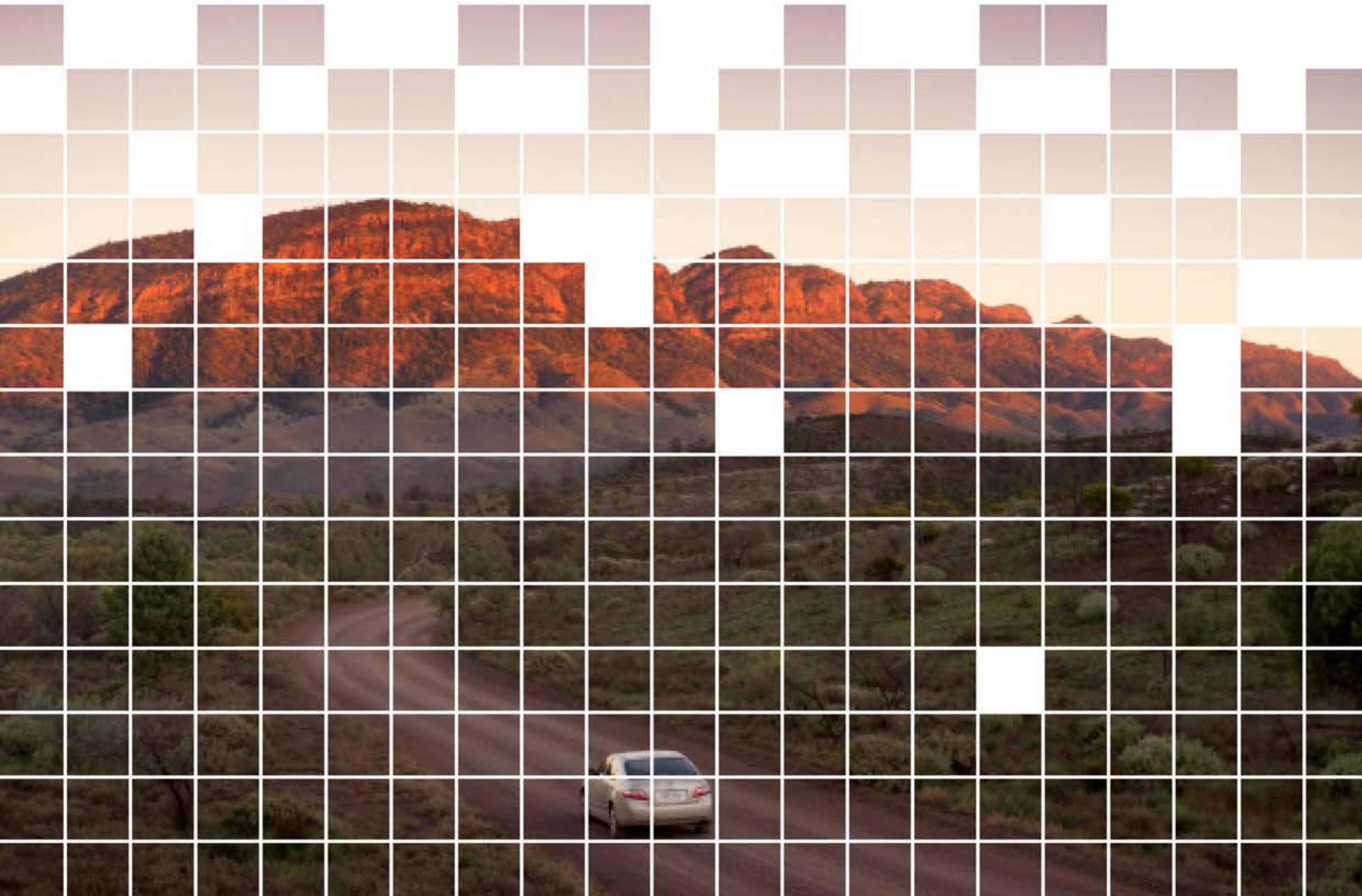
Nuclear Fuel Cycle **Royal Commission**

RESA
Unearthing Skills Solutions

Resources & Engineering Skills Alliance Submission

Authorised by: Phillip de Courcey, RESA

Drafted by: Stuart Hodge and Stephen Marlow



RESA Submission to the Nuclear Fuel Cycle Royal Commission

Contents

Notes on the structure of this report

This report seeks to discuss the workforce implications of increased involvement in the nuclear fuel cycle by the State of South Australia. Each section will discuss different aspects of the cycle and provide information for the commission pertaining to the questions raised within the issues papers issued by the commission. Line numbers are included for ease of reference.,

Chapter 1, intended for the lay reader, outlines the history of radioactive materials within South Australia and the current regulatory regime.

Chapter 2 discusses the four nuclear fuel cycle engagement scenarios presented by the commission and the workforce implications of all four.

Chapter 3 discusses the current situation with respect to skills development in the nuclear industry within Australia

Chapter 4 discusses the regional implications of increased involvement within the nuclear fuel cycle and the community engagement process that should be undertaken to build community consensus on the process

A Conclusion and a collation of specific recommendations by RESA are given at the end.

With respect to the questions posed by the Commission within the issues paper, the following table outlines sections of interest for specific questions:

Chapter/Section	Question
1	
2	
b	1.5, 1.6, 1.12
c	2.1, 2.5
d	3.6, 3.17
e	4.1, 4.4, 4.7
3	1.6, 3.10
4	1.9, 2.7, 2.14, 3.9, 4.7

Chapter 1: Introduction

a. About RESA

RESA is a not-for-profit industry development and advisory body, providing organisational and workforce development services to build capacity, capability and productivity for improvement of the resources sector and its supply chain.

An important part of RESA's mission is to understand impacts on the future workforce and play an integral part in future workforce planning: to identify, understand and forecast the future workforce needs of the resources industry and address skills, training and education gaps, taking into consideration transitioning workers, career pathways and potential changes in productivity, technology, demographics and other factors. This is the basis of RESA's submission to this Royal Commission, as part of the downstream supply chain of Uranium, any increased engagement with the global Nuclear Fuel Cycle will necessarily have an impact on size and skills within the resources workforce, potentially both, extensive and enduring.

RESA has a strong history and understanding of the South Australian resources and affiliated workforces and issues related to its development and uses a wide range of tools including:

- Project Management – RESA develops and facilitates the delivery of projects to increase the availability and productivity of the workforce, including organisational development, learning and development and training projects;
- Workforce Research and Analysis – RESA undertakes research and identifies gaps and issues impacting on productivity and effectiveness of the resources industry workforce and develops solutions to address those problems;
- Bridging - Working with businesses and government to translate policy and navigate government programs assisting industry in the adoption of government workforce development initiatives and facilitating business access to coordinated and supported solutions; and
- Brokering – RESA targets programs that reduce costs of development by applying for funding and support for organisational development projects.

The purpose of this submission, then, is to canvass the issues related to workforce, workforce management and development, and community consultation and engagement, particularly in regional areas where outcomes of increased involvement in the nuclear fuel cycle may bring the biggest impacts.

b. History of Nuclear materials production in South Australia

South Australia's history as a producer of radioactive ores dates back more than a century, with the first such production taking place at Radium Hill in 1906 (Kakoschke 2007), followed by production at Mount Painter in the Flinders Ranges in the 1930s. In both cases, the chief driver was to produce radium for medical use and South Australian radium was sold to nuclear pioneers including Ernest Rutherford and Marie Curie (World Nuclear Association 2015). Radium Hill operated for more than fifty years from 1906, most prominently between 1954 and 1961 when the associated town was populated by up to 1,100 people, before ceasing operations in 1961.

The Radium Hill discovery was accidental. Prospector Arthur John Smith believed the dark ore he found to be tin-bearing and sent samples to Adelaide University, where geologist and future Antarctic explorer Douglas Mawson identified it as containing radium and uranium (Mawson 1906). Mining ceased in 1914 and resumed in from 1923 to, until 1931. During that time a treatment plant had been built at Dry Creek. Further drilling resumed after World War II and contracts were signed with the UK and the US. The mine was officially reopened by the Governor General, Field Marshal Sir William Slim, in 1952 (World Nuclear Association 2015).

The SA Government operated the mine and built infrastructure including a rail spur to Broken Hill, an airstrip and 145 houses. Ore was transported via rail to the purpose-built Port Pirie Uranium Treatment Complex, also operated by the SA Government (McCleary 2004).

The first radioactive ores from the Mount Painter region of the Flinders Ranges were also identified by Douglas Mawson, in 1910. Various syndicates sought to exploit the deposits between 1911 and 1935 and during World War II the Commonwealth Government carried out investigations in the Mount Gee-Mount Painter area and developed what was known as the 'No. 6 Workings'. Companies including Exoil-Transoil carried out sporadic exploration during the 1950s, 1960s and 1970s but this was brought to a halt by the 'Three Mines Policy' introduced by the Commonwealth Government in the early 1980s (Drexel 1982).

Marathon Resources explored the area in the early 2000s and maintained that a JORC resource of 31,400 tonnes of U3O8 existed, which would have been the sixth largest deposit in Australia. However, their activities came to an end after they were found ultimately responsible for an environmental breach and as a result, exploration and mining in the area is now prohibited by the South Australian Arkaroola Protection Act (2012)) (Government of South Australia 2012a).

South Australia's currently operating uranium mines are Olympic Dam and Beverley with Four Mile (which processes through the Beverley plant). A third mine, Honeymoon, ceased production in 2013 and was placed in care and maintenance mode due to low uranium pricing on the world market. The main Beverley and North Beverley mines were also halted at around the same time(World Nuclear Association 2015).

The Olympic Dam deposit was discovered by Western Mining Corporation Limited (WMC) in 1975, during a search for copper deposits. It is the largest known uranium deposit in the world (Resources and Engineering Skills Alliance 2015). WMC formed a joint venture with British Petroleum Limited to evaluate the deposit in 1979 and a decision to proceed was made in 1985, with production commencing three years later.

Olympic Dam is a poly-metallic underground mine, producing copper, silver and gold as well as uranium, with copper as the primary product. BHP Billiton has owned and operated the mine since 2005 (World Nuclear Association 2015).

Federal Government approval for a substantial expansion was granted in 2011, but in 2012 BHP Billiton advised that the expansion was on hold indefinitely while it investigated a 'new and cheaper design' (Australian Broadcasting Corporation 2012).

Earliest workers at the site lived in tents and caravans and the town of Roxby Downs was built in 1987-88 to house them and their families. Roxby Downs and Olympic Dam were officially opened on 5th November, 1988. Latest estimates put Roxby's population at around 4,500 and a further 900 people work at the mine in a fly in-fly out basis(Roxby Council 2013b).

Roxby now has some third-generation residents, though it also has a high turnover of population with many people staying for only 3-5 years. The latest census figures indicate that 28% of the population had arrived in the previous 12 months. . Roxby Downs has also been judged to be South Australia's wealthiest town (CommSec; SBC News July 2012). Uncertainty about the expansion plans is cited by the Roxby Council as a limiting factor for further growth(Roxby Council 2013a).

Notwithstanding that uncertainty, the Roxby Downs and Environs Development Plan Amendment (DPA) was approved by the Minister for Planning and Gazetted on 11 October 2012(Government of South Australia 2012b).The DPA addresses the predicted demand for housing and temporary workers accommodation and the overall growth of Roxby Downs and its surrounds in anticipation of the then proposed expansion of the mine. It focuses on zone changes to make more land available for residential and industrial uses in Roxby Downs, a new village for temporary workers and a new airport, both to be developed at Hiltaba, approximately 16 kilometres east of the existing town.

The Beverley uranium deposit was discovered in 1969 by the OTP Group (Oilmin NL, Transoil NL, & Petromin NL). A draft EIS was produced in 1982 but plans to mine it by in situ leaching (ISL) were abandoned in 1983 when a newly-elected South Australian Government resolved that mining leases would not be approved. The deposit was sold to Heathgate Resources Pty Ltd, an affiliate of General Atomics of USA, in 1990(World Nuclear Association 2015).In 2008 a major mine lease extension was obtained to the north so that the lease is now contiguous with the Four Mile lease to the north and west of it. In 2013-14 Beverley and then Beverley North suspended production and all production has come from Four Mile since January 2014.

c. History of Nuclear power proposals in South Australia

In 1952, South Australian Premier Thomas Playford said he was confident that Australia's first nuclear power plant would be on the shores of Spencer Gulf, and in July of that year the site was identified as Fitzgerald Bay, between Whyalla and Port Augusta.(Whyalla News 1952)

The location was proposed again in 2007 under the then Federal Coalition Government. The proponent was Australian Nuclear Energy (ANE), formed by Robert Champion de Crespigny, Ron Walker and Hugh Morgan. The Federal Government announced the Switkowski Review into nuclear energy shortly after ANE was formed and the company revealed it was in discussion with the American company GE about building a nuclear generator in Upper Spencer Gulf. Then South Australian Premier Mike Rann strongly opposed the idea and plans for the plant were shelved(Kenny and England 2015).

d. SA - An experienced nuclear regulator

As South Australia was the first State or Territory in the Commonwealth to produce radioactive materials the State and its agencies have a long history as nuclear regulators.

South Australia hosts the world's largest uranium deposit (Olympic Dam), 80% of Australia's total uranium resources and one third of the world's known Uranium resources(McKay 2013).In 2012-13 South Australia produced 4691t of U_3O_8 which was 53% of Australia's total production.

Almost all of the Uranium mined in South Australia is sold under licence from the Commonwealth, which stipulates that it must be used in overseas nuclear power stations to generate electricity[i], with small amounts used for medical research overseas and domestically. Long-term contracts are in place with power generators in the United Kingdom, France, Sweden, Finland, Belgium, Japan, South Korea, Taiwan, Canada, the United States and Spain(Department of State Development 2013).

e. Regulatory arrangements

The mining of uranium – and any future processing or use of Uranium products – is subject to some of the most stringent regulatory requirements in Australia. Operators must comply with both State and Federal legislation and regulation, the latter of which must further meet international standards.

There are strict safety and reporting regulations safeguarding the environment and natural resources.

This extensive regulation covers exploration, development, production, exports, taxes and royalties, labour standards, occupational health, waste disposal, protection and rehabilitation of the environment, mine reclamation, mine safety, toxic and radioactive substances, security, native title and other matters. While this degree of regulatory attention naturally imposes a cost burden on the industry, it also generates a correspondingly broad range of career opportunities and community confidence and security in the process, its governance and regulation. In its simplest form, RESA's argument is that positions will need to be created and appropriately filled in the areas above to ensure the smooth introduction of a nuclear industry to the State.

RESA's key area of interest is in identifying the potential workforce impacts of a future nuclear industry in South Australia – whatever shape that may take – and in the training and educational requirements which will need to precede the development and provide it with ongoing support.

The South Australian Government supports uranium exploration and production and says it has 'streamlined the project approvals process, improving transparency and boosting industry and community confidence that regulatory processes are effective, and promoting efficiency in mining operations while effectively ensuring the safety and protection of all South Australians and the environment'(Department of State Development 2015)(Wilson 2015).

It says that the regulatory framework in place for the uranium industry is widely recognised as being effective and representing world's best practice. Specifically, the South Australian and

Commonwealth governments collaborate in ensuring compliance with the Commonwealth Environment Protection and Biodiversity Conservation Act (EPBC).

Prospective miners must submit a Program for Environmental Protection and Rehabilitation (PEPR) for State Government approval, a process which includes (in part) community engagement and consultation and incorporates environmental aspects. PEPRs are administered by the Department of State Development (DSD).

Under the current regime, DSD broadly manages the issue of licences for Uranium exploration and aspects of development, while the EPA has the major role in Uranium mine regulation and monitors mining activities. Operations that undertake the mining and milling of uranium must hold a licence from the EPA, granted under the Radiation Protection and Control Act 1982(Department of State Development 2015).

The EPA is also the responsible agency for the Radiation Protection Committee, an expert advisory body established under section 9 of the Radiation Protection and Control Act 1982.

Recommendation 1: Unification of Uranium and nuclear regulatory activities within one department

RESA recommends that in the interests of further streamlining process – without compromising any aspect of regulatory rigour – the Uranium and nuclear-related activities of DSD and the EPA can and should be brought within a single State department, with a single Minister taking overall responsibility. This department and Minister would then be charged with working with the Commonwealth to facilitate Uranium mine development and the regulation of any future nuclear industry in SA.

Such a proposal, once enacted, would be of major benefit to the industry, creating a true 'one stop shop' and further strengthening the existing Case Manager approach taken by DSD. While critics often equate streamlining with cutting corners, if managed properly the opposite should be the case as the proposed approach would ensure greater scrutiny and closer management of proposals, whilst at the same time ensuring that all legislative and regulatory requirements are adhered to and that nothing 'slips between the cracks'.

Uranium processing beyond the 'Yellowcake' stage is currently prohibited under Commonwealth legislation, specifically the Environment Protection and Biodiversity Conservation Act 1999 and any further transformation of Uranium ore requires approval under the act(Government of Australia. 1999).

If further processing were to be allowed, a new legislative and regulatory regime would need to be drafted, approved and implemented. A similar scenario would arise if a nuclear waste industry was established beyond the current scope of low-level waste management.

Chapter 2: Nuclear Fuel Cycle Engagement Scenarios

a. Employment Classifications and definitions

Any increase in Nuclear Fuel Cycle activity in South Australia will have a necessary impact on the skills base present within South Australia and to best meet this challenge it is necessary to define the different types of nuclear employees that each area will require. While a nuclear industry will require a wide variety of skills (to be explored in subsequent chapters), a useful framework applicable is the level of nuclear specific knowledge employees will require as another layer on top of existing competencies.

This model was developed by the European Commission Joint Research Centre Institute for Energy and Transport (JRC-IET) for considering the types of skill profiles needed to operate nuclear industries (Simonvska and Estorff 2012). The framework defines three categories of competency and awareness that can be used for nuclear industry employees, based upon how they primarily interact with nuclear material within their role:

Nuclear Experts are employees that work at a high level within a nuclear operation. These employees, usually professionals and subject matter experts, require strong knowledge not only of the operations in which they are involved but the physics and physical principles that underlie the operations. Nuclear Experts are expected to have a specialised training on nuclear subjects (for example, nuclear physics, and radiochemistry) and will likely have completed a university degree in the topic as a minimum.

Nuclearised staff included employees specialised in a technical area which are then specialised in the nuclear aspects in which they work. For example, a mechanical engineer who is then given additional training to support reactor operations, or a process engineer who supports fuel rod manufacture would be expected to be given additional training to support them in that role, and to have a good working knowledge of the implications that adding a nuclear element to their work would bring.

Nuclear aware staff are employees that must be aware of the nuclear systems and processes that will affect their work. An example may be an electrician that supports work in reactors- while their specific work may not include interaction with nuclear materials, they still must be aware of the processes within their nuclear area that could impinge onto their work.

The Organisation for Economic Co-operation and Development refers to these three classifications as part of a competence pyramid.

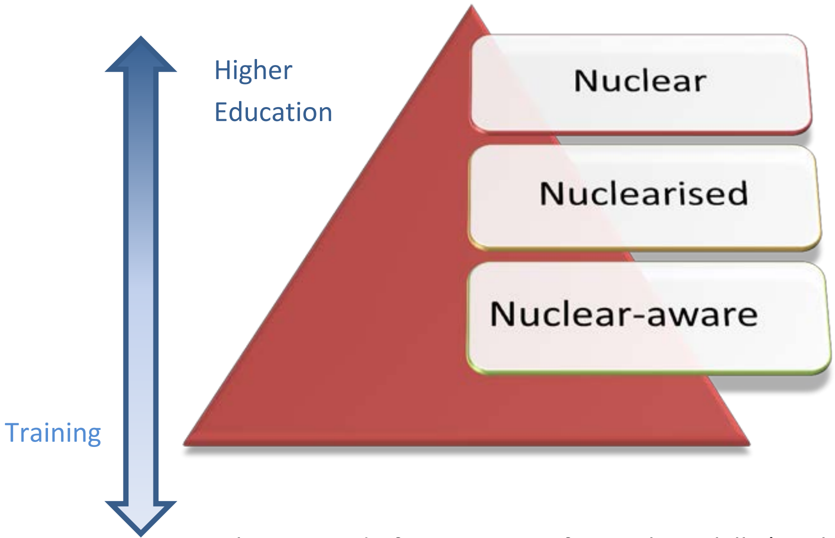


Figure 1: The Pyramid of Competence for Nuclear Skills (Nuclear Energy Agency 2012)

The Nuclear Energy Agency also draws a clear picture of how workers interact with the competence pyramid within nuclear organisations:

> *"Typically, as one moves from the base to the tip of the pyramid, the acquisition of competencies shifts from training focused on a particular job, task or set of tasks, towards education, developing more in-depth underlying principles that, when properly acquired, can be applied to a less predefined set of circumstances. Education and training, sometimes viewed as two distinct processes, are intertwined for the preparation of a competent nuclear workforce. Traditionally, vocational entrance has been associated with a stronger training component, while professional routes employ a more educative approach. Pathways are now less rigidly separated, with a necessary degree of interchange to match the development needs of employees."*
>
> -Nuclear Education and Training: From Concern to Capability (Nuclear Energy Agency 2012)

This classification system matches the tiered model used by the UK government in its recent paper Sustaining our Nuclear Skills (Department of Energy & Climate Change 2015).The remainder of this submission will refer to these three classifications in the discussion of workforce needs of each scenario.

While South Australia, because of its Uranium mining history, has the most experience in these areas, it does not have the necessary size or depth of nuclear specific workforce in these three categories to enable immediate more extensive participation in the nuclear fuel cycle. RESA has held preliminary discussions with a number of educational and training stakeholders with a view to explore the development of a nuclear education and training framework. Participants in the discussions include the University of Adelaide, the CSIRO- Mineral Resources National Research Flagship, and the Minerals Council of Australia and its Minerals Tertiary Education Council (MTEC).

University College London (UCL) will maintain a full-time campus in Adelaide until the end of 2017, after which time its programs will be delivered via arrangements with the three larger South Australian Universities. UCL has nuclear experience within the framework of its energy and resources programs, which have been successfully offered to students in Adelaide since the University was established here. It is a highly regarded international educator and is committed to the ongoing provision of PhD and other programs in the area of future energy and resources management, delivered in South Australia. UCL has made significant contributions to the nuclear debate – as well as education – since its establishment in South Australia.

RESA contends that workforce planning including, education and training pathway development, sourcing, including available international nuclear expertise in training and education, needs to take place well in advance of the commencement of design, construction and operation of any nuclear facilities and related infrastructure. This planning could be developed by an agency and implemented progressively facilitating development and delivery of programs appropriate to each of the levels from Nuclear-aware to Nuclear (Expertise) as indicated in Figure 1 above. This should lead the operational phase by as much as 10 years to create local nuclear (expertise) and experience at that level. This has become the subject of Recommendation 2: Creation of a National Nuclear Industry Skills Authority.

b. Scenario 1: Exploration, Extraction and Milling.

Examining questions

> *1.5 What would be necessary to develop new mine sites or expand existing sites? To what extent are those factors affected by the ability to extract commercial resources other than Uranium? What are the necessary factors that might stimulate an expansion in activity? What is the evidence that those factors have been relevant to an expansion in activities elsewhere?*
>
> *1.6 Does more need to be done now and in the future with factor inputs (including skills and training, research, education and infrastructure) which are relevant to decisions made to invest in new projects or to expand those that already exist? What capabilities and capacities would be required for the development of new projects? What is the evidence that any specific deficiency influences new investment? What needs to be done to address any deficiency and how would it be done?*
>
> *1.12 If an expansion of exploration or extraction activities were viable, what would the estimated benefit be expected to be directly in those sectors, in terms of economic activity? Can growth in employment relating to the extraction or milling of Uranium (alone or in conjunction with other commodities being extracted) be estimated? Is there evidence increased extraction and milling would create additional capabilities and capacities in related sectors? What are those sectors? What would their value be?*

And related matters.

South Australia is an experienced nuclear State, well-versed in the workforce requirements of Uranium mining. As an organisation focused on workforce planning and development, RESA has been involved with several plans discussing the current and projected future of the industry and is pleased to share this information with the commission.

In 2013 RESA released the South Australian Future Mining Workforce Report 2014-2030 (Resources and Engineering Skills Alliance 2013), which explored the projected changes in the mining workforce at the time. Based upon industry surveys and interviews, the report forecast skills demand for developing and/or prospective Uranium mines within South Australia over the period 2014-2030 based upon best estimates at the time. This report revealed that up to 2614 jobs associated with Uranium mining and processing could be created if these projects proceeded in line with company expectations. While several of these projects have since been placed on hold pending market factors, the skills demanded once the mining business cycle turns and these projects became operational, is not expected to greatly vary.

Table 1: Developing/prospective Uranium Mines included within the *South Australian Future Mining Workforce Report 2014-2030*

Mine/project	Company
Olympic Dam	BHP Billiton
Beverly South	Heathgate Resources
Crocker Well Uranium Project	Sinosteel PepinNini Curnamona Management
Four Mile	Heathgate Resources
Junction Dam	Marmota Energy
Samphire	UraniumSA

Under the likely scenario developed at the time, the demand profile for these projects for various occupational categories was analysed, with key skill shortages in the future identified (Figure 2 below).

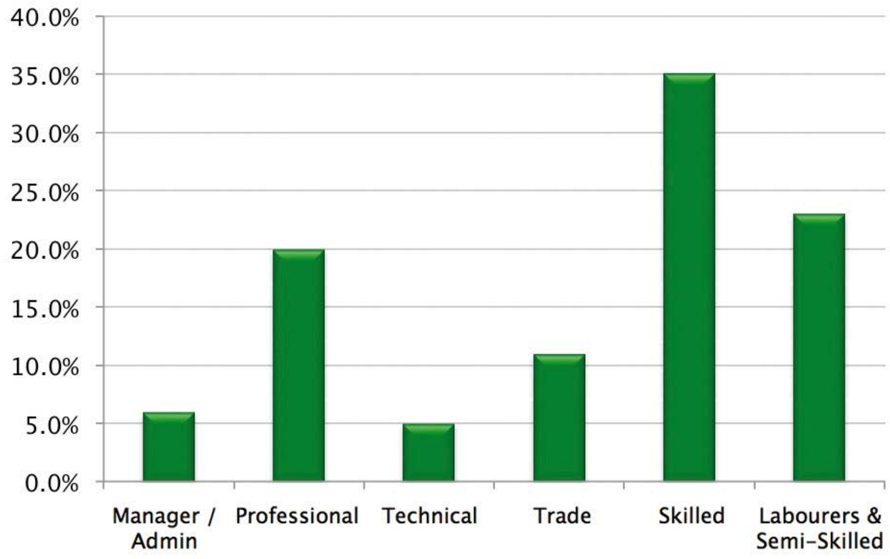


Figure 2: Occupational Structure of developing Uranium mines (Percentage composition of workforce)(Resources and Engineering Skills Alliance 2013)

From Figure 2 we can infer that Uranium mining is a highly skill-intensive process, with more than 75% of workers requiring formal on-the-job training or higher. The aggregated occupational demand identified across the 6 years in the report also indicated that many of these skill sets would be required across multiple commodities, so Uranium mining companies may be placed into competition for some of these skills in the labour market in the event of an industry uptick.

Under a scenario of increased exploration and mine development, it is anticipated that a similar skills mix would be required, necessitating a commensurate increase in skills investment to achieve production status. Any future exploration and project development in the Uranium sector is highly contingent on factors such as the Uranium price and infrastructure investment within the state, as access to key infrastructure is a major identified factor in new exploration and the establishment of new projects. This has a knock-on implication on the workforce in several related sectors, including the civil construction sector. Uranium processing also has a large power and water requirement, so access to key infrastructure in these areas is a key enabler to further production.

Of the four interest areas to the commission, the skills needs of further mining and exploration are likely the most familiar within a South Australian context. A key recommendation to support further activity within this space is for the State to continue to support the upskilling of South Australians to maximise utilisation of South Australian workers within these projects.

Recommendation 2: A comprehensive skills audit of South Australia with respect to the Nuclear Fuel Cycle

RESA recommends that a comprehensive skills study of the State is performed to assess the current level of applicable and available skills that could support increased involvement within the Nuclear Fuel Cycle. This Skills Audit study should cross industry, institutional and organisational boundaries and cover the full range of technical, academic and non-technical aspects of skills and also examine the skills pipeline over the implementation period of any increased Nuclear Fuel Cycle

activity. This study should be conducted early in the planning processes for increased activity to ensure that South Australians are skilled and equipped to maximise their opportunities in any future development of the industry.

c. Scenario 2: Further Processing and Reprocessing

Examining questions

2.1 Could the activities of conversion, enrichment, fabrication or reprocessing (or an aspect of those activities) feasibly be undertaken in South Australia? What technologies, capabilities or infrastructure would be necessary for their feasible establishment? How could any shortcomings be addressed?

2.5 Could South Australia viably increase its participation in manufacturing materials containing radioactive and nuclear substances? Why or why not? What evidence is there about this issue? What new or emerging technologies are being developed which might impact this decision?

And related matters.

As noted elsewhere, South Australia has long been part of the nuclear supply chain, shipping Uranium out in the form of "yellowcake" for further processing overseas. Current usage of that Uranium has meant that the value-adding to the original ore has been limited: further enrichment and fuel rod manufacture has generally taken place in countries of use and major enrichment capabilities lie primarily in the hands of four companies globally. The nature of this market and the integration of this supply chain gives long term certainty to generation operators and relies on multiple-year contracts with suppliers to offset capital costs, making new entry by a wholly new party from South Australia difficult. It is likely that if a facility in South Australia was established, it would be in partnership with or owned by one of these major manufacturers.

From a workforce perspective, the nature of these facilities has changed over time. A study commissioned in South Australia in the 1970s estimated that a processing centre in South Australia could employ 1,550 full time workers (Parliament of Australia 2006); a much larger and soon to be commissioned facility, the Georges Besse II plant operated by French company AREVA, will employ 450 (AREVA 2013). As with many manufacturing processes, enrichment of Uranium and fuel rod manufacture is becoming increasingly automated, which reduces the labour costs attached to the process and also minimises exposure risk for workers within the facility, however it is not unreasonable to conclude that if a new facility for enrichment and fuel rod manufacture was commissioned in South Australia a similar workforce size (450 workers) could be utilised.

As a highly automated modern manufacturing process, the establishment of processing facilities in South Australia would necessarily require a large capital investment and extensive automation fit-out and would need to be created as part of a long-term supply agreement with nuclear power operators, and the 450 workers employed by such a facility would also require training and development. As with all of the scenarios presented here, a sustained program of workforce planning is required to ensure that the workforce needs of the project can be serviced across the life of the facility.

d. Scenario 3: Electricity Generation

Examining Questions:

3.6 What are the specific models and case studies that demonstrate the best practice for the establishment and operation of new facilities for the generation of electricity from nuclear fuels? What are the less successful examples? Where have they been implemented in practice? What relevant lessons can be drawn from them if such facilities were established in South Australia?

3.17 Would the establishment of such facilities give rise to impacts on other sectors of the economy? How should they be estimated and using what information? Have such impacts been demonstrated in other economies similar to Australia?

And related matters.

RESA considers the workforce needs of electricity generation from nuclear sources as unique amongst the scenarios presented. Rather than the management of non-reacting material, this scenario has unique skilling requirements from the operation and management of active fission processes. The design, commissioning and operation of a full nuclear power reactor requires an significant investment in skills and expertise over an extended period, indeed for many years before a project to ensure a true skills pipeline is developed. This is particularly relevant for the extant electricity generation workforce currently in the Upper Spencer Gulf.

The International Atomic Energy Agency (IAEA), in its paper Workforce Planning for New Nuclear Power Programmes,(International Atomic Energy Agency 2011) outlines many of the challenges a New Nuclear Power (NNP) program requires. Without replicating the information in detail here, it is important that the commission consider several key points with regards to the development of the nuclear workforce to support electricity generation in South Australia.

The IAEA identifies a number of workforce relevant areas which an overseeing agency must consider within a new Nuclear Power Programme. In South Australia, many of these areas will have been considered at some point in the context of Uranium mining but will need to be re-examined if a power program were to be initiated. The IAEA has identified three key phases in the establishment of a new nuclear project, and the core workforce planning and infrastructure focus areas that must be addressed at each phase:

- ***Phase 1: Considerations before a decision to launch a nuclear power programme is taken;***
- ***Phase 2: Preparatory work for the construction of a nuclear power plant (NPP) after a Policy decision has been taken;***
- ***Phase 3: Activities to implement a first NPP***

Arguably, South Australia is in the precursor to any establishment of any nuclear program at this point, so must examine all of the areas within Table 2 to accurately prepare itself for any new nuclear program.

Table 2: Workforce Focus areas in the development of a New Nuclear Power program

National policy development
Nuclear safety
Management
Funding and financing
Legislative framework
Safeguards
Regulatory framework
Radiation protection
Electrical grid
Human resources development
Stakeholder involvement
Site and supporting facilities
Environmental protection
Emergency planning
Security and physical protection
Nuclear fuel cycle
Radioactive waste
Industrial involvement
Procurement

For further detail of these focus areas, refer to the original source document(International Atomic Energy Agency 2011).

RESA's view is that for South Australia to develop a New Nuclear Program (NNP), all of these areas training, education and skills, will need to be addressed. South Australia is already experienced in some of these focus areas by virtue of our experience as a long-term Uranium mining jurisdiction and regulator but, under an NNP regime, it will be necessary to extend this capability.

To appropriately contextualise these areas within South Australia, careful consideration must be given to the degree to which a South Australian NNP could be developed natively as opposed to bringing capability into the state from external sources. As an example, it is unlikely that an NNP in South Australia would seek to design and manufacture an entirely new reactor design; rather, to lower the risk and cost, it is likely that it would base a new generation capacity on buy-in of existing technology and designs and construct and operate a facility under a collaborative, partnership or JV arrangement. This has a direct implication on the degree of procurement and industrial involvement within the state and would mitigate the need for a large scale uneconomic investment in these areas, though strategies should be put in place to maximise the value captured within the State to build South Australian industry capability and high-skill, high value jobs in line with the State's economic priorities. Most of these skill areas will need to be available and applied regardless of the build model used.

In terms of employment numbers, analysis by Harker and Hirschboeck in 2010 put the average employment per MWe (Megawatt electric) of a Nuclear Power plant as .503 local jobs, which for an average plant size of 1000MWe meant 504 jobs (Harker and Hirschboeck 2010). This figure is in keeping with employment figures from other sources including the European Commission (Roelofs and Estorff 2013) and could be expected to hold true in a South Australian context. The United States industry group the Nuclear Energy Institute has also estimated a labour multiplier effect on the Local (Regional), State and National economy for the American nuclear industry (reproduced in Table 3 below)(Nuclear Energy Institute 2014).

Table 3: Impact of a 1000 MW nuclear plant on local, state and national economies(Nuclear Energy Institute 2014)

Units	Area	Effect	Output	Labour Income	Employment
Multipliers		Direct	1.00	1.00	1.00
	Local/Region	Direct + Indirect/induced	1.04	1.22	1.66
	State	Direct + Indirect/induced	1.18	1.49	2.36
	National	Direct + Indirect/induced	1.87	3.75	8.26

While these figures will necessarily vary depending upon local conditions (And, in the United States, economies of scale and local component manufacture), a multiplier effect is nonetheless expected within local communities with the establishment of any nuclear generation facility.
If we build a scenario using this data for a 1000MWe employing around 500 people and Average Annual Earning SA Nov 2014 of $69,800 (Australian Bureau of Statistics 2015) direct employment would create a total of $34.9M in direct wages incomes. Extrapolating this data into the table below gives an indication of the possible impacts, the creation of such a power generation facility could

create 830 full-time on-going jobs, with the potential to create as many as 5000 more jobs (Schmitt 2008) and opportunities for local contractors during construction phase.

Table 4: Scenario extrapolating Multiplier impacts of Table 3 into income and jobs figures.

Units	Area	Effect	Output	Labour Income	Employment
Wages		Direct	1.00	34.9M	500
	Local/Region	Direct + Indirect/induced	1.04	42.58M	830
	State	Direct + Indirect/induced	1.18	52.01M	1180
	National	Direct + Indirect/induced	1.87	130.88M	4130

An NNP will also require workforce planning on a generational timescale. As the operational life of a nuclear plant can be upwards of 50 years, the skills required to effectively manage it across all of the listed areas will need to be sustained across the operational timeline of the plant, the construction beforehand and the waste management for an extended period afterwards. To ensure this skills culture within the state and embed the expertise over a long period, a number of initiatives will need to be supported aimed towards:

- the development of STEM skills within South Australian school students, starting at an early age
- University level development of Nuclear Experts, building on capability already present within South Australian Universities
- Support for training (both through the TAFE system and private providers) for Nuclearised staff
- Increased research and collaboration with CSIRO and ANSTO to meet new research challenges generated by a NNP

Comprehensive workforce planning will need to be a core component for operators, the broader supply chain and the regulator to ensure that skills are at a required level. Workforce requirements will need to be planned with enough lead time to ensure that employees are appropriately skilled. Due to the long life of such a program it would serve South Australia best to embed this workforce plan within the State at a high level within state development plans, education policy and industrial policies. This process should be consolidated and coordinated by a single body to ensure consistency of approach.

Recommendation 3: Establishment of a National Nuclear Industry Skills Authority

RESA recommends the establishment of a National Nuclear Industry Skills Authority to be established in South Australia and charged with the responsibility of ensuring that the appropriate skilled, trained, educated and experienced personnel are available. While this recommendation falls under Scenario 3, it relates to, and is important in all scenarios associated with the development of a nuclear industry in South Australia. To be effective this Authority must be established early in the planning cycle to ensure that it has sufficient lead time throughout the 20-30 year development and build period and into operation of a new facility and across the entire operational time of the facilities, to ensure that appropriately skilled staff are available. This

Authority should contain representatives from industry, skills bodies, universities, research institutions and the vocational educational sector to best cover the breadth of skills a NNP will draw upon, and will lead the coordination and facilitation of nuclear skills and nuclear workforce planning nationally.

Various other nuclear operators have spoken of a "lost generation" of nuclear skills (Westall 2010) as workforce plans were poorly conceived and executed, with the result being an aged current nuclear workforce with poor succession planning leading to skills gaps. The magnitude of these skill gaps is quite high, with the United States Nuclear Energy Institute estimating 26,000 roles needing to be filled in the ten years from 2008 in existing facilities alone (Schmitt 2008). The UK government expects demand of up to 5,000 workers to build each new reactor within that country to combat attrition over the build program, a massive skills impost that will require significant investment by the government to manage. To successfully implement any program within South Australia, a shortfall in skills to support a power generation project across a small population is a major risk factor that must be carefully considered and managed. A Nuclear Industry Skills Authority would ensure that the skills needs of the industry are monitored and met for a long period of time and that the industry in South Australia would never encounter a "lost generation" of its own.

e. Scenario 4: Waste Management

Examining Questions:

4.1 Are the physical conditions in South Australia, including its geology, suitable for the establishment and operation of facilities to store or dispose of intermediate or high level waste either temporarily or permanently? What are the relevant conditions? What is the evidence that suggests those conditions are suitable or not? What requires further investigation now and in the future?

4.4 What sorts of mechanisms would need to be established to fund the costs associated with the future storage or disposal of either Australian or international nuclear or radioactive wastes? Are there relevant models in operation which should be considered? What mechanisms need to be put in place to increase the likelihood that the South Australian community, and relevant parts of it, derive a benefit from that activity?

4.7 What are the processes that would need to be undertaken to build confidence in the community generally, or specific communities, in the design, establishment and operation of such facilities?

Waste management is a key component of nuclear programs, with the wastes produced from generation, processing and mining each requiring specific management plans.

From a workforce perspective, the requirements of waste management depend greatly upon the method of storage used. Worldwide, there are two main types of storage: Above ground, "temporary" storage and deep geological storage, both of which have some unique requirements as well as shared skill sets that could apply in either scenario. For the purposes of this discussion, we will assume that we are examining either scenario as a centralised waste repository independent of the source of the waste: While low-level waste has historically been stored on-site at the generation source in Australia, it is conceivable that a central facility (or facilities) is established to contain the waste produced either across the state or the country (in line with efforts from the Federal Department of Industry to establish such a facility). Previous State Government storage has occurred at Radium Hill and is still managed by the Department of State Development (McLeary 2004)

In 2013 the Federal Government commissioned a report from Spanish design company Enresa detailing a generic design for co-located storage facilities for low-level and intermediate level waste (de Gregorio, Bajos, and Lopez 2013). This design would be suitable for current Australian-generated low level wastes (sourced from medical and research facilities) as well as the intermediate level wastes generated by the Lucas Heights research reactor. This above ground/near surface facility would be designed based upon a 300 year timeline, in line with established half-lives of isotopes, which places facilities and facility management within the lifespan of a physical building. While the report does not canvass workforce plans, it is anticipated that this facility would primarily be comprised of nuclearised technical staff.

A second scenario would be for South Australia to develop a capability for the storage of high level waste from other countries as well as waste generated by a domestic NNP. . This option has been canvassed and would have major workforce implications in terms of size, though many of the skills required would overlap with other storage options. The storage of high-level nuclear wastes, as classified by the Australian Radiation Protection and Nuclear Safety Agency, requires stringent safety measures to safely store waste for extended periods(Australian Radiation Protection and Nuclear Safety Agency 2010), and would require the construction of geological-level facilities within a stable region of the state.

South Australia is uniquely suitable for such a development. The State is home to older rock types, not impacted by ground water and tectonically inactive, providing ideal geological disposal opportunities. Add to this, the voids created from mines that are currently operating in these rock types could be considered for safe extreme-term disposal. It is envisaged that the safe storage of nuclear waste could simply be integrated as an additional stage within the mine production and rehabilitation cycle. South Australian Universities are already proficient in several complementary areas including the characterisation of rock masses for storage and complementary capabilities in materials science, fluid dynamics and mineral processing put South Australia in a strong position to be able to meet the demands of a storage facility.

A model facility for this approach would be the Onkalo facility, in Finland. Designed to stor high level wastes from the Olkiluoto nuclear plant (among others), the Onkalo facility will, when commissioned, house 100 years' worth of Finnish waste for an estimated 10,000 years. Onkalo is managed by Finnish company Posiva Oy, specially established for the purpose. While still under construction, Posiva directly employs 117 people (Posiva Oy 2014) and a number of subcontractors. It is expected that a similar facility within South Australia would have a similar organisational footprint during the construction phase, with the final numbers depending on the capacity of the facility.

For both scenarios, key components include logistics and security for transporting waste from the site of creation to the storage facility. If Australia followed the example of other countries, waste would be stored in large concrete cylinders for transport via road or rail (with tonnage varying depending on shipment method).

From a workforce perspective, this will require the development of specialised nuclearised staff in a logistics capacity to ensure safe loading, transport and unloading of material. Depending on the location of the facility, specialised port areas may be required to receive higher level waste and the commensurate security and emergency management teams will need to be trained and equipped to International standards.

As part of a business model based around the storage of high level waste from overseas, specialised loading and unloading facilities would be required. This would need significant capital investment (though this could be offset through partnership with prospective client states) and the location of geologically stable sites, some studies identify within South Australia. The specific nature of storage facilities (especially geological storage) will depend on the scale of the facilities, but will require nuclear experts to design and manage construction, while nuclearised staff may be needed for other frontline construction roles. Management of the wastes contained within a deep storage facility (similar in design to the Onkalo facility in Finland) would require a sophisticated understanding of the geology of the site and modelling of its long-term prospects, as well as ongoing monitoring and engineering to ensure the integrity of the facility and the specific storage methods. Capability to undertake this modelling and monitoring is strongly present within South Australian universities at present, and RESA recommends the State Government should support and develop this capability as part of any proposed further involvement within the nuclear fuel cycle.

As for the generation scenario, the skills to manage a waste program must be embedded within South Australia. Given the timescales of high level radioactive waste decay, it is not feasible to plan workforce for the life of the management program, but it should be coordinated for at least the material life of the facility with ongoing revision and re-evaluation of both the storage method and the workforce supporting it as a core feature of the entire program.

Chapter 3: Current education and training programs

Examining Questions:

1.6 Does more need to be done now and in the future with factor inputs (including skills and training, research, education and infrastructure) which are relevant to decisions made to invest in new projects or to expand those that already exist? What capabilities and capacities would be required for the development of new projects? What is the evidence that any specific deficiency influences new investment? What needs to be done to address any deficiency and how would it be done?

3.10 If a facility to generate electricity from nuclear fuels was established in South Australia, what regulatory regime to address safety would need to be established? What are the best examples of those regimes? What can be drawn from them?

And related matters.

There is some capacity to address the training needs of Nuclear Experts, Nuclearised Staff and Nuclear Aware staff within the current national competency framework and Post Graduate training sectors. Further investigation is recommended to ascertain the relevance of these qualifications and establish the capacity of providers to meet the increase in demand for skills and expertise that would result from these projects.

The Post Graduate programs currently available include:

- Master of Engineering Science - Nuclear, University of NSW
- Nuclear and Radiation Physics - Adelaide University
- Nuclear Physics – University of Sydney
- Master of Nuclear Science – Australian National University
- Nuclear Materials, Radiation, Processes and Policy – University of South Australia

In correspondence with RESA, Adelaide University in particular cited a number of complementary capabilities in nuclear science and engineering, including :

- Radiation protection and management (including education provision)
- Radiation monitoring
- Nuclear Physics
- Nuclear Chemistry
- Materials and particle science and engineering
- Uranium mining
- Environmental impact assessment of mining projects.
- Characterisation of rock masses for the safe storage of radioactive wastes
- Radioactive waste packing for optimal long-term storage

This strong capability (outlined in the submission by the Institute for Minerals and Energy Research to this commission) suggests that South Australia has a strong resident capability in these areas and that the university would be well placed to support the increased development of new nuclear experts. Similarly, the local presence of the University College London (UCL) supports the development of nuclear skills. UCL has nuclear experience in the United Kingdom within the framework of its energy and resources programs, and these programs have been successfully offered to students in Adelaide since the University was established here. UCL has supported PhD and other programs in the area of future energy and resources management, delivered in South Australia, and has been a contributor to the public debate about nuclear issues within the state since establishment.

Within the Vocational Education and Training framework nationally accredited courses, units of competency and skill sets have been endorsed however they are not all available as there are no training providers approved to deliver them.

Table 5 provides a summary of the currently endorsed vocational training available:

Table 5: Current endorsed vocational education units within Australia

Units of Competency
PSPRAD302 - Consign radioactive material PSPRAD303 - Handle and transport radioactive material PSPRAD202 - Work safely with radioactive ores and minerals PSPRAD710A - Apply radiation safety knowledge to develop and implement ionising radiation management plans PSPRAD708A - Coordinate radiation safety PSPRAD401 - Monitor radiation PSPRAD301 - Perform basic radiation measurements PSPRAD709A - Select, commission and maintain radiation measuring instruments PSPRAD201 - Work safely in a radiation environment PSPRAD304 - Work safely with radiation-sealed source equipment DEFOH007B - Apply ionising radiation safety procedures DEFOH003B - Identify and monitor radiation hazards DEFOH005B - Apply radio frequency radiation safety procedures DEFOH008B - Develop ionising radiation safety plans DEFOH006B - Develop radio frequency radiation safety plans MSL943001A - Work safely with instruments that emit ionising radiation MEM13013B - Work safely with ionizing radiation
Qualification
PSP80212 Graduate Certificate in Radiation Safety
Skill Sets
Radiation Environment Safety Skill Set PSPRAD201 Work safely in a radiation environment Radiation Sealed Sources Skills Set PSPRAD301 Perform basic radiation measurements PSPRAD303 Handle and transport radioactive material PSPRAD304 Work safety with radiation-sealed source equipment Radiation Technician Safety Skill Set PSPRAD301 Perform basic radiation measurements PSPRAD303 Handle and transport radioactive material PSPRAD304 Work safety with radiation-sealed source equipment PSPRAD401 Monitor radiation PUAWER009B Participate as a member of a workplace emergency initial response team

It will be necessary to build the capacity of Registered Training Organisations (RTOs) for delivery of this training, as there may be additional competency requirements for persons working in Reprocessing and Electricity Generation. This would be a key role of the Nuclear Industry Skills Authority proposed earlier in this submission. A full task analysis and workforce profile will necessarily be dependent on the specific involvement within the nuclear fuel cycle.

As previously indicated, the skills required for operations involved in extraction, milling, transport and waste management are largely addressed through existing training packages such as the Resources and Infrastructure (RII), Transport and Logistics (TLI) and Public Safety (PUA) training packages.

Internationally, there is a range of industry specialist organisations providing training programs and professional development services to build capacity in the nuclear energy sector. To best meet the nuclear skills challenges, the State should look to international regulators with similar training systems as a model for Australia. The Canadian Nuclear Safety Commission is a strong example of a regulator with a strong standard applied to vocational skills, with standards set down by the Canadian Standards Association for the certification of operators within radiation sensitive roles(CSA Group 2015). South Australia should look to harmonise comprehensive standards for vocational roles to make accreditation compatible with other regimes. A Nuclear Industry Skills Authority would be the best mechanism to achieve this.

To develop the skills needed to increase participation within the Nuclear Fuel Cycle, a focus on precursor education at the primary and secondary school level will also be required. A Nuclear industry is heavily reliant on science, technology, engineering and mathematics (STEM) skills being developed from a young age, in order to support skills across the competence pyramid. To support STEM skills for the Nuclear industry, a specific school based Nuclear Technology program is recommended. This program could draw material from educational initiatives within other nuclear nations, such as the work done through the Nuclear Industry Association and the Smallpeice Trust in the United Kingdom(Nuclear Industry Association 2015).

Recommendation 4: The State develops and supports a school-based program to increase the level of nuclear focused STEM education

RESA recommends the establishment of a school-based program to support the development of STEM skills for the nuclear industry. This program, modelled on leading programs internationally and programs already within the State, should support the development pathways into the future nuclear workforce and the development of a more highly skilled workforce for South Australia.

A model for this program is the Advanced Technology Program currently on-going within South Australia. Facilitated by the Department of Education and Child Development and with support from industry and industry associations and the Commonwealth Department of Defence, the Advanced Technology Program has provided resources and activities to support teachers and students in STEM education with great success. A recent evaluation of the program by Flinders University (Martin Westwell and Kristin Vonney 2014)highlighted the increased engagement of students within participating schools with outside providers such as universities and industry groups, and increased demand for programs leading to the design of new STEM focused courses within the South Australian curriculum. A Nuclear Fuel Cycle focused program could have a similar impact on schools and ensure that the STEM skills needed for the future are realised.

Chapter 4 Regional implications and community engagement

Examining Questions

1.9 Are the existing arrangements for addressing the interaction between the interests of exploration and extraction activities and other groups with interests such as landowners and native title holders suitable to manage an expansion in exploration or extraction activities? Why? If they are not suitable, what needs to be done?

2.7 What are the processes that would need to be undertaken to build confidence in the community generally, or specific communities, in the design, establishment and operation of such facilities?

2.14 Would South Australia's establishment and operation of such facilities give rise to impacts on other sectors of the economy? What would those impacts be? How should they be estimated and what information should be used? Have such impacts been demonstrated in other economies similar to South Australia?

3.9 What are the lessons to be learned from accidents, such as that at Fukushima, in relation to the possible establishment of any proposed nuclear facility to generate electricity in South Australia? Have those demonstrated risks and other known safety risks associated with the operation of nuclear plants been addressed? How and by what means? What are the processes that would need to be undertaken to build confidence in the community generally, or specific communities, in the design, establishment and operation of such facilities?

4.7 What are the processes that would need to be undertaken to build confidence in the community generally, or specific communities, in the design, establishment and operation of such facilities?

And related matters

Regional implications

The regional implications of a future nuclear industry in South Australia can be referenced within the context of the 10-point economic priority plan released by Premier Jay Weatherill in August 2014. Those 10 points are:

1. Unlocking the full potential of SA's resources, energy and renewable assets.
2. Premium food and wine produced in our clean environment and exported to the world.
3. A globally recognised leader in health research, ageing and related services and products.

4. The Knowledge State - attracting a diverse student body and commercialising our research.
5. South Australia - a growing destination choice for international and domestic travellers.
6. Growth through innovation.
7. South Australia- the best place to do business
8. Adelaide, the heart of the vibrant state.
9. Promoting SA's international connections and engagement
10. South Australia's small businesses have access to capital and global markets.

Of these, points 1, 4, 6, 7 and 9 have direct relevance to, and support, the establishment of a nuclear industry in the State.

Given the placement of Uranium mines within currently entirely within the North of the State, the majority of the mining and processing workforce should be located close to the regional sites, with the regulatory agencies likely to be more centralised around Adelaide with specialised officers on site.

RESA holds a view that regional SA must be given the opportunity to share the administrative, technical and scientific positions which would arise from any expansion of the nuclear industry in the State. RESA believes that regional hubs, in particular the Upper Spencer Gulf (USG), are ideally placed to take on this role:

- The USG as a whole has traditionally been a mining/energy powerhouse and while its fortunes have ebbed and waned over the decades, there is a culture and history of close involvement in these industries and their support facilities.
- Port Augusta needs job creation which a nuclear industry could bring, after the power stations close.
- Port Pirie has an historical connection with the nuclear industry as the site of the State's first processing plant.
- Whyalla is the major northern regional port and a gateway to the markets of North Asia and beyond.
- The USG has existing under-utilised education and training infrastructure facilities (including TAFE) and a long-term culture of tertiary training and apprenticeships.
- Any South Australian expansion into the nuclear cycle will create additional infrastructure requirements in the transport sector via road, rail and port developments.

Over the longer term if all scenarios were to be acted upon direct employment outcomes of an NNP may approach the total of 3681 direct new jobs (Table 6 below) with significant indirect and multiplier effects.

Table 6: Total potential roles projected across all fuel cycle engagement scenarios

Increased Exploration and Extraction	Further processing and reprocessing	Electricity Generation	Waste Management	Total
2614[1]	450[2]	500[3]	117[4]	3681

It is expected that the USG and regional communities would be significant beneficiaries of this job creation and would experience multiplier effects on the local economy similar to the effects cited by the Nuclear Energy Institute in Chapter Two.

A comprehensive analysis of these needs can only be undertaken once the nature and scope of a nuclear development is determined.

Recommendation 5: A regional workforce plan is developed for increased involvement in the Nuclear Fuel Cycle in the Upper Spencer Gulf

RESA recommends that if the determination of the commission is for increased involvement in the Nuclear Fuel Cycle, the State should develop a regional workforce plan for this involvement based in the Upper Spencer Gulf region. As a region with historical linkages and comparative advantages for involvement within the Nuclear Fuel Cycle, the Upper Spencer Gulf should be positioned as a natural source for workers for new Nuclear Fuel Cycle projects, and a plan to realise this ambition should be created.

The USG as a whole has traditionally been a mining/energy powerhouse and while its fortunes have ebbed and waned over the decades, there is a culture and history of close involvement in these industries and their support facilities.

Further north and inland, Coober Pedy has extensive mining history and experience and is well located to act as a regional inland hub for any expansion of the nuclear industry via expanded mining or remote area storage. A number of possible commercially viable mining sites have already been identified and further exploration would be encouraged as a domestic nuclear industry progressed.

As is noted elsewhere in this submission, RESA's interest in any such development is focused on workforce numbers and training. Given the relative dearth of nuclear activities within Australia, as a country we do not currently possess sufficient numbers of appropriately trained, skilled and experienced scientific and technical officers to develop a nuclear industry without significant investment in workforce development. To achieve the required workforce for any waste management, processing or generation capabilities, expertise must be resident in country and embedded within the Australian workforce and the normal mining cycle. While skilled migration can assist with achieving this goal, the training of Australian workers is the best way to achieve this capability in the long term.

[1] See line 376 in this document
[2] See line 450 in this document
[3] See line 533 in this document
[4] See line 669 in this document

It is important to qualify as well as quantify the nature of the workforce which a nuclear industry would require.

The specific workforce numbers are contingent on the projects that are proposed and must be assessed as part of the workforce planning process, but the nature of the work and therefore the skills required can be predicted with reasonable accuracy. As a predominantly new industry for the state, the result would be the creation of new roles in both the public and private sectors.

In the public sector there will need to be additions to the numbers of suitably qualified regulators within both the EPA and related agencies. The State and Federal Governments will also require policy makers and people who can work alongside communities and other stakeholders in a community engagement role.

The regional importance of this goes beyond a ‘shot in the arm’ for the local economy: new business keeps young people living in what would otherwise be struggling communities and attracts additional new population. The positive consequential impacts are not limited to the economic: it means more players at the football and netball club, more students in the local school, and more service support to the community.

In summary the regional workforce implications are that there will need to be provision for training new people into the workforce to take new career opportunities; existing workers and those made redundant from industries which are being phased out will need facilities for re-training into the new workforce (and these facilities can make user of under-utilised training infrastructure in centres such as Whyalla and Coober Pedy); there will need to be more skilled and unskilled migration to the regions; and there will be positive implications to breathe new life into regional schools, University and TAFE campuses.

Community engagement and relations

Speaking at a CEDA special event luncheon in Adelaide on 12 March 2015, Dr. John Soderbaum, Executive Director and Director of Science and Technology at ACIL Allen Consulting, encapsulated the importance of this issue when he said that the biggest challenge in establishing a nuclear industry in SA will be to bring the public along.

At the same event, Professor Nobumasa Akiyama, Associate Professor, Graduate School of International Law, Hitotubashi University (Japan), speaking in the context of the Fukushima incident, emphasised the importance of ensuring that the community understands the risks involved in the nuclear industry. He said that the ‘future cost can be far higher if you get it wrong and everything is not understood’.

These views were further echoed by Dr Tim Stone of University College London and a former Head of the Office for Nuclear Development (UK) who advised that the engagement process should be open, with public meetings and all regulator reports made public.

A proposal for the establishment of a nuclear industry in SA, whatever its size and shape, is quite different from a proposal to set up any other industry. The nuclear industry carries with it sizeable baggage, not the least of which is the very strong opposition to waste management taken by a forerunner of the current State Government.

Recommendation 6: Comprehensive public and stakeholder engagement process

RESA recommends that once the recommendations of the commission have been made and the South Australian Government has decided upon the policy position and which of the recommendations are to be acted upon, a pro-active public and stakeholder engagement process must be extensive and transparent. This process must be organised in such a way as to ensure that communities that will be impacted by any increased activity in the Nuclear Fuel Cycle are confident in the outcomes. RESA recommends a progressive program of education, conversation and engagement with affected regions to ensure the social and economic benefits of increased involvement are understood and realised, and that affected regions are confident that the process has taken their views into consideration.

Conclusion

South Australia has been a nuclear state for over 100 years, from a time where the effects of radiation were first being quantified until now, where the global nuclear industry operates on mature technologies and processes across the entire nuclear fuel cycle.

An increased involvement with the Nuclear Fuel Cycle within South Australia, regardless of the manner in which it is achieved, will have an implication on the workforce within the State. The jobs and employment benefit of increased involvement is notable, but this workforce must be appropriately skilled to best manage the challenges that increased involvement will bring.

If the decision is made to proceed down this path, the skills and culture behind the safe management of nuclear fuel cycle products must be institutionally embedded at all levels within the State. We must be a modern, considered regulator, and must have a workforce that has been provided with the knowledge and skills to sustainably manage nuclear fuel cycle products in any capacity with which we are involved. This is achievable, but requires a strongly coordinated approach across all levels of South Australian and Australian society to bring into action. RESA believes it has the capacity and skills to support the planning and development of this future workforce and would wish to be strongly involved in the process.

We also must consider, as a State, how we best engage with the community and realise the benefits of increased involvement with the nuclear fuel cycle across the whole state. Regional areas within the state are strong candidates for the siting of nuclear fuel cycle related facilities, and we must ensure that those areas are able to reap the benefits.

Summary of Recommendations

Recommendation 1: Unification of Uranium and nuclear regulatory activities within one department

RESA recommends that in the interests of further streamlining process – without compromising any aspect of regulatory rigour – the Uranium and nuclear-related activities of DSD and the EPA can and should be brought within a single State department, with a single Minister taking overall responsibility. This department and Minister would then be charged with working with the Commonwealth to facilitate Uranium mine development and the regulation of any future nuclear industry in SA.

Recommendation 2: A comprehensive skills audit of South Australia with respect to the Nuclear Fuel Cycle

RESA recommends that a comprehensive skills study of the State is performed to assess the current level of applicable and available skills that could support increased involvement within the Nuclear Fuel Cycle. This Skills Audit study should cross industry, institutional and organisational boundaries and cover the full range of technical, academic and non-technical aspects of skills and also examine the skills pipeline over the implementation period of any increased Nuclear Fuel Cycle activity. This study should be conducted early in the planning processes for increased activity to ensure that South Australians are skilled and equipped to maximise their opportunities in any future development of the industry.

Recommendation 3: Establishment of a National Nuclear Industry Skills Authority

RESA recommends the establishment of a National Nuclear Industry Skills Authority to be established in South Australia and charged with the responsibility of ensuring that the appropriate skilled, trained, educated and experienced personnel are available. While this recommendation falls under Scenario 3, it relates to, and is important in all scenarios associated with the development of a nuclear industry in South Australia. To be effective this Authority must be established early in the planning cycle to ensure that it has sufficient lead time throughout the 20-30 year development and build period and into operation of a new facility and across the entire operational time of the facilities, to ensure that appropriately skilled staff are available. This Authority should contain representatives from industry, skills bodies, universities, research institutions and the vocational educational sector to best cover the breadth of skills a NNP will draw upon, and will lead the coordination and facilitation of nuclear skills and nuclear workforce planning nationally.

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