conducted in 2023 showed majority support from the WA public to remove the ban on uranium mining. See: https://thewest.com.au/business/mining/minerals-council-push-to-lift-wa-uranium-ban-as-surprise-poll-reveals-voter-support-for-contentious-move-c-11935899

5.4. Since this poll has been conducted in 2023; I have been very active in community and am confident that support for uranium mining has continued to grow.

5.5. Further the community is increasingly understanding the difference between uranium mining (WA state ban) and nuclear energy (federal ban), and hence its possible to overturn for example the uranium mining ban in the short term and allow that industry to flourish, whilst the federal nuclear ban issue remains unresolved or is unsuccessful.

5.6. WA can become a uranium mining export powerhouse even if Australia does not build its own reactors.

5.7. Uranium mining could bring a broad range of benefits to WA including:

5.7.1. Diversification of government royalty revenue away from iron ore; especially important given the impending production commencement at Simandou (Guinea) and expectation that over time, iron ore pricing will fall substantially.

5.7.2. New mining jobs to replace those jobs being lost in other sectors such as nickel, lithium and iron ore, all of which have shed many thousands of jobs and are continuing to do so.

5.7.3. By exporting significant volumes of green energy in the form of uranium; WA can be a responsible actor on the global stage and play its role in the global decarbonisation trend.

5.7.4. Natural support between uranium mining and the WA AUKUS industrial base.

5.7.5. The CCIWA released a report last year suggesting the impact of the WA uranium industry could be >$1bn per year and 9,000 jobs. See: https://cciwa.com/policy-submission/uranium-mining-in-western-australia/

6. Why is uranium mining important if we are talking about nuclear energy – security of supply

6.1. There is an issue with energy security and bifurcation in the global uranium market at the moment. The US has banned the import of nuclear fuels from Russia; and this also makes it difficult for Kazakhstan, the world's largest supplier, to supply the West, as many of their export routes run through St Petersburg. Additionally, Kazakhstan is under political pressure from Russia and China to directly supply them, meaning availability of pounds for the West is expected to be significantly restricted.

6.2. Our strategic trading partners are desperate for us to supply them with high ESG, western friendly uranium. Additionally, if we build our own reactors, it would be sensible to develop a domestic source of the raw fuel (ie yellowcake uranium) as well as, over time, potentially develop the intermediate steps including conversion and enrichment and fuel assembly. Australia has the capacity to be fully self sufficient in the fuel process; which is quite different to what we see in renewable energy where we are heavily reliant on China for panels, turbines and batteries.

6.3. Think globally act locally– we have an obligation in Australia to help the world achieve Net Zero by 2050. Removing the ban on uranium mining in WA and QLD will allow Australia to supply aligned countries even if Australia does not progress down the nuclear power generation pathway. Mining uranium and exporting it to our strategic partners is the highest leverage activity that we can do to help global decarbonisation. Put simply, mining of uranium is a no-brainer for Australia, especially WA and QLD where bans currently exist.

7. How does uranium mining fit in with AUKUS?

7.1. Australia is set to be the receiver of global leading nuclear submarine technology from its partners the UK and the US.

7.2. In return, being a strong and responsible partner, it is not unreasonable to expect that we would supply those same trading partners with more uranium; a raw material they are absolutely desperate for.

7.3. Indeed, under the Sapporo 5 initiative, there is even billions of dollars of funding being made available by our strategic allies (US,UK, France, Canada, Japan) to help develop western friendly, anti Russia / China nuclear fuel supply chains.

7.4. It is a lost opportunity for Australia not to be actively involved in this Sapporo 5 initiative.

7.5. Further, some of the skills base built up for AUKUS could easily be transferable across and assist the uranium industry; and vice versa. One simple demonstration of how industries support each other is that there is not one country that operates nuclear submarines that does not have a civilian nuclear industry.

8. How does existing radioactive waste infrastructure support future waste needs?

8.1. The Tellus facility is licensed to accept low level radioactive waste facility and does not accept higher level wastes.

8.2. However, the majority of radioactive waste by volume from civilian industry is indeed low level, so there is no reason to suggest that such waste could not go to the Tellus facility, as similar low level waste from various sectors already goes there.

8.3. Further, the Tellus facility did have to go through State and Federal approval processes, including a radiation safety case approval; learnings and process from which may be applied to a future higher level repository (wherever it is sited in Australia) to potentially streamline its approval.

8.4. As part of AUKUS; the Federal Government has already guaranteed that a higher level facility will be available at some time in the future in order to take the higher level wastes coming out of the AUKUS fleet.

9. How does our current handling of chemical hazardous waste inform our capability of handling radioactive wastes?

9.1. Chemical hazardous wastes are generated across almost all industries, and can vary from some mildly hazardous materials to some which are deadly to humans. Australia is one of the world's largest generators of hazardous waste per capita.

9.2. In addition to low level radioactive materials, the Tellus facility is also licenced to handle other intractable wastes (ie chemical hazardous waste). This is the best practice place in Australia to isolate these materials and can act as an aid for future industrial development; with project developers and regulators confident there is a best practice facility available to handle materials from future developments.

9.3. Many chemical hazardous wastes that are handled every day in our economy will remain chemically hazardous and toxic forever, and never decay at all.

9.4. Yet whilst chemical wastes will never decay, and some of those are extremely toxic; there is not the same concern or fear in the community around their use or their safe handling and disposal as there is for radioactive wastes. Yes, the community expects that we handle them appropriately (and the Tellus facility is a perfect example of that) but its accepted that we do it and we do it well.

9.5. Radioactive wastes, by their nature, decay over time. Some are relatively short lived (measured in seconds, minutes or hours), some medium lived (Cs-137 – 30 years, plutonium - ~80 years) whereas others can have extremely long half lives measured in the thousands of years – for example many of the Naturally Occurring Radioactive Materials or NORM, which is generated across many industries such as the oil&gas industry.

9.6. When considering the appropriate level of future monitoring that is required of any facility that disposes of or permanently isolates wastes; there are a number of different principles that are adopted:

9.6.1. Where a level of hazard of a material may decrease over time; the period of "institutional control" may be related to the period of time whereby the material may no longer be hazardous. For example (and to be clear this example does not apply to Sandy Ridge), a facility holding primarily Cs137 – one of the more common byproducts of nuclear fission; it may be appropriate for an institutional control period of 300 years, which is 10 x the half life of Cs137. As by the end of that period; the level of hazard is no longer a concern.

9.6.2. Where a level of hazard does not meaningfully change over time (ie; such as chemical hazardous waste that does not decay at all; or for longer lived radioisotopes where their half lives may be measured in thousands of years); the basis of monitoring switches not from one monitoring for a decrease in the level of hazard; instead the basis of monitoring is for there to be confidence that the level of barriers and containment are working as they should be. This generally actually leads to a shorter expected period of institutional control (such as maybe 100 years).

9.7. Best practice provides for these institutional control periods to be pre-funded to ensure those costs are covered and not a liability on future generations.

10. The economics of waste repositories

10.1. The majority of costs in developing a waste repository are independent of the volume being disposed of in it – these are costs associated with community and stakeholder engagement and approvals, and then building of the structure itself.

10.2. If a facility were to be built for the AUKUS fleet, it would sit idle for significant periods of time; as there would be relatively few instances of waste movements to site. Therefore, during these times; it would be relatively easy for civilian wastes to arrive at the site and be appropriately isolated without having to significantly impact the overall scale of the facility.

10.3. Once you have built a facility; from an economic perspective, it makes sense to dispose of more tonnes in the ground, so that you can amortise the large fixed costs over a greater amount of tonnes, to reduce the effective cost per tonne disposed. For this reason, it would make no sense to build one repository specifically for AUKUS higher level wastes and a separate facility for civilian higher level wastes.

10.4. As has previously been stated in the hearings, there may be some sensitivity to having AUKUS wastes "on the current or future Defence Estate". This does not mean this has to be the current landholdings of Defence – if suitable land or facilities are available elsewhere, that suitable land could be leased / compulsorily acquired or suchforth to ensure that it could be part of the "Future Defence Estate". Further, just because defence wastes are present, this should not preclude civilian wastes also being present; although there may be some physical separation of the wastes in the layout of a facility that could handle both types of wastes.

11. Further involvement and advocacy

11.1. I am very active calling for education in the community about the current state of the uranium mining ban in WA and its eventual reform – right now; a significant proportion of the population don't know about the ban – there is an assumption that WA is a powerhouse in mining and thinking that would apply to uranium as well. Additionally, there is some view that WA deposits are not economic to mine at current uranium prices; which is completely and utterly incorrect.

11.2. I have also been fortunate to participate in the community debate around nuclear energy in WA and broader Australia; having being asked to be the MC for a Collie community information evening recently run by a group called Nuclear for Australia, an apolitical organisation run by Will Shackel and chaired by Dr Adi Paterson; which is focused on educating the public about nuclear facts. It has been extremely rewarding to have the opportunity to answer questions of the community on nuclear energy / uranium mining and I look forward to and would welcome any further opportunity to do so.

Thank you for the opportunity to make this submission.

Yours sincerely,



Jonathan Fisher

Chief Executive Officer

Cauldron Energy Limited (ASX:CXU)